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The University of California, Davis will provide assistance to the visually impaired regarding the information contained in this catalog. Questions should be directed to the office or department concerned.

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ADDRESS DIRECTORY

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

Office of the Chancellor
Mrak Hall
916-752-2065

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

College of Engineering
2132 Balner Hall
916-752-0553

College of Letters and Science
150 Mrak Hall
916-752-0392

Graduate Division
252 Mrak Hall
916-752-0650

School of Law
1011 King Hall
916-752-0243

Graduate School of Management
338 Voorhis Hall
916-752-7362

School of Medicine
Medical Sciences 1C
916-752-0311

School of Veterinary Medicine
1018 Harling Hall
916-752-1360

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

University Extension
1333 Research Park Drive
916-752-0880

Admissions
Undergraduate: Office of Admissions
175 Mrak Hall
916-752-2971

EOP Office of Admissions
175 Mrak Hall
916-752-2993

Graduate: Graduate Division Admissions
252 Mrak Hall
916-752-0655

Law: School of Law Admissions
115 King Hall
916-752-6477

Management: Graduate School of Management
311 Voorhis Hall
916-752-7399

Medicine: School of Medicine Admissions
Medical Sciences 1C
916-752-2717

Veterinary Medicine: School of Veterinary Medicine Admissions
916-752-1383

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

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

Scholarship Office
207 North Hall
916-752-2397
(undergraduate scholarships)

Fellowships and Graduate Scholarships
Graduate Division
252 Mrak Hall
916-752-7931

Teaching and Research Assistantships
Write to department or group concerned. Addresses given in the Announcement of the Graduate Division.

Housing
Community: Student Housing Office
916-752-2483

Residence Halls: Student Housing Office
916-752-2033

Student Family Housing: Orchard Park
916-752-4000

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

Disability Resource Center
101 Sibo Student Center
916-752-3184 (voice), 916-752-8889 (telephone device for the speech and hearing impaired)

Memorial Union Information Desk
916-752-2222

News Service
334 Mrak Hall
916-752-1930

Relations with Schools/EOP Outreach Services
2628 Chiles Road
916-757-3108

Residency Matters, Attorney In
580 University Hall
University of California
Berkeley, CA 94720

Student Health Service
54A Cowell Student Health Center
916-752-2300 (voice, and telephone device for the speech and hearing impaired)

Information Services Office
129 Mrak Hall
916-752-0539
(campus tours, maps, and information)
### ACADEMIC CALENDAR*

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<td>Nov. 4-8</td>
<td>Feb. 10-14</td>
<td>May 28-July 31</td>
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<tr>
<td>May 30-31</td>
<td>Nov. 7-8</td>
<td>Feb. 13-14</td>
<td>May 28-29</td>
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<tr>
<td>May 30-Aug. 2</td>
<td>Nov. 4-8</td>
<td>Feb. 10-14</td>
<td>May 28-July 31</td>
</tr>
<tr>
<td>May 30-Aug. 16</td>
<td>Nov. 4-21</td>
<td>Feb. 10-Febr. 28</td>
<td>May 28-Aug. 14</td>
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<tr>
<td>Sept. 23, Mon.</td>
<td>Jan. 6, Mon.</td>
<td>April 2, Thur.</td>
<td>Sept. 21, Mon.</td>
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<tr>
<td>Sept. 23-24</td>
<td>Jan. 6-7</td>
<td>Apr. 2-3</td>
<td>Sept. 21-22</td>
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<td>Sept. 25</td>
<td>Jan. 7</td>
<td>Apr. 3</td>
<td>Sept. 23</td>
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<td>Sept. 26</td>
<td>Jan. 8</td>
<td>Apr. 6</td>
<td>Sept. 24</td>
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**Final day**
- of late registration
- to change status from part-time to full-time or vice versa
- to add courses without paying a $3 fee
- to file petitions for PELP

**Instruction begins**
- Feb. 11, Tue.
- May 8, Fri.
- Oct. 28, Wed.

**Instruction ends**
- April 12, Fri.
- Apr. 17, Fri.

**Final examinations**
- Dec. 6, Fri.
- Mar. 18, Wed.†
- Jan. 17, Fri.
- June 11, Thur.
- June 13-19
- June 19, Fri.
- Dec. 4, Fri.
- Dec. 7-12
- Dec. 12, Sat.

**Quarter ends**
- Dec. 14, Sat.
- Mar. 26, Thur.
- Mid-June
- May 25
- Nov. 26-27
- Dec. 24-25
- Dec. 31-Jan. 1

**Commencement**

**Academic and Administrative Holidays**
- Nov. 28-29
- Dec. 24-25
- Dec. 31-Jan. 1

**Summer Sessions I and II**
- June 22-July 31, 1992 and Aug. 3-Sept. 11, 1992

---

### Financial Aid Deadlines

Filing period for grants, loans, work-study, and California Student Aid awards for 1992-93

| Financial Aid Deadlines | Jan. 1-Mar. 2 |
---|---|

### Filing for Graduation

Filing period for those who expect to complete work for a bachelor's degree to file with the Office of the Registrar:

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<th>May 27-Sept. 18</th>
<th>Nov. 11-Dec. 20</th>
<th>Feb. 7-Mar. 20</th>
<th>May 29-Sept. 18</th>
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*†Note: Wednesday, March 18, treated as Monday for class schedule purposes.

Deadline for students who plan to complete a minor program to file with the Dean's Office:

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<th>Admission Deadlines</th>
<th>Oct. 9</th>
<th>Jan. 22</th>
<th>Apr. 17</th>
<th>Oct. 7</th>
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*Dates are subject to change and should be checked with appropriate Class Schedule and Room Directory.
†For students graduating September 1992, the filing period is May 25-July 3. Deadline to file a minor program with Dean's Office: July 3.
DEGREES OFFERED BY UC DAVIS

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

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<td>Aeronautical Science and Engineering</td>
<td>B.S.</td>
<td>College of Engineering</td>
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<tr>
<td>Afro-American Studies</td>
<td>A.B.</td>
<td>College of Letters &amp; Science</td>
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<tr>
<td>Agrarian Studies</td>
<td>B.S.</td>
<td>College of Agricultural &amp; Environmental Sciences</td>
</tr>
<tr>
<td>Agricultural and Environmental Chemistry</td>
<td>M.S., Ph.D.</td>
<td>College of Agricultural &amp; Environmental Sciences</td>
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<tr>
<td>Agricultural Economics</td>
<td>M.S., Ph.D.</td>
<td>College of Agricultural &amp; Environmental Sciences</td>
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<tr>
<td>Agricultural and Managerial Economics</td>
<td>B.S.</td>
<td>College of Engineering</td>
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<tr>
<td>Agricultural Education</td>
<td>B.S., Credential</td>
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<tr>
<td>Agricultural Engineering</td>
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<td>B.S.</td>
<td>College of Agricultural &amp; Environmental Sciences</td>
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<td>Agricultural Engineering: Food Engineering Option</td>
<td>B.S.</td>
<td>College of Engineering</td>
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<td>Agricultural Engineering: Forest Engineering Option</td>
<td>B.S.</td>
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<td>Agricultural Science and Management</td>
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<td>Agronomy</td>
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<td>American Studies</td>
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<td>Avian Sciences</td>
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<td>Biochemistry</td>
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<td>and Engineering</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>East Asian Studies</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.

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Introduction
UC DAVIS

With 5,200 acres, UC Davis ranks first in physical size of the nine campuses of the University of California. It’s also one of the nation’s top 20 universities in research funding and has 11 undergraduate programs rated among the country’s top 10, including the No. 1 botany department. What does this mean to you as a student? It means that 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 teaching faculty of 1700 is also supported by campus resources such as the Teaching Resources Center, which helps professors and teaching assistants sharpen their teaching skills, and the Learning Skills Center, which assists faculty in preparing classroom materials. Constructive criticism is provided by the Student Viewpoint, an evaluation of classes and instructors which is compiled each year from course questionnaires completed by students. Additional academic resources include laboratories; natural reserves; institutes; and centers for research, teaching, or service to students, faculty, or the community.

The Davis campus has undergraduate colleges of Agricultural and Environmental Sciences, Engineering, and Letters and Science. Undergraduate enrollment is close to 18,400 students. The Graduate Division administers graduate study and research at all schools and colleges. Professional studies are carried on at the schools of Law, Management, Medicine, and Veterinary Medicine. Approximately 5,500 students are engaged in graduate or professional study.

A Small-Town Setting

Davis is surrounded on all sides 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 the vibrant pulse of city life, Sacramento, the state capital, is only 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, the city 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 46 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 rain gear. 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 comprise nearly half of the city’s population of 46,000, 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 18 city parks offering a variety of attractions: tennis courts, playgrounds, swimming pools, and playing fields.

Campus Life

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

Underlying the casual style of Davis students, however, is a fundamental seriousness and a dedication to academic excellence. Davis students do study hard. After your studying is done, however, you can relax at a movie, public lecture, dance recital, or concert. For the energetic, 20 intercollegiate sports, 35 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

Davis was founded in 1905 as a “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 as “Cal Aggie.” 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
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 which 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. Huller 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.*
Science was founded in 1951, bringing degree programs in the humanities to add to the campus' strong scientific foundation. By 1959, Davis had expanded enough to be declared a general campus of the University by the Regents, and the campus continued to grow. The College of Engineering came into being in 1962. The School of Law held its first classes in the fall of 1966, and the School of Medicine admitted its first students in the fall of 1968. Davis' newest addition, the Graduate School of Management, opened its doors in 1981.

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

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 the 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 166,500 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 known for its distinguished academic achievements. On its nine campuses, the University has 26 Nobel laureates, and membership in the National Academy of Sciences is the largest of any university in the country. In 1991, 15 scholars from within the University received a Guggenheim fellowship grant, one of the highest honors that a scholar can receive.

VISITING THE CAMPUS

You may wish 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 the Undergraduate Admissions Office. 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 Mrak Hall at 11:30 a.m. and 1:30 p.m. No appointment is necessary.

Information: Information Services Office, 129 Mrak Hall, 916-752-0539

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 its facets. Although its roots are in traditional agriculture and it is still world-renowned for its agricultural programs, the shared commitment has led to the College's expansion into programs which address four major areas: natural resources and the protection of the environment; the production, distribution, and utilization of food and
fiber; the advancement of basic biology, which underpins successful strategies to meet human needs; and issues of the enhancement of the human environment, including environmental design.

The College offers 38 majors in many different areas, including environmental biology and resource sciences, environmental toxicology and pest management, animal and plant sciences, basic biology, food production and processing, nutrition, human development, design, and managerial economics. The College strives to provide students with the intellectual tools to master their area of study and the ability to apply this knowledge to the world outside the university.

The College offers several levels of academic advising in order to help students get the most out of their education. Advisers can assist students in meeting degree requirements and in taking maximum advantage of the resources available at the University. Students are encouraged to talk not only with their assigned faculty adviser, but also with Advising Associates and peer advisers in different departments. This allows students to make educational decisions on the basis of information and ideas from a wide variety of disciplines. Although degree requirements may appear complex, they are usually flexible enough for students to individualize their study programs. With the help of faculty advisers, students can explore many different areas while progressing toward their major degree objectives.

It is the students’ responsibility to maintain regular contact with their faculty advisers, and good relationships are developed by meeting frequently and discussing evolving interests and goals. Faculty and students working together helps keep the College of Agricultural and Environmental Sciences vital and produces individuals committed to improving the relationship of humanity with the natural world.

Information: College Office, 228 Mrak Hall, 916-752-0107

The College of Engineering

The College of Engineering has a tradition of excellence in instruction, in research, and in public service. With an undergraduate enrollment of approximately 2,200 and a graduate enrollment of 750, the College can offer both a friendly atmosphere and the varied academic programs in basic sciences and engineering that have made UCD engineering graduates highly valued in industry and research.

The College has six departments; each has outstanding programs of instruction. The Department of Agricultural Engineering combines study in engineering with instruction in the biological processes used to solve challenging environmental and technical problems. The Department of Applied Science instructs engineering graduate students in broad areas of scientific technology. The Department of Chemical Engineering offers a curriculum integrating an effective knowledge of chemistry with engineering sciences to enable students to solve problems in both current and future product technologies. Devoted to the improvement of the human environment to make our activities and surroundings more productive, safe, enjoyable, and aesthetic, the Department of Civil Engineering trains students to plan and design systems that have a direct impact on the health and quality of human life. The Department of Electrical Engineering and Computer Science 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, Aeronautical, and Materials Engineering educates students to design and manufacture complex engineering systems for transport, industry, or energy; to design, manufacture, and operate aircraft and aeronautical structures; or to analyze the structure, properties, and behaviors of materials.

Every effort has been made to provide students in engineering with the maximum flexibility consistent with rigorous educational standards. The key to flexibility is academic advising. Incoming students are assigned to a faculty adviser before their first term on campus and usually retain the same adviser throughout their college careers. Faculty advising is supplemented by a well-developed peer advising system and by staff advising in the Dean's Office and in many departments.

Undergraduate education in engineering at Davis is intended to serve as a sound basis for beginning pro-
essional practice in engineering design and development, as a general 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 become obsolete.

Engineers will continue to face new challenges as society continues its demand for improvements in the quality of life. As a unit in a land-grant institution, the UCD 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, 2132 Bainer Hall, 916-753-0553

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 more than 600 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 ongoing process of education that begins in the classroom but continues over a lifetime. They will have learned how to learn—the ultimate objective of a liberal arts education.

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

The English Composition Requirement 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 to gain 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 unwavering 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, 150 Mrak Hall, 916-752-0592
ACADEMIC RESOURCES

Central Support

The University Library

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

The libraries contain over 2.3 million volumes and receive about 51,600 periodical and journal titles annually. Shields Library houses the collections in the humanities, arts, social sciences, biological sciences, and agricultural sciences. The collections of the Physical Sciences Library support teaching and research in engineering, computer sciences, physical sciences, and mathematics. 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 217,000 volumes. The Agricultural Economics Library holds more than 7,500 bound volumes and 244,000 unbound pamphlets in this field. The library at the UCD Medical Center provides a collection of 22,000 volumes.

Information: Library Administration Office, Shields Library, 916-752-6561

Computing Services

Computing Services provides batch, interactive time-sharing, and remote job entry mainframe computing. Additionally, many microcomputers and scientific workstations are provided for student use at no charge. Computers operated by Computing Services include: a Unisys A10FX, the primary administrative computer; a Unisys A6KX for administrative development work and an A10FX backup; and three DEC VAX 11/785s and two VAX 6600s for academic use. These systems support over 100 terminals located in four student terminal rooms, plus over 3,000 additional terminals and microcomputers located throughout the campus.

Information: Surge II, 916-752-0233

University Arboretum

The 150-acre University 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 oaks in the Shields Grove, the Mary Watts 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 and has provided the University with numerous exotic plant specimens and also serves to distribute California native plants throughout the world. Internships are available in nursery management, landscape design and maintenance, environmental education, conservation biology, 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, the history of farm land values, the causes and consequences of agricultural mechanization and other sources of productivity improvements in the nineteenth and twentieth centuries, and the impact of scientific research.

Information: 376 Voorhies Hall, 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 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, 916-752-1810

Institute of Ecology

The Institute of Ecology has a campuswide responsibility to foster ecological and environmental research, provide intellectual leadership in ecology, administer resources and facilities, provide information on extramural support of ecological research, and maintain liaisons with governmental and private organizations interested in funding ecological and environmental research, or requiring advice on these subjects. The Ecology Institute has a publication series and sponsors national and international activities, including organizing symposia and conferences.

Information: 2132 Wickson Hall, 916-752-3026

Institute of Toxicology and Environmental Health (ITEH)

ITEH coordinates interdisciplinary research concerned with biomedical and toxicological problems related to exposure to chemical, physical, and biological toxic agents or to ionizing radiation. Studies on toxic, radioactive, mutagenic, carcinogenic, and teratogenic compounds are carried out in special animal holding facilities. Central laboratories exist for analytical chemistry, radiochemistry, ionizing radiation detection and quantification, cell biology research, inhalation toxicology, and human epidemiology. The Institute
houses major Universitywide programs in toxic substances 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 115,000 vascular plant specimens. It also houses 30,000 specimens of the Beecher Crampton Herbarium Collection of grasses and other range plants. Smaller teaching herbaria are located in various plant science departments on campus.

Information: Department of Botany, 916-752-0817

**Jepson Prairie Reserve**

The Jepson Prairie Reserve is used to study the effects of long-term grazing, to conduct fire ecology research, and to aid in management of native grasslands. The reserve is located fifteen miles south of the campus and comprises 1,566 acres of perennial bunchgrass grassland and vernal pools. The Jepson Prairie area is typical of habitats which once covered most of California's Central Valley and is recognized as the best remnant of native prairie land. Several rare or endangered species are endemic to the area.

Information: Institute of Ecology, 2126 Wickson Hall, 916-752-6580

**Mann Laboratory**

Personnel housed in the Mann Laboratory study the physiology and biology of harvested vegetables, train students, and extend information about postharvest biology and technology to growers, shippers, marketers and consumers. The facility is part of the Department of Vegetable Crops and houses 16 controlled-temperature rooms, seven research laboratories, a teaching laboratory, and a library/conference room.

Information: 113 Mann Laboratory, 916-752-1410

**Putah Creek Campus Reserve**

The goals of the Putah Creek Campus Reserve are habitat conservation, education, research, and environmentally-directed recreation. The reserve consists of a 150-acre corridor along the north bank of Putah Creek and is approximately 6 kilometers long and averages 100 meters wide. Vegetation and wildlife include native and introduced species.

Information: University Arboretum, 916-752-2498

**Water Resources Center**

The center supports selected research in such areas as agricultural sciences, biological sciences, economics, engineering, history, geography, law, meteorology, physical sciences, and political science. Research interests include drought responses, water resource systems engineering, economic evaluation of water development and conservation, political strategy in water resource development, environmental and energy relationships in water resource management, watershed hydrology, ground water use, soil and land use management in relation to water resource use, and maintenance and improvement of water quality.

Information: University Extension Building, 916-757-8901

**Stebbins Cold Canyon Reserve**

Terrain and rainfall patterns of the Cold Canyon area support examples of several different plant communities found in both the inner and outer coastal ranges. The diversity of plant and animal species on the reserve, and its close proximity to the campus, contribute to the popularity of the reserve as an open-air classroom and research site. The 576-acre reserve is located 24 miles west of campus near Lake Berryessa and is available for teaching and field research by scientists and students.

Information: Department of Avian Sciences, 3202 Meyer Hall, 916-752-1300

**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: College of Agricultural and Environmental Sciences, 916-752-7666

**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: 110 University House, 916-752-2320

**Biological and Life Sciences**

**Adult Fitness Program**

The Adult Fitness Program serves as an educational laboratory for 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 cardiorespiratory endurance. Studies stress fitness, relaxation, and weight reduction and control through appropriate diet and exercise programs which are individually prescribed after extensive medical and physiological testing.

Information: Department of Physical Education, 916-752-2540

**Bodega Marine Reserve**

The Bodega Marine Reserve is 362 acres of coastal
habitat near Bodega Bay in western Sonoma County, approximately 100 miles from the Davis campus. This site includes a remarkably diverse set of 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. Located within the reserve is the Bodega Marine Laboratory, an organized research unit dedicated to research and teaching in marine and coastal biology and related fields. Current areas of research on the Reserve include population biology and behavior of insects, shorebirds, marine invertebrates and fishes; plant-insect interactions; population genetics of coastal plants; subtidal biomechanics; and other topics.

Information: Peter G. Connors, Ph.D., Reserve Manager, P.O. Box 247, Bodega Bay, CA 94923, (707) 875-2020 or (707) 875-2211

California Primate Research Center (CPRC)
The research staff of the California Primate Research Center investigates selected human health problems for which the nonhuman primate is the animal model of choice. Research programs include behavioral biology, developmental and reproductive biology, respiratory diseases, virology and immunology, and a variety of biomedical collaborative research projects. A major theme of the CPRC is the study of environmental influences on nonhuman primates and the identification of spontaneously occurring disorders.

Information: Primate Center, 916-752-0447

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

Information: TB 33, 916-752-7515

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

- **Animal Surgery Laboratory**—provides instruction and facilities for the preparation of monoclonal antibodies. The laboratory is also developing additional lines of animal plasmacytomas.

  Information: Buildings H and J—ARS, 916-752-7758

- **Biochemistry and Special Instrumentation Laboratory**—includes ultracentrifuges, beta and gamma spectrometers, and spectrophotometers.

  Information: TB 161, 916-752-3166

- **Electron Microscopy Laboratory**—transmission and scanning electron microscopes, freeze fracture
apparatus, ultramicrotome, darkroom, photomicroscope, and complete EM specimen preparation facilities.

Information: 9 Hutchison Hall, 916-752-0284

- **Protein Structure Laboratory**—instrumentation for quantitative amino acid analysis and automated sequencing by Edman degradation, ancillary instrumentation for identification of amino acid phenylthiocarbamolines. This laboratory also houses a DNA-synthesizer and a flow cytometer for fluorescence-activated cell sorting.

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. DEC LSI-11 minicomputers, and 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

**Institute of Marine Resources**

The marine food science component of this statewide institute is part of the Department of Food Science and Technology at Davis. The staff studies factors affecting the chemical, biochemical, microbiological, and nutritional properties of fish and other seafood. Current studies include those dealing with comparative biochemistry of proteolytic enzymes, the use of modified atmospheres for storage of seafood products, crustacea nutrition, carotenoprotein extraction as a part of a project dealing with shellfish waste, and extracellular enzyme processing and production by a hydrocarbon-utilizing yeast.

Information: Temporary Building 186, 916-752-2506

**Serology Laboratory**

The laboratory is recognized for its pioneering research on animal blood groups and biochemical polymorphisms. Current research activities of the Serology Laboratory include: investigation of red cell, serum, lymphocyte and DNA genetic markers which enhance the effectiveness of current techniques applied to parentage investigation and identification of cattle, horses, sheep, goats, llamas, and dogs; study of breed relationships through gene frequency analysis; investigation of the mode of inheritance of several suspected hereditary diseases; 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 serves as the principal clinical center of UCD's School of Veterinary Medicine. The Center offers a forum for teaching, research, and service programs on food-animal herd health, preventive medicine, and production management.

Information: 18830 Road 112, Tulare, California 93274, 209-686-1731

**Engineering and Physical Sciences**

**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, neutron 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

**Center for Geotechnical Modeling**

At the Center for Geotechnical Modeling, research in physical and numerical modeling is conducted by faculty and students from several departments and campuses of the University. The center operates two small centrifuges and the large National Geotechnical Centrifuge. These centrifuges are used for research on geotechnical problems such as the effect of earthquakes on earth structures, toxic waste transport, and foundations of large buildings.

Information: 2092 Building 9, 916-752-6966

**Facility for Advanced Instrumentation**

The Facility for Advanced Instrumentation supports research and instructional programs in electron microscopy, mass spectrometry, and morphometrics. The electron microscope laboratory houses scanning and transmission electron microscopes adjacent to a specimen preparation laboratory. Morphometric analysis is supported by a computerized digitizing tablet and digitizing video image analysis computer. The mass spectrometer laboratory consists of a quadrupole mass spectrometer and a high resolution double-focusing instrument. Both mass spectrometers have soft ionization and high mass capabilities and are interfaced to gas chromatographs and data acquisition systems.

Information: 9 Hutchison Hall, 916-752-0284

**Institute of Theoretical Dynamics**

The Institute promotes the study of the ways in which physical, chemical, and biological systems change over the course of time. Studies in theoretical population dynamics are being used by faculty in genetics and mathematics to study changes in animal populations. Faculty in chemistry and physics are studying the dynamics of chemical reactions, changes which occur among elementary particles, and molecular processes in cell biology. In the departments of engineering and mathematics, faculty are developing methods for analyzing and solving dynamical equations, and applying these methods to problems in ecology, pest management, movement control of robots, and the flow of fluids past objects of irregular shape.

Information: 509 2nd Street, Suite 206-207, Davis, CA 95616, 916-752-0838
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, 916-752-1790

Nuclear Magnetic Resonance Facility
The Nuclear Magnetic Resonance Facility provides researchers with direct access to high resolution 500 MHz and 300 MHz General Electric spectrometers. Experts in NMR are available to advise and assist in the application of NMR to problems in chemistry, biochemistry and molecular biology. For the study of metabolic processes in animals, a 1.9 Tesla spectrometer with a horizontal bore of 200 mm is available to obtain localized spectra and magnetic resonance images from animals. A 7 Tesla spectrometer for both in vivo NMR and magnetic resonance imaging is also available.
Information: Med Sci 1D, 916-752-7677

X-Ray Crystallographic Facility
An 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 VAXstation 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: Department of Chemistry, 916-752-6688

Humanities and Social Sciences
Center for Consumer Research
The Center is a small research unit devoted to consumer issues. Major areas of interest include product and service quality, consumer information and education, consumer decision behavior, and institutions and public policy as they relate to consumer issues. In addition to a core research program, activities of the Center include support of consumer projects undertaken by faculty, graduate students, and Extension specialists; and a newsletter. The Center also houses a library containing books and periodicals on consumer-related topics.
Information: 148 Eversoll Hall, 916-752-2947

Early Childhood Laboratory
The Early Childhood Laboratory provides a facility where students enrolled in human development courses can develop observational techniques and participate with peers, children, parents, and professionals in an early childhood program. The faculty helps students link theory and practice, develop a recognition and respect for individual differences, and consider their interaction and communication styles. Selected graduate students and faculty also conduct research at the laboratory.
Information: Temporary Building 117, 916-752-2888

Humanities Institute
The Davis Humanities Institute promotes the development of the humanities by organizing interdisciplinary research programs and co-sponsoring discussions with other departments. Under its fellowship program, three visiting fellows spend a year in residence at the Institute along with nine campus fellows who each spend one quarter in residence and participate in a year-long seminar on themes selected by the Humanities Institute Board. The Institute also produces Humanities at Davis and sponsors an Interdisciplinary Graduate Seminar.
Information: 508 Second Street, Suite 202, Davis, CA 95616-8612, 916-753-8979, FAX: 916-756-2376

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 two Centers: the Center for Regulation and Deregulation and the Center for State and Local Taxation. In addition, IGA sponsors eight research programs: Productivity and Quality Control; Labor and Immigration Policies; International Conflict and Cooperation; Economy, Justice and Society; Pacific Rim Studies; Government and Politics; East Asian Business and Development; and Applied Public Policy. 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, statistical package instruction, data file maintenance, a data library, limited program writing, and assistance in the acquisition of computer time.
Information: 161 AOB 4, 916-752-6063
The Undergraduate Application Packet may be obtained 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.

<table>
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<tr>
<th>Quarter of Attendance</th>
<th>Filing Periods</th>
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<tr>
<td>Fall quarter 1992</td>
<td>November 1-30, 1991</td>
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<tr>
<td>Winter quarter 1993</td>
<td>July 1-31, 1992</td>
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Submit your completed application form to
University of California
Undergraduate Application
Processing Service
P.O. Box 23460
Oakland, California 94623-0460

Application Fees

The basic application fee is $40 to apply to one campus of the University. For each additional campus you select, you must pay an extra $40 fee. These fees are not refundable. A check or money order made payable to the Regents of the University of California should be attached 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. You should learn to read analytically and critically, actively questioning yourself about the author's intentions, viewpoint, arguments, and conclusions. You should also 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 which every University student must master. By University standards, a student who is proficient in English composition is able to: a) understand the assigned topic; b) select and develop a theme by analysis and argument; c) choose words which aptly and precisely convey the intended meaning; d) construct effective sentences, i.e., sentences that economically and successfully convey the writer's ideas and display a variety of structures; and e) 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 that stress expository writing: the development of persuasive critical thinking on the written page.

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, and 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 which requires either calculus or statistics, you should expect to take that course during your first year at the University.

You should 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.

The ability to use algebra to solve problems 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 undergraduate studies for which mathematics is a prerequisite.

Finally, you should take advantage of any guidance your high school may offer in study skills. 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 ninth 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 ninth-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—1 year
One year of United States history, or one-half year of United States history and one-half year of civics or American government.

B. English—4 years
Four years of English—composition and literature (university preparatory in nature, including frequent and regular practice in writing expository prose compositions of some length). Not more than one year will be accepted from the ninth grade. (See English Proficiency below.)

C. Mathematics—3 years
Three years of mathematics—elementary algebra, geometry, and intermediate algebra. (Courses taken in grades seven and eight may partially satisfy the requirement if they are accepted by the high school as equivalent to its own courses.)

D. Laboratory Science—1 year
A year course in one laboratory science, taken in the tenth, eleventh, or twelfth grade.

E. Foreign Language—2 years
Two years of the same foreign language. Courses should emphasize speaking and understanding, and include instruction in grammar, vocabulary, reading, and composition. (Courses taken in grades seven and eight may satisfy this requirement if they are accepted by the high school as equivalent to its own courses.)

F. College Preparatory Electives—4 years
Four years in addition to those required in “A” through “E” above, to be chosen from at least two of the following subject areas.
- 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 nine as preparation for a laboratory science may be used.
- Foreign language: courses may be in either the same language used to satisfy the “E” requirement or a second foreign language. If a second language is chosen, however, at least two years of work in that language must be completed.
- Social science: courses that fit the general description for elective courses above, and that serve as preparation for lower division work in social science at the University. (Courses of an applied, service, or vocational nature are not acceptable.)
- Visual and performing arts: courses should enable students to understand and appreciate artistic expression, and to talk and write with discrimination about artistic materials studied. Courses that develop creative artistic ability or artistic performance may be used. (Courses that are recreational or are offered under physical education are not acceptable.)

If you are a California high school graduate, the courses used to satisfy the Subject Requirement must appear on a list that your high school principal has certified meets the course descriptions above, and has 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 are acceptable in fulfillment of 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:
- College Board Achievement Test in English Composition (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, 3); or
- California State University and Colleges English Equivalency Test (a “pass for credit” only).

The requirement may also be satisfied with a 3-semester or 4-quarter unit transferable college-level English course with a grade of C or higher in literature, composition, or speech.

Scholarship Requirement
An applicant must have earned a grade of C or better in all high school courses to satisfy the “A” through “E” requirements above. The grades earned in these courses that are taken in grades ten through twelve will be used to compute the grade-point average for admission.

If you attain a grade-point average of 3.30 (where the letter grade A=4, B=3, and C=2, and in honors or advanced placement courses taken during the
eleventh and twelfth years—limit of four year-long courses—where the letter grade A=5, B=4, and C=3) in the required "A to F" subjects taken after the ninth grade, you will be minimally eligible to enter the University regardless of your scores on standardized tests. If your grade-point average falls below 3.30 but higher than 2.77, you will be minimally eligible for the University by achieving 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 ninth 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, you should take the tests no later than December of your senior year (earlier testing is recommended). The following tests are required:

- Scholastic Aptitude Test (College Board)—The verbal and mathematics tests scores you submit must be from the same sitting

- American College Test

and

- Three Achievement Tests (College Board), which must include (a) English Composition (with or without the essay), (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 over 3.30, the tests are required but your scores will not be used to determine your minimum eligibility.

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 Scholastic Aptitude Test (SAT) and the Achievement Tests by writing to The College Board, 147 Center Street, Berkeley, CA 94704. For the American College Test (ACT) write to American College Testing Program, Registration Unit, P.O. Box 168, Iowa City, IA 52240.

<table>
<thead>
<tr>
<th>Grade Level</th>
<th>Eligibility Index</th>
</tr>
</thead>
<tbody>
<tr>
<td>A-F</td>
<td>SAT† Total Scores</td>
</tr>
<tr>
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<tr>
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<td>3.30</td>
<td>400</td>
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</table>

†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.
(Test fees should be paid to the Testing Service, not the University.) UC Davis's College Board code is 4834 and the ACT code is 0454.

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

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 February 1 and mid-March. The Statement of Intent to Register 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 Statement of Intent to Register 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.

Acceptance of Admission
When you receive your notification of admission you will also receive an important form called the "Statement of Intent to Register" (SIR). You must complete the form and return it to this 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 re-admission applicants are not required to submit the $100 advance deposit; however, they will pay full registration fees at the time of registration.

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+) on the courses used to meet the subject requirements
- Complete the examination requirements listed for California residents

Admission by Examination Alone
If you do not meet the scholarship and subject requirements for minimum eligibility and have completed fewer than 12 quarter or semester units of transferable college work since high school graduation, you can qualify for minimum eligibility as a freshman by examination alone. (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 1100 on the Scholastic Aptitude Test, or a score of 26 on the American College Test. Your total score on the three Achievement Tests must be 1650 or higher with no score less than 500 on an individual Achievement Test. If you are a nonresident applicant, your score on the three Achievement Tests 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. 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 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 UCD 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 GE section in next chapter.)

In general you may not earn University credit for courses which 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 UCD 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 is a high school graduate and has been a registered student in a college or university or in college-level extension classes following high school graduation. Summer session attended immediately following high school graduation is excluded in this determination. If you are a transfer applicant, you
<table>
<thead>
<tr>
<th>EXAMINATION</th>
<th>SCORE</th>
<th>UCD COURSE EQUIVALENCIES</th>
<th>CONTINUING COURSE</th>
<th>CREDIT TOWARDS DEGREE</th>
<th>CREDIT ALLOWED TOWARDS SPECIFIC DEGREE REQUIREMENTS</th>
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<tr>
<td>ENGLISH</td>
<td>5, 4</td>
<td>English A, 1, 3</td>
<td>French 23, or consultation with adviser</td>
<td>8 units</td>
<td>English/Humanities Credit: Satisfies Subject A requirement. College of Agricultural and Environmental Sciences: 4 units satisfies first part of English composition requirement. College of Engineering: 8 units satisfies English 1, 4 units toward Humanities and Social Sciences electives, and 2 units toward Unrestricted electives. College of Letters and Science: Satisfies first course toward English Composition requirement.</td>
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<tr>
<td>FOREIGN LANGUAGES</td>
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<td></td>
<td></td>
<td>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 Foreign Language requirement. In the College of Engineering, 4 units toward Humanities/Social Sciences electives.</td>
</tr>
<tr>
<td>French</td>
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<td>French 22</td>
<td>French 23 or consultation with adviser</td>
<td>8 units</td>
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<tr>
<td>French</td>
<td>4</td>
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<td>French 22</td>
<td>8 units</td>
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<td>French 21</td>
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<td>5, 4</td>
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<td>German 101, upper division literature courses</td>
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<td>Determined by consultation with Classics adviser</td>
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<tr>
<td>Latin (Lyric)</td>
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<td>Determined by consultation with Classics adviser</td>
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<tr>
<td>Spanish</td>
<td>5, 4</td>
<td>Spanish 21 or 23</td>
<td>Spanish 22, 24 or 23, or more advanced course in consultation with adviser</td>
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<tr>
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<td>Spanish 3</td>
<td>Spanish 4, or consultation with adviser</td>
<td>8 units</td>
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<tr>
<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.S. degree. 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 Foreign Language requirement. In the College of Engineering, 4 units toward Humanities/Social Sciences electives.</td>
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<td>8 units</td>
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<tr>
<td>Art History</td>
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<td>8 units</td>
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<td>American History</td>
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<td>NATURAL SCIENCES</td>
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<td></td>
<td>Natural Sciences Credit/Preparatory Courses for Science Majors: 4 units Biological Sciences 1A is the first course taken by most students contemplating majors in the Life Sciences. Credit for Chemistry 1A and 1B equivalence may serve as prerequisite to 1C with consent of Instructor. Although 1A and/or 1B may be taken for full credit, students are strongly encouraged to enroll in the 1A-1B-4C 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, 4 units towards the unrestricted electives requirement.</td>
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<td>5, 4, 3</td>
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<td>Computer Science AB</td>
<td>5, 4</td>
<td>Computer Science Engineering 30</td>
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<td>Computer Science AB</td>
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<td>Mathematics AB</td>
<td>5, 4</td>
<td>Mathematics 11, 16A, or 21A</td>
<td>Mathematics 16B or 21B</td>
<td>4 units</td>
<td>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</td>
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<tr>
<td>Mathematics AB</td>
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<td>Mathematics 16A or 21A</td>
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<td>4 units</td>
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<td>Mathematics 11A, 16A-16B, or 21A-21B</td>
<td>Mathematics 16C or 21C</td>
<td>8 units</td>
<td>Mathematics 16A, 16B, 21A, or 21B may be taken for full credit. Mathematics 16A, 16B, 21A, or 21B equivalents may serve as 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.</td>
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<td>Mathematics BC</td>
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<td>Mathematics 11A, 16A, or 21A</td>
<td>Mathematics 16B or 21B</td>
<td>8 units</td>
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<td>5</td>
<td>Physics 1A, 1B, 5A, 5B, 5C, 10</td>
<td>Physics 10</td>
<td>8 units</td>
<td>Course equivalents may be used as prerequisite for preceding course of same series with consent of instructor. In the College of Engineering, only a score of 5 on Physics (CI and CII) Examinations applies toward Physics requirement.</td>
</tr>
<tr>
<td>Physics B</td>
<td>4, 3</td>
<td>Physics 1A, 5A, or 5A</td>
<td></td>
<td>8 units</td>
<td></td>
</tr>
<tr>
<td>Physics CI</td>
<td>5</td>
<td>Physics 1A, 5A</td>
<td></td>
<td>8 units</td>
<td></td>
</tr>
<tr>
<td>Physics CI</td>
<td>4</td>
<td>Physics 1A or 5A</td>
<td></td>
<td>8 units</td>
<td></td>
</tr>
<tr>
<td>Physics CII</td>
<td>5, 4</td>
<td>Physics 1B</td>
<td></td>
<td>8 units</td>
<td></td>
</tr>
<tr>
<td>SOCIAL SCIENCE</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Social Science Credit/Unrestricted Electives: 4 units Political Science 1 satisfies American History and Institutions requirement. In College of Agricultural and Environmental Sciences, satisfies credit toward breadth requirement or Unrestricted electives. In College of Engineering, awards credit toward Humanities-Social Sciences electives requirement.</td>
</tr>
<tr>
<td>American Government and Politics</td>
<td>5, 4, 3</td>
<td>Political Science 1</td>
<td></td>
<td>4 units</td>
<td></td>
</tr>
<tr>
<td>Comparative Government and Politics</td>
<td>5, 4, 3</td>
<td>Political Science 2</td>
<td></td>
<td>4 units</td>
<td></td>
</tr>
<tr>
<td>Economics</td>
<td>5, 4, 3</td>
<td>Economics 1A, 1B</td>
<td>Determined by consultation with Economics adviser</td>
<td>8 units</td>
<td></td>
</tr>
</tbody>
</table>
may not disregard your college record and apply for admission as a freshman.

If you are a California resident, you must meet the requirements that follow. If you are not a California resident, see Requirements for Residents of Other States below.

Requirements for California Residents

As a transfer applicant you 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 eligible to be considered for admission if you have a C (2.0) average in your transferable college course work.

- If you have completed fewer than 12 quarter or semester units of transferable college credit since high school graduation, you must also satisfy the examination requirement for freshmen. 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 may be 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
  3. completed 12 or more transferable quarter (or semester) units, or have met the freshman examination requirement.

- If you did not meet the needed scholarship requirement or did not meet the scholarship requirement and lack the required subjects, you may be eligible to be considered for admission after you have:
  1. completed 84 transferable quarter (56 semester) units of credit in college courses; and
  2. established an overall grade-point average of 2.40 or better in another college or university;
  3. completed one of the following:
     a. appropriate college courses, with a grade of C or better, in high school subjects that you lacked—up to two units (one unit-one year-long course) of credit may be waived except in English and mathematics;
     or
     b. a college course, or courses, in mathematics; one in English; and one in either U.S. history, a laboratory science, or a foreign language, all with grades of C or better. The mathematics component must at least be equal to algebra, geometry, and advanced algebra. A course for which advanced algebra is a prerequisite, including statistics, will satisfy the entire requirement. Courses on the appli-
of the priority filing period will be processed as space
permits.

Before being admitted, you must complete a Confi-
dential Financial Statement and provide copies of
your transcripts to the Undergraduate Admissions
Office. The Confidential Financial Statement is
required to demonstrate that you can provide $20,000
(or more, based on proposed fee increases) per year
for educational fees and living expenses.

Applicants whose native language is not English or
whose schooling has not been in the English lan-
guage must take the Test of English as a Foreign Lan-
guage (TOEFL). A minimum score of 500 is required.
To arrange a testing date and location in your home
country write to the Educational Testing Service, P.O.
Box 899, Princeton, New Jersey, 08540.

In addition to taking the TOEFL, international students
whose native language is not English are required to
take a proficiency examination given at UC Davis the
week before school begins. If students do not pass
this examination, they must enroll in English classes
for international students—English 21, 22, or 23—until
they have acquired the necessary language skills. In
addition, students must satisfy the University Subject
A requirement.

For additional information, look under International
Student Services in the Academic Advising and Stu-
dent Resources section of this catalog.

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 avail-
able. When UC Davis cannot accept all eligible appli-
cants, it uses standards which 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 are only for
applicants for the fall 1991 term. The criteria may dif-
fer for the winter and spring terms because enrollment
targets and applicant qualifications change. Appli-
cants for winter or spring should contact the Under-
graduate Admissions Office 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 stu-
dents 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
Davis ranks all freshman applicants using the following academic index: [(1,000 x Grade Point Average (capped at 4.00)) + [(SAT Verbal) + (SAT Math) or (composite ACT scores)] + (three required College Board Achievement Tests)].

Academic Criteria (used to select 40% of admits): Applicants in all majors are selected on the basis of academic index score.

Supplemental Criteria (used to select 60% of admits): The academic index is used as the basis for selection, with consideration of additional factors, including intended major, strength and range of college preparatory courses, and personal accomplishments and qualities.

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 and psychology, for example—the completion of specific lower division preparatory courses for the major is required. Contact Undergraduate Admissions for information on which majors are so impacted.

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

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

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 1991</td>
<td>August 23, 1991</td>
</tr>
<tr>
<td>Winter 1992</td>
<td>December 6, 1991</td>
</tr>
<tr>
<td>Spring 1992</td>
<td>February 28, 1992</td>
</tr>
<tr>
<td>Fall 1992</td>
<td>August 21, 1992</td>
</tr>
</tbody>
</table>

SPECIAL PROGRAMS
Academic Reentry Program
The Academic Reentry Program gives assistance in applying to the University to students in nontraditional age categories who are reentering the University after life and work experience. Preadmission and reentry advising provides assistance in combining past study with current academic and career goals. A reentry student who has not met the entrance requirements but has demonstrated recent academic potential, has special talents, or a disadvantaged educational history may be considered for admission by special action.

(See also the Academic Advising and Student Resources section.)

Concurrent Enrollment
Concurrent courses are regular University courses open to the community on a space-available basis through UC Extension. The purpose of the program is to allow an individual to pursue academic interests and to test academic abilities at the University.

For information, write the University Extension Office, Research Park, University of California, Davis 95616, 916-757-8777.

Educational Opportunity Program/Student Affirmative Action (EOP/SAA)
The Educational Opportunity Program/Student Affirmative Action is designed to assist and provide opportunities in higher education for students from ethnic groups who are underrepresented in the UC eligibility pool (American Indian, African-American, Chicano, and Latino). Also, the program assists students with a disability and students from economically and/or educationally disadvantaged backgrounds.

The services include assistance with the admission application process and 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 the Undergraduate Admissions Office for information on obtaining the fee waiver.

An EOP/SAA applicant may be admitted in one of these two ways: (1) as a freshman or advanced standing student who has met the standard admission requirements, or (2) as a special-action freshman or advanced standing student who has not met the admission requirements but who has demonstrated academic potential.

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.

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.

**Special Status**

The special status classification is designed 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.

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**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 Office, 175 Mrak 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. Retain for your records the notices received from both the Undergraduate Application Processing Service and the Undergraduate Admissions Offices which acknowledge receipt of your application.

- 5. If you are applying from high school, do not send a preliminary transcript unless requested to do so by Undergraduate Admissions. If you are applying as an advanced standing student, arrange to have all official transcripts sent. If test scores are required, please arrange to have these forwarded by the testing agency.

- 6. High school applicants to the fall quarter should make arrangements to take the SAT or ACT and three Achievement tests by no later than December. We strongly encourage that these tests be completed by the November test date.

- 7. Respond to Undergraduate Admissions Office requests for additional information, such as transcripts, test scores, or confirmation of work in progress. **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), therefore it is important to make arrangements for these requests if you want to avoid delay in the processing of your application.

- 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.
Fees, Expenses and Financial Aid
FEES AND EXPENSES

It is extremely important to consider carefully 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 aid well in advance of enrollment. The deadlines for financial aid (grants, loans, work-study, and scholarships) can be found in the following pages.

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

Undergraduate Student Fees
University registration fee ...................... $231.00
Memorial Union fee .......................... 28.50
Associated Students fee ....................... 23.50
Optional undergraduate health insurance fee ...................... (118.00)
Educational fee .................................. 527.00
Total for California residents ................... $928.00
Tuition for nonresidents ....................... 2,566.00
Total for nonresidents ....................... 3,494.00

Graduate Student Fees
University registration fee ...................... $231.00
Memorial Union fee .......................... 28.50
Graduate Student Association fee .................. 4.50
Health Insurance fee .......................... 104.00
Educational fee .................................. 527.00
Total for California residents ................... $995.00
Tuition for nonresidents ....................... 2,566.00
Total for nonresidents ....................... 3,461.00

These are the proposed fees for the 1991-92 academic year. Because they are subject to legislative and gubernatorial action, these fees may change without notice.

Important Fee Exceptions
The Graduate Student Association fee is optional for students in the Schools of Law, Medicine, and Veterinary Medicine. (Law students are required to pay a Law Student Association fee of $5.00 per semester.)

Students approved for enrollment on a part-time basis are required to pay only one-half of the Educational Fee and one-half of the Nonresident Tuition Fee.

The Undergraduate Health Insurance plan is available to all undergraduates, except for foreign undergraduate students who must pay the Graduate Student Health Insurance fee.

Additional Fees and Expenses
Students may be subject to the following fees for optional services (rates subject to change):

Parking (per year: $72 to $204 for cars, depending on the type of permit; $60 for motorcycles; $72 for nighttime only permit, i.e., $17 per quarter)

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

For details concerning fees and deposits, consult the publication 1991-92 Student Fees and Deposits, available from the Office of the Registrar. Current fees are also published in the Class Schedule and Room Directory.

Costs for a Year at UCD
The costs 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 obtained from the Financial Aid Office.

<table>
<thead>
<tr>
<th>Average Student Costs Annually</th>
</tr>
</thead>
<tbody>
<tr>
<td>Undergraduate</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>Total (off-campus residence)</td>
</tr>
<tr>
<td>Additional for living on campus</td>
</tr>
<tr>
<td>Total (on-campus residence)</td>
</tr>
<tr>
<td>Graduate (Single, living off campus)</td>
</tr>
<tr>
<td>General</td>
</tr>
<tr>
<td>School of Law</td>
</tr>
<tr>
<td>(depending upon the year in school)</td>
</tr>
<tr>
<td>Graduate School of Management</td>
</tr>
<tr>
<td>School of Medicine</td>
</tr>
<tr>
<td>(depending upon the year in school)</td>
</tr>
<tr>
<td>School of Veterinary Medicine</td>
</tr>
<tr>
<td>(depending upon the year in school)</td>
</tr>
</tbody>
</table>

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.

Employee-Student Fees
Reduced fees are available to UC career employees and certain UC retirees who are qualified for admission to the University. Once admission has been granted, a petition for the reduction in fees must be filed prior to each quarter of enrollment. Employees students pay one-third of the regular fees and may enroll for up to nine units or three courses per quarter whichever is greater. Employee students on the semester system may enroll for up to six units or two courses, 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 the Library Reference Center, or the Staff Development and Professional Services Office. Petitions can be obtained through the employee's unit.

International Student Expenses
Careful budgeting is essential for international students. A minimum allowance of $20,000 (or more based on proposed fee increases) per year for a single student is recommended to cover nonresident tuition
and fees, and living expenses. A married student must budget an additional $2,500 per year for a spouse and $1,000 for each child accompanying the family.

The University of California, Davis, expects the international student to be responsible for the above costs. Prior to admission, the student must complete the Certification of Finances form certifying availability of funds for twelve months. It is important to note that tuition and fees may be increased without advance notice.

The international student should be cautioned that there will be numerous initial expenses during the first few months including cleaning and rent deposits for housing, telephone installation costs, bedding and cooking utensils.

No financial aid is awarded by the University to international students during their first year of study. After the first year of attendance, very little financial aid is available to international students, and it is probable that in the near future, no aid will be available to them. Therefore, international students must be prepared to pay their expenses for the entire length of their stay at UC Davis.

Fee Refunds

If you have to withdraw before the first day of instruction, you must complete a Cancellation of Registration form which is available from the Office of the Registrar. After the first day of instruction, you must fill out a Petition for Withdrawal which is also available at the Office of the Registrar.

New Undergraduate Students:

Prior to 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 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:

<table>
<thead>
<tr>
<th>Days</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>1-14</td>
<td>80%</td>
</tr>
<tr>
<td>15-21</td>
<td>60%</td>
</tr>
<tr>
<td>22-28</td>
<td>40%</td>
</tr>
<tr>
<td>29-35</td>
<td>20%</td>
</tr>
<tr>
<td>36 days and over</td>
<td>0%</td>
</tr>
</tbody>
</table>

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 will be refunded 100 percent of this fee. After the first day of instruction, no refund of the health insurance fee will be issued. Any questions regarding the refund of this fee for withdrawals should be directed to the Student Health Center.

FINANCIAL AID

Information:
Financial Aid Office
113 North Hall
916-752-2390 (TDD 752-3244)

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

Students who miss the priority filing date may not receive funds to meet their full need. However, you should still apply for financial aid even after the priority deadline because application processing will continue until funds are depleted. The Student Aid Application for California (SAAC) is available at local high schools, community colleges, and the Financial Aid Office. Continuing UCD students and prospective graduate students should obtain the SAAC and "Financial Aid—How to Apply, 1991-92" from the Financial Aid Office in December.
Financial Aid Deadlines
Priority filing period for grants, loans, work-study, and California Student Aid Commission applications for 1991-92: Jan. 1-Mar. 2
Deadline to file for fellowships and graduate scholarships for 1991-92 with the Graduate Division: Jan. 15

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 UCD Scholarship Office, 207 North Hall, 916-752-2393.

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 the Graduate Division. Eligibility for state graduate fellowships is based on grade-point average, test scores, and financial need. Awards are applied directly toward fees.

Eligibility for most assistance is based upon demonstrated financial need. Most scholarships are not need-based. Eligibility is determined by the following formula: 1) the student is assigned a standard budget reflecting the average costs for a student attending UCD; 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.

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, 113 North Hall. 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.

Pell Grants are federally funded awards. All undergraduate financial aid applicants are required to apply for a 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 for a Pell Grant 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). All parts of the SAR must then be submitted to the UC Davis Financial Aid Office. The amount received depends on 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 by following 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 and are available to U.S. citizens or permanent U.S. residents who are at least half-time students and 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 regular financial aid application and provide supporting documents. Applicants should also write to the agency which administers their tribal affairs and request a BIA Higher Education Assistance application. The BIA Financial Aid counselor on campus can assist you with completing 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 the PLUS/SLS program) 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

Perkins Loans are for U.S. citizens or permanent U.S. residents. Loans may be limited to a percentage of student's need because of demand and limited funds. Repayment starts six to nine months after graduation or withdrawal from school and may be extended over ten 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.

$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)

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 maximum for veterinary medicine and first-year medical students
$3,333 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

Stafford Student Loans are available through banks and other lending institutions. These loans are based on financial need. Interest accrued while the student is in school is paid by the federal government.

$2,625 maximum per year for freshmen and sophomores, $4,000 maximum per year for juniors and seniors, to $17,250 maximum cumulative indebtedness for undergraduate students
$7,500 maximum per year to $54,750 maximum cumulative indebtedness for graduate students
7-9 percent interest (may change on short notice)
Repayment begins six months after graduation or withdrawal

Health Education Assistance Loan (HEAL) Program provides federally insured loans to students attending the School of Medicine. The loans are made by participating lenders, including banks, credit unions, and savings and loan associations.

$20,000 maximum per academic year (or the financial need of the student, whichever is less)
$80,000 total maximum
The HEAL Program does not provide a subsidy for interest

Interest is set at 3 percent points above 91-day T-Bill rates
Repayment begins nine months after completion of formal training, including accredited internship and residency programs or withdrawal

Parent Loans to Assist Undergraduates (PLUS) and Supplemental Loans to Assist Students (SLS) are government-insured loans that are made to parents of dependent students, to independent undergraduate students, and to graduate or professional students by participating banks and other lenders, regardless of income and assets.

Parents of (1) dependent undergraduate students or (2) dependent graduate and professional students may borrow $4,000 per year to a maximum aggregate of $20,000 for each dependent student
Independent undergraduate students or graduate and professional students may borrow up to $4,000 per year to a maximum aggregate of $20,000
There is no interest subsidy for this loan
Repayment begins 30 days after loan disbursement

Quick Loans, Short-Term Loans, Teaching and Research Assistant Loans are designed to meet temporary or emergency financial needs of registered students. Loan funds are provided by UCD alumni, ASUCD, the Cal Aggie Foundation, the Regents of the University of California, and private donors.

Quick loan: $200, or fee payment and $200; no appointment is required. Pick up the application and drop it off at the Financial Aid Office during the hours posted in North Hall. Return in 24 to 48 hours to obtain the loan.
Short-term loan: $300 maximum; the full amount of in-state registration fees for one quarter may be borrowed in the form of a fee voucher. The maximum repayment period is five months.
Teaching assistant loan: students who are in the teaching assistant, research assistant, associate-instructor, and postgraduate researcher classifications can apply for a maximum of one month's salary before and during fall quarter. The maximum repayment period is six months.
Applications for Short-Term Loans, Quick Loans, or Teaching and Research Assistant Loans are available in the lobby of North Hall. For more information or to schedule an appointment, call 916-752-6470, 10 a.m. to noon and 2 to 4 p.m.

Work-Study
The College Work-Study Program enables 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 College Work-Study.

Federal Work-Study is funded by the federal government. Employment may be on or off campus with profit or nonprofit organizations. To be eligible, you must be a citizen or permanent resident of the U.S., must carry at least a half-time academic course load, and must 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. This program is primarily used for international students with financial need who would be ineligible for Federal Work-Study.

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 section of this catalog.

UNDERGRADUATE SCHOLARSHIPS AND AWARDS

Information:
Scholarship Office
207 North Hall
916-752-2393

At UC Davis a special effort is made to recognize exceptional students. Approximately 150 different undergraduate scholarships are administered by the Scholarship Office, and many more scholarships are handled through outside agencies.

Scholarships are awarded on the basis of academic excellence and exceptional promise. 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. Continuing students and applicants for winter or spring quarter should obtain scholarship applications from the Scholarship Office in October. These applications are due in mid-December. Announcement of winners is usually made beginning in mid-April.

Graduate students are also eligible for various scholarships and fellowships. (See the Graduate Division 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 $500 per year award) or may be accompa-panied by a stipend generally covering the difference between family resources and yearly educational costs. The Regents Scholarship Committee conducts personal interviews during the final selection process. 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 $2,000

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

Fees, Expenses and Financial Aid
Student Life
LIVING AT DAVIS

Residence Halls
Information:
Student Housing Office
916-752-2003

You can expand your UC Davis experience and add a measure of convenience to your life by living on campus; some 4,300 undergraduates and 178 graduate students do just that. Each of the residence hall complexes is staffed with students and professionals who 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 applications are received on or before April 1, 1991, are guaranteed residence hall housing as long as they complete all of the instructions which accompany their contracts. All graduate students whose applications are received on or before May 1, 1991, will participate in a lottery for the 178 spaces available in Lysle Leach Hall.

The total room-and-board rate for 1991-92 is $5,015 for a double-occupancy room and $5,505 for a single room (of which there are very few available to new residents). Rooms are furnished to provide each resident with a bed, desk and chair, bookcase, chest of drawers, study lamp, and bulletin board. Two meal options are available.

If the Davis campus is your choice when filling out your University Admissions Application, the necessary information and applications are mailed to you by the Student Housing Office. If you have a physical disability which requires special housing accommodation, please attach a detailed letter of explanation to your application.

Student Family Housing
Information:
Student Family Housing Office
Orchard Park/Solano Park
916-752-4000

There are 476 furnished and unfurnished on-campus apartments for UCD student families. The monthly rates for the academic year 1990-91 were as follows:
- Orchard Park, two-bedroom unfurnished apartment, $391.
- Orchard Park, two-bedroom furnished apartment, $405.
- Solano Park, one-bedroom unfurnished apartment, $266.
- Solano Park, two-bedroom unfurnished apartment, $324.

Vacancies in Student Family Housing are filled from a chronological list based on the date of application. You should anticipate a wait of at least eight months for a fall assignment (may be less at other times during the year). An application may be submitted before you are admitted to the University and before you are married, but you must show documentation of your student and marital or parental status before occupancy can be granted. If a member of your family has a physical disability which 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 1990-91 ranged from $390 for a one-bedroom unit to $630 for a three-bedroom unit.

Other Graduate Student 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. For the academic year 1990-91, monthly rent for a studio was $409 and $570 for a two-bedroom unit.

Community Housing
Information:
Student Housing Office
916-752-2483

If you choose to live off campus, the Community Housing Office can be a valuable resource. This office maintains vacancy listings to assist you in roommate selection and in locating rental housing off campus. Housing available in the community includes apartments, duplexes, condominiums, mobile homes, and rooms in private homes. Listings change daily, so they are not furnished by mail nor given over the telephone.

Other services of the Community Housing Office include: counseling and mediation of landlord/tenant and roommate grievances; educational programs; publications; liaison with fraternities, sororities, city government offices, and housing-related agencies in the community; and child care information and referral. This office also provides information on accessible housing to persons with disabilities.

STUDENT SERVICES

Student Health
Information:
Cowell Student Health Center
916-752-2300 (voice, and telephone device for the speech and hearing impaired)

Your health is important to you and to the University. Consequently, every new full-time student and every full-time student who returns after an absence must submit a medical history form, and evidence of mumps and rubella immunity to the Health Center as part of registration.

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. Applicants 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 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.

The services of the Health Center are available to students and their dependents on a fee-for-service basis. Also, a Health Insurance Plan for your spouse and children may be purchased at the Health Center.

**Health Insurance.** Graduate, professional, and international students have a mandatory insurance plan that is purchased as part of registration. Undergraduate students have an opportunity to purchase a voluntary plan during registration. For more information, you may call 916-752-2612 or visit the Insurance Office at Cowell Student Health Center, 8:00 a.m. to noon and 1:00 to 5:00 p.m., Monday through Friday.

**Child Care Programs**

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

- The Community Housing Office distributes child care publications, coordinates child care information and referral services among a network of satellite campus units, and serves as the University's liaison with Kids On Kampus, Russell Park Child Development Center, and the City of Davis Child Care Services Program. For further information, contact Community Housing, 101 Student Housing Office, or telephone 916-752-2483.

- The City of Davis Child Care Services Program provides free child care resource and referral information and on child care subsidies in the community. The program is funded jointly by the University of California, Davis; the City of Davis; and the State Department of Education. Up-to-date information is maintained on licensed day care homes, day care centers, nursery schools, co-ops, playgroups, and other family-related services. Additional services include workshops and handouts; a bimonthly newsletter; a parenting resource library; and a book, video, and toy lending library. It is located at 23 Russell Boulevard, 916-757-5626.

- The UCD Registration Fee Child Care Subsidy Program assists full-time students with partial child care subsidies. Spouses must also be full-time students or employed full time. Eligibility is based on family income, with awards determined by lottery. Parents can choose from licensed family day care providers and child care centers. For additional information, call City of Davis Child Care Services Program at 916-757-5626 or drop by 23 Russell Boulevard.

- The Child Care Grant Program, funded by the California Department of Education and administered by the City of Davis Child Care Services Program, provides subsidized care on a sliding fee schedule. Waiting list applications are accepted year round. Admittance is based on income and priority guidelines set by the State. For information call 916-757-5626, or drop by 23 Russell Blvd.

- The Financial Aid Office can assist students who are parents and who qualify for financial aid with allowances for direct child care costs (in-home provider or child care center charges). This office is in 113 North Hall, 916-752-2390.

- The Student Employment Center posts job listings of parents wishing to hire child care providers and of providers interested in serving students, staff, and faculty. This office is in 114 South Hall, 916-752-0520.

- Kids On Kampus and Russell Park Child Development Center are privately owned and operated child care centers on the UC Davis campus. Reduced rates are given to residents of Russell Park, Orchard Park, and Solano Park student family housing. Information about Kids on Kampus, serving infants through preschool, 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 Early Childhood Laboratory is a teaching and research facility associated with the Human Development Program. Four different programs accommodate children from the ages of six months to six years for three hours a day, following the UC Davis academic calendar. Student families pay lower tuition than do UCD staff, faculty, and community-affiliated families. Children are selected from a waiting list according to criteria designed to meet academic goals. The laboratory is located on campus, and the office is in TB 117, 916-752-2898.

- For those living in on-campus Student Family Housing, parent associations in Orchard and Solano Parks sponsor low-cost cooperative playgroups. Morning sessions are held in each area for children ages two to five. Participation is limited to Student Family Housing residents. For further information or referral, telephone 916-752-4000, Orchard Park/Solano Park, Student Family Housing Office.

- The Perfect Tender infant care cooperative serves six infants under twelve months of age whose parent(s) attend the School of Law. Contact 916-752-0243 for additional information.

- The Women's Resources & Research Center provides a free child emergency notification service for single parents and others with special circumstances. Once registered, the parent will be located and contacted in class in the event of a serious, health-related emergency involving her/his child. The Center is located in 10 Lower Freeborn, 916-752-3372.
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.

A variety of employment opportunities are offered 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 8:30 to 11:45 a.m. and from 1:00 to 4:00 p.m.

**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, 5, 25, 30, 47, 49, 50, 54, and 81. 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. For visitor parking information, please consult the South Gate Kiosk on Old Davis Road, or call Transportation and Parking Services at 916-752-8277.

**Campus Shuttle.** The TAPS (Transportation and Parking Services) Intracampus Shuttle System provides service to the central campus area. Other TAPS shuttles provide service to the UCD Medical Center, Research Park, and University facilities on Chiles Road.

**Buses.** Units, eight bus lines operated by the Associated Students, serves the campus year round. Undergraduate students ride by showing a valid registration card. Others ride by paying a cash fare or purchasing tickets or passes at the Campus Box Office. Full service is provided each UCD school day (Monday through Friday) and Monday through Thursday night during the regular school year—fall, winter, and spring quarters. Reduced schedule bus service operates during the summer, finals week, and all academic break periods. Finals and break schedules are available during the last week of classes each academic quarter. Schedules are available at the MU Information desk, bus terminals, City Hall, Chamber of Commerce, Post Office, and at the Unitrans office.

**Ridesharing.** Ridesharing is encouraged. Information on transportation alternatives to the Davis campus is available by calling 916-752-MILE or by visiting the Transportation and Parking Services Office located on Extension Center Drive. Information may be obtained on 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, music listening, 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 UCD with your leisure interests.
Memorial Union and Campus Recreation

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

The Memorial Union (MU) complex, directly north of the Quad, serves as the community center for the campus by providing campus services and a variety of extracurricular activities. Bring yourself up to date on local events by stopping at the MU Campus Information Center in Griffin Lounge on the main floor. 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 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, Campus Events and Information, and Student Activities and 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 UC Davis Presents Office and the Campus Box Office, where you can purchase tickets for campus events and cash checks, are in Freeborn.

Outdoor patios furnished with wooden benches and umbrella tables offer an inviting open-air seating environment.

In addition to the overall operation of Memorial Union facilities, professional and student staff of the Memorial Union and Campus Recreation office coordinate the following facilities and programs:

The MU Art Gallery and Music and Periodicals Center, adjacent to King Lounge on the second level of the Memorial Union, feature changing series of contemporary and historical art exhibits throughout the year. Print sales, special programs, and lectures are sponsored by the Gallery, 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 library of albums for your listening pleasure. Further information regarding these services may be obtained by calling 916-752-2885/1730.

The Games Area, located below the UCD Bookstore, is a recreational facility consisting of a bowling center, billiards room, video arcade, lounge, snack bar, 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 the disabled. Call 916-752-2580/1730 for details.

Two special programs of the Memorial Union, the MU Campus Information Center and Leisure Education Programs promote balanced, healthy living. Through information and referrals, the Center links people and their interests with appropriate resources. The Center is open weekdays from 8:00 a.m. to 5:00 p.m., or call 916-752-2222. Leisure Education Programs offer a variety of presentations on personal balance and well-being as well as recreational opportunities available on campus. Presentations are available for your group by calling 916-752-1730.

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 like volleyball, receptions, and picnics. Additional lodge amenities include kitchens and outdoor barbecues.

Outdoor Adventures, in the Barn on the corner of California and Hutchison, is a valuable resource for planning your outdoor excursions and developing your outdoor skills. Rental equipment of professional quality is available as well as resource information from an up-to-date library of topographic maps, trail guides and other materials. Classes, excursions and clinics in backpacking, rock-climbing techniques, white-water 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, white-water 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 916-752-1730.

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 an extensive volunteer program has been designed to 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 Polo and Equestrian Clubs for student participation. Telephone 916-752-2372/1730 for further details.

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. The Hickey Gymnasium Pool is also available on a limited basis for nighttime recreational lap swimming. More information regarding these services can be obtained by calling 916-752-2695 or 916-752-1995/1730.

The Silo Union, recently renovated to serve a variety of campus needs, offers food services, meetingconference facilities, lounges, and the campus pub. If you
would like to reserve space in the Silo for a meeting, social event or conference, contact Campus Events and Information at 916-752-2813.

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 passes may be purchased 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. More information can be obtained by calling 916-752-1475/1730.

The South Silo also houses the ASUCD Experimental College (916-752-2568), Student Special Services (916-752-2007), Graduate Student Association (916-752-6108), and a Branch 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, sports clubs, and special events. The tri-level facility has locker rooms; a flat running track; an equipment room; racquetball, wallyball, and squash courts; a weight room with free weights, universals and a self-guided circuit training concept that utilizes hydraulic machines; main court areas for basketball, volleyball, and badminton; and areas for martial arts, table tennis, gymnastics, aerobics, and dance. The Special Events Room can be reserved for meetings by calling the Campus Events and Information Office.

Students can use Rec Hall facilities by showing their current, valid photo ID card. They may also purchase a $5.00 guest pass valid for three people. Nonstudents 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 Friday from 6:00 a.m.–midnight, Saturdays 9:00 a.m.–6:00 p.m., and Sundays noon–10:00 p.m. throughout the year. Rec Hall hours are shortened during quarter breaks and summer.

Numerous special events sponsored each year by the campus and community are held in the 8,400-seat Recreation Hall.

Recreation Hall maintains an outdoor fitness cluster on Orchard Field, the tennis courts 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.

Intercollegiate Athletics, Intramurals and Club Sports

Information:
264 Hickey Gymnasium
916-752-1111 (Intercollegiate Athletics)
916-752-3500 (Intramurals and Club Sports)

Intercollegiate athletics, intramurals, and club sports 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 participation that meets student needs at every level of competence and depth of interest.

Although intercollegiate athletics at Davis is intended to benefit the campus by providing esprit de corps, its prime 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 1,000 students compete on varsity or junior varsity teams each year.
The club sports program includes both recreational and competitive offerings involving 37 sports with 2,100 participants per year, while the intramural program provides competition in 36 sports and serves approximately 14,000 participants.

**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 (916-752-2523), located in Freeborn Hall, 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 advertise programs and local events.

Annual and quarterly brochures and promotional materials for upcoming events are available through the UC Davis Presents office at the above location. Tickets for UC Davis Presents events may be purchased at the Campus Box Office in Freeborn Hall.

**Music**

The Department of Music (916-752-0666) sponsors the UCD 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 also sponsors an artist-in-residence for one quarter each year who gives concerts, recitals, and lectures, and who works with music classes and individual students. 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 one hundred public concerts each year.

**Drama**

The Department of Dramatic Art has one of the best 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); graduate students working on Master of Fine Arts (MFA) degrees in acting, directing, playwriting, and design; and an unusually good stock of scenery, props, costumes, and lighting equipment all contribute to the professional quality of Davis productions. Each year's drama schedule includes University Theatre Season (five major productions of established plays); one major special event; Premiere Season (five smaller productions of plays written by students); Studio Season (three smaller productions of established plays); and dozens of class-related projects. 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 UCD 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 and summer break. Student employees and interns operate the facility. Works by professional artists as well as students are on display for periods of six weeks.

The Design Gallery (916-752-6223) 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 Picnic Day Student 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.

The Richard L. Nelson Gallery (916-752-8500), named in honor of the first chairperson of the Department of Art, was dedicated in 1976. Located on the first floor of the Art Building, the Gallery organizes reg-
ularly 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. 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 student-run Basement Gallery (916-752-0105 to leave a message) in the Art Building features art work by undergraduate UCD art majors. The work changes weekly.

The C. N. Gorman Museum (916-752-6567, Native American Studies), located in Hart Hall, was established in 1973 in honor of Carl N. Gorman, artist, advocate and former faculty member of Native American Studies on campus. The museum features changing exhibitions of works by contemporary Native American and other ethnic artists. Selections from the permanent collection of art and artifacts are also exhibited on a rotating basis throughout the year.

ASSOCIATED STUDENTS (ASUCD)

Information:
Executive Council Office
370 Memorial Union
916-752-3833

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. Graduate and professional students may 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 Executive Council. Based on the city council form of government, the Executive Council consists of seven elected council members and the Council President and Vice President. The Council is the policy-making body for ASUCD and supervises all aspects of the association. The Council 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 University-wide administration, the Regents, and the Davis city government.

Five commissions are subordinate advisory bodies of the Executive Council, and assist the governing board with its decisions by researching legislation and making recommendations. Commission chairpersons are ex-officio members to the Council. Each commission also involves itself with various projects that relate to their specific area.

- Academic Affairs acts as an advocate to 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 Executive Council on all financial matters.
- Ethnic and Cultural Affairs makes recommendations on policies and programs concerning UCD's 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.
- The Judicial branch consists of two boards whose members are appointed by the Executive Council Chair.

- The Student Judicial Board is responsible for determining eligibility of candidates for elective office in ASUCD and interpreting and enforcing the ASUCD Constitution.
- The Student Appeals Board rules on appeals to Student Judicial Board decisions.

ASUCD operates more than fifty activities and services for UCD students. Information about these services can be found in the Student Directory, which combines details about ASUCD services and organizations and the ASUCD directory, or by visiting the ASUCD offices in the Memorial Union.

Some of the services operated by the ASUCD for University students include the Unimart bus system, California Aggie newspaper, Student Viewpoint evaluation of professors and classes, the Bike Barn repair service, travel service, free legal advice for undergraduate students, 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 KDSV stereo FM, Classical Notes and Campus Copies, The Third World Forum newspaper, Homecoming, Student Forums, Entertainment Council, Whole Earth Festival, and Picnic Day. ASUCD also cooperates with Associated Student groups on other University of California campuses to operate a full-time Student Lobby in Sacramento to represent student interests to state government, as well as a full-time student lobby on the national level to represent student interests on such matters as financial aid.

GRADUATE STUDENT ASSOCIATION (GSA)

Information:
Room 253, South Silo
916-752-6108

GSA is the officially recognized student government for UC Davis graduate students. It links graduate students to each other and to the UCD administration. GSA provides a place for discussion of any issues affecting graduate student academics or quality of life. Every graduate program should elect or designate GSA representatives to advocate graduate student concerns effectively.

General Assembly meetings are held once a month and are open to anyone interested in attending. Each
year several graduate students are elected to the GSA Executive Council in a variety of positions to carry out the policies and functions of the organization. A small portion of your registration fees is used to support the activities of GSA. GSA provides advocacy, services, and information to all graduate students, and in turn, needs your participation. Please call or visit the GSA office.

STUDENT ACTIVITIES

Information:
Student Activities Office
4th Floor, Memorial Union
752-2027

There are over 300 registered student organizations at UCD which represent a wide variety of student interests, including cultural, social, religious, political, ethnic, academic, international, recreational, performing, residence hall, and service groups. The Student Activities Office registers these diverse groups and provides advising on activities, resources, and campus policies. In addition to the subunits described below, Student Activities administers a number of campus programs: Club Finance Council, Activities Faire, Leadership Training Programs, and national collegiate leadership awards competitions. Student Activities staff assist individual students who want to become involved in activities or start new organizations. All students are encouraged to drop by the office to review the resources available to them.

Cultural Days is an annual series of programs celebrating the diverse ethnic cultures of the university community. They include Native American Indian, African American Festival, 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 UCD Spirit Squad is a group of talented and enthusiastic dancers, stunt team members, and gymnasts who travel and perform with the band.

JUDICIAL AFFAIRS

Information:
Student Judicial Affairs
4th Floor, Memorial Union
916-752-1129

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 serves as a resource for 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 compati-

ble 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 booklet, University of California Policies Applying to Campus Activities, Organizations, and Students. The operation of the campus student disciplinary system is outlined in the booklet UCD Administration of Student Discipline. These policies and regulations are available from the Office of Student Judicial Affairs, 463 Memorial Union.

A one-sheet summary of student conduct expectations is distributed during registration. 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; harassment, including “fighting words”; forgery; theft: vandalism; illegal possession, use, or sale of drugs or alcohol; hazing; and alteration or misuse of University documents, records, keys, or identification. Disciplinary sanctions which may be involved range from a warning to dismissal and/or restitution.

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 compliance with the announcements and regulations printed in this catalog and in the Class Schedule and Room Directory, published in the campus newspaper, and with all policies, rules, and regulations of the University and this campus.

You will not be able to register, receive transcripts of record, or diplomas until you have met all University obligations.

ALUMNI ASSOCIATION

Information:
Cal Aggie Alumni Association
UC Davis
Davis, CA 95616
916-752-0286
Toll free in California 1-800-242-GRAD

After graduation you can continue your association with UC Davis through membership and participation in the Cal Aggie Alumni Association.

The Association and its alumni members support UC Davis through support and sponsorship of many activities and programs. Sustaining membership in the alumni association is only $20 per year for first year graduates. Members are afforded the many special programs and benefits of the Association. Call the alumni association for more information or drop by the alumni office before you graduate.
Academic Advising and Student Resources
ACADEMIC ADVISING
UC Davis offers many different types of academic advising to help you get the most from your education. Our 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
916-752-0108

The Dean's Office provides you with:

• Academic advising: advice regarding probation/dismissal status, admission to the College, readmission, and second bachelor's, limited, and regular status.

• Action on petitions that require the Dean's approval.

• Additional services include: study plan clearance; College English requirement check; release of holds on registration packets; final evaluation for graduation; evaluation of Transfer Core Curriculum.

• A Special Events unit responsible for the College Commencement Program.

Departments and Advising Centers
Faculty Advisers. You will be assigned a faculty adviser to help you plan a program that corresponds to your individual educational interests. The Master Advisers are responsible for coordinating advising within a major. You are strongly urged to consult with your faculty adviser or staff adviser each quarter prior to 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.

Advising Centers. Advising on academic programs is available at the College's Academic Advising Center, 122 Hoagland Hall, where advising activities in the College are coordinated.

The primary advising function is advising for students in the Exploratory Program. Advising for Individual Majors is also carried out in the Academic Advising Center.

There are numerous Advising Centers staffed by Advising Associates who are knowledgeable in all aspects of University and College rules and regulations, courses, specific requirements of majors, and career opportunities. Following is a list by major.

ANIMAL SCIENCE
 Majors in Animal Science
 Animal Science
 Avian Sciences
 Wildlife and Fisheries Biology
 Advising Centers:
 1202 Meyer Hall, 916-752-8118 (Animal Science only)

3202 Meyer Hall, 916-752-1300 (Avian Sciences only)
Interdisciplinary Major
Agricultural Science and Management
Advising Center: 1202 Meyer Hall, 916-752-8118

APPLIED ECONOMIC AND BEHAVIORAL SCIENCES
 Majors in Applied Economics
Agricultural and Managerial Economics
Advising Center: University House Annex, 916-752-6185

 Majors in Behavioral Sciences
Agricultural Education
Applied Behavioral Sciences
Design
Human Development
Landscape Architecture
Advising Centers:
101 or 103 AOB 4, 916-752-2244
152 Walker Hall, 916-752-1165 (Design; Landscape Architecture only)

BIOLOGICAL SCIENCES (an Intercollege Division)
 Majors in Biological Sciences
Biochemistry
Biological Sciences
Botany
Genetics
Microbiology
Physiology
Zoology
Advising Centers:
376 Mrak Hall, 916-752-0410 (Biological Science only)
106 Briggs Hall, 916-752-3896 (Animal Physiology only)
148 Briggs Hall, 916-752-9332 (Biochemistry only)
151 Robbins Hall, 916-752-4749 (Botany only)
2301 Storer Hall, 916-752-7466 (Zoology only)

FOOD, NUTRITION, TEXTILE AND CONSUMER SCIENCES
 Majors in Food Sciences
Consumer Food Science
Fermentation Science
Food Biochemistry
Food Science
Advising Centers:
128 Cruess Hall, 916-752-1488 (Consumer Food Science, and Food Science only)
2487 Chemistry Annex, 916-752-6188 (Food Biochemistry only)
3001 Wickson Hall, 916-752-1909 (Fermentation Science only)

 Majors in Nutrition
Community Nutrition
Dietetics
Nutrition Science
Advising Center: 1151 Meyer Hall, 916-752-2512

 Majors in Consumer Sciences
Fiber and Polymer Science
Textiles and Clothing
Advising Center: 129 Everall Hall, 916-752-4417

PLANT SCIENCES AND PEST MANAGEMENT
 Majors and Programs in Plant Sciences
Plant Science
Range and Wildlands Science
Advising Center: 132 Hunt Hall, 916-752-1715

Food Science
Fermentation Science
Food Biochemistry
Food Science
Advising Centers:
128 Cruess Hall, 916-752-1488 (Consumer Food Science, and Food Science only)
2487 Chemistry Annex, 916-752-6188 (Food Biochemistry only)
3001 Wickson Hall, 916-752-1909 (Fermentation Science only)

 Majors in Nutrition
Community Nutrition
Dietetics
Nutrition Science
Advising Center: 1151 Meyer Hall, 916-752-2512

 Majors in Consumer Sciences
Fiber and Polymer Science
Textiles and Clothing
Advising Center: 129 Everall Hall, 916-752-4417

PLANT SCIENCES AND PEST MANAGEMENT
 Majors and Programs in Plant Sciences
Plant Science
Range and Wildlands Science
Advising Center: 132 Hunt Hall, 916-752-1715
Major in Pest Management
Entomology
Advising: 394A Briggs Hall, 916-752-0490

Interdisciplinary Major
Agrarian Studies
Advising: 2039 Wickson Hall, 916-752-0928

RESOURCE SCIENCES AND ENGINEERING

Majors in Environmental Studies
Environmental Biology and Management
Environmental Policy Analysis and Planning
Advising Center: 2134 Wickson Hall, 916-752-3088

Majors in Resource Sciences
Atmospheric Science
Environmental Toxicology
Resource Sciences
Soil and Water Science
Advising Centers:
122 Hoagland Hall, 916-752-1869
4111 Meyer Hall, 916-752-1042 (Environmental Toxicology only)

Major in Agricultural Engineering
(See College of Engineering)

Interdisciplinary Major
International Agricultural Development
Advising Center: 101 AOB 4, 916-752-2244

Peer Advisers. Student advisers are available in the College's Academic Advising Center and at other advising centers around campus.

Associate Deans of Resident Instruction and Student Affairs
Associate Deans:
Ericka L. Barrett
Shu Geng
228 Mrak Hall
916-752-0108

The College has two associate deans of resident instruction and student affairs and an 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:
122 Hoagland Hall, 916-752-0610

Are you unsure what major you really want to pursue? If so, you may wish to register in the Exploratory Program. With the assistance provided by the College's Academic Advising Center and the major advisers in the respective departments and major program offices, 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.

Orientation Class
Each quarter the College offers an orientation course (see Programs and Courses section) to introduce students to the University, to aid them in formulating edu-
cational objectives, and to help them identify the many educational opportunities at UCD. Although not required, this course is recommended as a useful means for discovering what the Davis campus and the College of Agricultural and Environmental Sciences are all about.

College of Engineering
Departments and Advising Centers
Undergraduate Office (2132 Bainer Hall). By contacting the Undergraduate Office, you may obtain information and assistance on academic, career, and personal matters either through direct assistance with one of the staff members or through referral to other offices on campus. The Undergraduate Office has primary responsibility for student petitions, for evaluation of transfer units, for articulation, and for degree certifications.

Faculty Advisers. You will be assigned a faculty adviser before your first term on campus. Students in engineering usually retain the same faculty adviser throughout the undergraduate program, but you may change to a new adviser of your choice whenever you wish. It is necessary only to keep the Undergraduate Office informed of adviser selections.

Faculty advising is supplemented in some departments by a system of staff advising that can provide services especially designed for students in that department. Consult your departmental office for more information.

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

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

Peer Advisers. Faculty advising is complemented by a well-developed peer advising system. Student advisers are available at Bainer Hall 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
150 Mrak Hall
916-752-0392

The Associate Deans and staff in the Letters and Science Advising Office are available to assist you with a wide variety of issues relating to your academic goals and experiences. Individual consultation is provided 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 UCD

Departments and Advising Centers

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 campus to discuss their educational goals, course program, and progress.

Continuing students who have completed three quarters in residence in the College are no longer obligated to consult an adviser except at checkpoint stages (below); they are urged, however, to maintain regular contact with an adviser in their major to avoid program errors which 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 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 are required to 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 the 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 a Degree Check from the Letters and Science Advising Office and consult your adviser concerning course selec-

tion 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 achieve your goals and to meet the degree requirements, you must contact the Letters and Science Advising Office immediately.

If you have not met with your faculty adviser before these established check points, a hold will 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 student assistants to the dean are available during regular office hours in 150 Mrak Hall to talk with students about their academic concerns.

Division of Biological Sciences

The Division of Biological Sciences Office
376 Mrak Hall
916-752-0410

The associate dean and staff in the Division of Biological Sciences Office can assist you with a variety of issues including PEP, withdrawal, part-time status, 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.

Departments and Advising Centers

Students entering or intending to declare departmental majors in biochemistry, botany, genetics, microbiology, physiology, or zoology should contact the specific department office for academic advising services. Students selecting the biological sciences major should contact the Division of Biological Sciences Office for academic advising services.

OTHER ACADEMIC ADVISING

Academic Peer Advising

Academic Peer Advising 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 108 South 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 pro-
cedures, 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 which is open from 9 a.m.—4 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 provides coordination for the Summer Advising and Registration Program, Fall Quarter Advising activities, Preview Day, and many other student assistance and orientation programs for new students. The staff seeks to help students learn about the campus environment, procedures, and opportunities, and to offer 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 106 South Hall, 916-752-3000.

Advising Services

The Pre-Business School Adviser, 108 South Hall (916-752-3000), is a student peer adviser who can assist you in seeking information about graduate schools in business, management, and public administration. This office also works with students who are in the process of applying to graduate school in business and distributes the Graduate Management Admission Test (GMAT) booklet. There is a useful library of business school catalogs and an informational handbook available.

The Pre-Graduate School Information and Referral Service is a program available through Advising Services to assist students interested in M.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. Advisers are available through the main Advising Services office, 108 South Hall, 916-752-3000.

The Pre-Law Advising Office is where students interested in 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. Many seminars and workshops are also held each year to provide students with more information for preparation for law school and a legal career. The pre-law advisor may be contacted in 108 South Hall, 916-752-3009.

The Health Sciences Advising Office, 106 South 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:
313 North Hall
916-752-5472

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; coordinating EOP/SAA new student orientation programs; as well as serving as liaison to staff, faculty and administrators. The office's multicultural peer staff is particularly sensitive to differing social, cultural, and ethnic concerns and serves as a valuable resource to students. 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 North Hall or any one of the outreach locations to find out more about the peer counseling services.

Academic Reentry Program

Information:
175 Mraz Hall
916-752-2671

If you are a nontraditional student, you can find help through the Academic Reentry Program which offers preadmission and reentry advising. The program's resource area contains information on major programs, and staff is available to discuss ways of combining past study with future academic and career goals. Referrals to major advisers and campus services are made. Students reentering at the graduate level can also receive special assistance in the Office of the Graduate Division.

Once admitted, the campus provides additional assistance with an orientation to campus life through Advising Services and through study skills workshops at the Learning Skills Center. Reentry/Transfer Student Services assists admitted students in connecting with campus resources and support groups.

ACADEMIC HELP

Learning Skills Center (LSC)

Information:
The Basement, South 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 many more...

In addition to the above areas of assistance, the Center provides individual tutoring sessions for students on academic probation or subject to dismissal. Group and drop-in tutoring is available to the general student body.

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 which enable you to work at your own pace. The LSC Library contains a variety of programmed instructional materials, reference books, and preparation materials for the GRE, MCAT, and LSAT exams, many of which may be checked out.

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

EOP/SAA Tutoring

Information:
Learning Skills Center
The Basement, South Hall
916-752-2013

EOP/SAA Tutoring is a free service for EOP and affirmative action students. If you are having difficulty with your course work, 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-on-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
The Basement South Hall
916-752-2013

New EOP/SAA students (freshmen and transfers) 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 course work and developing academic skills. It helps students adjust academically and socially to the campus by strengthening their learning skills and study habits, and by providing an extensive orientation to campus life.

Learning Resource Centers

Information:
Student Housing
Lora Jo Bossio
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: tutoring, PC computer terminals and assistance, a reference library, language tapes, study sessions, special learning skills programs, an exam file, and a quiet place to study.

RESOLVING ACADEMIC PROBLEMS

The Grievance Process

Discrimination/Harassment. If you believe that you have been discriminated against or harassed, you may contact the ASUCD Grievance Center (see below) for information and a list of advisers. Advice is also available from the campus' Sexual Harrassment Information Line (916-752-2255) or the office of Student Judicial Affairs (see below).

Grade Changes. If you believe you received an incorrect grade due to a clerical 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 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).

ASUCD Grievance Center

Information:
ASUCD Academic Affairs Office
376 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, and prejudicial treatment in the classroom.)

Committee on Student-Faculty Relationships

Information:
Academic Senate Office
350 Mrak Hall
916-752-2231

The Committee on Student-Faculty Relationships is a committee of the Academic Senate. If students feel they cannot get satisfaction through normal procedures, they may contact the committee 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. It may not, however, make any binding decisions.

Student Judicial Affairs

Information:
Student Judicial Affairs
4th Floor, Memorial Union
916-752-1125

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 serves as a resource for conflict resolution and it can provide interpretations of University policies and regulations.

**STUDENT SERVICES**

**Counseling Center**

Information:  
219 North Hall  
916-752-0871

The Counseling Center offers confidential psychological, psychiatric, and peer counseling services to students having problems which affect their academic progress and sense of well-being. To make an initial appointment, students can telephone or come to the Counseling Center. Students, faculty, or staff who have a concern about a student or desire assistance in making a referral, are encouraged to call the Center.

**The House**

Temporary Building 16  
24-Hour Hotline: 916-752-2790  
Business Line: 916-752-5065

Located in a green, two-story house next to the Housing Office, The House is a peer counseling program of the Counseling Center. The setting provides an informal environment where students can receive confidential support, information, and referrals regarding personal or relationship problems. The facility is staffed by well-trained student volunteers and is professionally managed.

Students can receive assistance through individual peer counseling and a wide variety of workshops and support groups. 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.

**Associate Dean of Students**

Information:  
1st Floor, South Hall  
916-752-2019

The Associate Dean of Students provides advising, referral, and program development to meet the needs of undergraduate and graduate students, particularly women students. The Associate Dean intercedes with faculty, academic, and Student Affairs administrators on behalf of students in academic or personal difficulty; interprets policies and procedures for students and parents; and works with schools, academic administrators, and individual faculty to assist students in meeting UCD academic requirements. This office also provides leadership and influences policy and program development in the administration of activities related to the special needs of women and graduate students.

**Health Education**

Information:  
Cowell Student Health Center  
916-752-9652

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

**Drink Responsibly in College** (916-752-DRUG or 752-3784)—Information on alcohol and other drugs, support and referral for students who have or know someone with a substance abuse problem.

**Health Advocates** (916-752-9651)—Information on nutrition, exercise, stress management, eating disorders, and other wellness issues.

**Peer Counselors in Sexuality** (916-752-1151)—Information on birth control, pregnancy, sexually transmitted diseases, sex roles and other sexual issues.

**International Student Services (SISS)**

Information:  
Services for International Students and Scholars  
300 South Hall  
916-752-0664

The functions of the SISS Office are to assist incoming international students and scholars in making preparations to come to the U.S., to orient them to the campus and community upon their arrival in Davis, to assist them in maintaining their legal status while at UCD, and to facilitate the international transfer of
funds in order to maintain their academic endeavors. In addition, immigration, personal, cultural, and financial advising are provided.

Prior to fall quarter registration, a special orientation program is held for new international students. The program provides assistance with registration, class enrollment, housing, cultural orientation and immigration regulations as well as an introduction to campus services and community resources. All new and transfer international students are required to attend this program.

Students must report to Services for International Students and Scholars as soon after their arrival as possible. This office can help with immediate needs, make introductions to the Davis international community, and assist students and scholars in locating other individuals from their home countries.

**Student Special Services**

**Information:**
160 South Silo
916-752-2007

Student Special Services coordinates a collection of programs and services to meet the special needs of students as described below.

**Disability Resource Center**

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

The Disability Resource Center (DRC) serves students who find their disability is a barrier to achieving academic or personal goals. Most often this occurs as individuals begin UCD, get established in the community, set up class support, seek personal/social outlets or plan career/personal changes. DRC provides information concerning campus as well as 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. Therefore, we work closely with each student in identifying 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
- Campus shuttle services
- Disability management counseling
- Emergency wheelchair repair
- Facilitation of access to all campus programs
- In-person registration assistance and priority enrollment
- 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
- 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 available for persons with disabilities. You are encouraged to contact DRC if your disability has affected your ability to meet academic requirements for admission.

**Draft Information**

**Information:**
Student Special Services
160 South Silo
916-752-2007/2020

The Office for Draft Information assists students who have inquiries and problems regarding their Selective Service status.

Students will find it to their advantage to continually keep themselves aware of Selective Service laws and procedures. Even during periods when induction is not in effect, draft-eligible students may still have legal responsibilities for registration and status changes. This office provides individual advising and consultation on legal obligations and classification options and conducts group workshops in all areas related to the draft.

If you are confused or unsure of your current Selective Service status, the office can help by offering information, assistance, alternatives, and support.

**Transfer/Reentry Student Services**

**Information:**
Transfer Student Services: 916-752-2200
Reentry Student Services: 916-752-2005
160 South Silo

The Transfer Student Services Office directly serves enrolled students who have transferred from other institutions of higher education. It provides information and assistance to ensure students an easy and smooth transfer to the University. It coordinates transfer student matters among existing student services units. It also sponsors special receptions and workshops for new transfers, links them to second-year transfers, publishes an annual Transfer Guide of available services and provides assistance to members of the Transfer Student Association.

The Reentry Student Services Office directly serves enrolled students who have reentered the university after several years of life and work experience. It provides information and referral assistance using the Reentry Resource Network. The Network is composed of representatives from existing student services units, colleges, and divisions who are designated to assist reentry students (e.g., Women's Resources and Research Center, Financial Aid, Student Housing, the Dean's Offices, etc.). It also sponsors special programs for new reentry students and provides assistance to members of Advocates For Reentry Students.
Veterans Affairs

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

The Veterans Affairs Office assists veterans, dependents of deceased or disabled veterans, 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 at the South Silo with your letter of admission. The office can give you the forms, information and advice to get your claim processed.

Women’s Resources and Research Center (WRRC)

Information:
10 Lower Freeborn
916-752-3072

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, and helps women develop their full potential. To this end, the WRRC provides the UCD community with information and programs on the educational, career, and personal needs and interests of women.

The Center is staffed by friendly, knowledgeable professionals and student interns. You are encouraged to drop by and talk with the staff. Student internships are available in legislative work, publicity, program planning, and research.

INTERNSHIPS AND CAREER SERVICES

Internship Programs

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

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

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

The Internship and Career Center

Information:
2nd floor, South Hall
916-752-2855

If you are an undergraduate, graduate, or alumnus, ICC can assist you in (1) identifying your abilities and interests, and relating them to jobs; (2) gaining access to practical experience to increase your competitiveness in the job market; and (3) finding 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 materials 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 the Placement Manual, prepared by ICC, 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, South Hall
916-752-2855

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

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

Advisers maintain contact with school district personnel and work with undergraduate students to explore teaching through internships. In addition, 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
2nd floor, South Hall
916-752-2855

Human Corps is a student community services program. Public service work can be a rewarding and satisfying experience which may also improve your qualifications for the job market. Service can be paid or non-paid and can take many forms, from a one-day activity to a long-term commitment.

The goal of Human Corps is to facilitate student involvement in community service by serving as a referral center for students wishing to volunteer and a resource for agencies looking for volunteers.
Academic Information
REGISTRATION
Information:
Registrar's Office
124 Marian Hall
(916) 752-2973

Registration is the means by which you become a student at the University. The registration process includes paying fees, enrolling in classes, and completing and filing informational forms. Every UCD 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 previously at Davis as undergraduates are considered to be new students.

Your registration is complete when you have submitted your registration forms, had your photo taken (first term of enrollment only), paid your fees, and enrolled in classes. 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. Permission 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 exchange.

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. Change of Address forms are available at the Office of the Registrar.

ENROLLMENT IN COURSES
The Class Schedule and Room Directory, available several weeks before the beginning of each quarter, gives class hours and room numbers, changes to the General Catalog, and the most up-to-date information on registration and enrollment procedures.

Class Level
Undergraduate classification is determined by the number of quarter units you have completed:

Class Unit Breakdown
Freshman 0–40.0
Sophomore 40.1–83.9
Junior 84.0–134.9
Senior 135.0–

Undergraduate Courses
Lower Division Courses
These courses, numbered 1–99, are open to all students for lower division credit, but are designed primarily for freshmen and sophomores.

Upper Division Courses
These courses, numbered 100–199, are open to all students who have met the necessary prerequisites as indicated in the catalog course description. Preparation should generally include completion of one lower division course in the given subject or completion of two years of college work.

Variable-Unit Courses
Subject to the approval by the department chairperson, an instructor may arrange to give a special study course (numbers 92, 97T, 97TC, 98, 99, 192, 194H, 197T, 197TC, 198, 199) to interested students.

• 92/192 (Internship) courses enable individual students to obtain practical experience to complement their educational goals or to explore potential career interests and opportunities. Students must have completed 84 units before enrollment in course 192.

• 97T/197T (Tutoring) and 97TC/197TC (Tutoring in the Community) are courses for students desiring to tutor in a subject in which they are proficient—generally in their major field—while enrolled as an undergraduate.

• 98/198 (Directed Group Study) courses are set up on a one-time basis for a group of students in a subject for which no regular courses have been established.

• 99 (Special Study for Undergraduates) is a course arranged for an individual student who shares with an instructor an academic interest which cannot be accommodated within the formal course structure.

• 194H (Special Study for Honors Students) courses are for individual students with honor status, as determined by the department offering the course, and who have completed 84 units.

• 199 (Special Study for Advanced Undergraduates) courses are the upper division counterparts of course 99, and involve supervised independent study and research requiring adequate background in the subject proposed for study as well as prior completion of 84 units.

Credit in courses 99, 194H, 199 is limited to a total of 5 units per term.

Autotutorial Courses are courses in which students instruct themselves at their own pace. These courses can be identified by the letters AT on their course numbers, e.g., 1ATA-1ATB-1ATC, 105AT, 141AT.

Research Conference Courses are courses in which advanced undergraduate students may participate in critical discussions of staff research activities. These one-unit courses are numbered 190C and are graded on a Passed/Not Passed basis.

Graduate Courses
Courses numbered 200-299 are open to students 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 Division before enrolling 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 equal 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 enrolling may not be waived.

Adding or Dropping Courses

You are officially enrolled in all courses listed on your individual study list and will be held responsible for completing each of the courses. You must file an add/drop card in order to add or drop courses after this initial enrollment. Cards are to be filed with the departments offering courses to be added or dropped.

See the Academic Calendar in the front of this catalog for final dates for filing petitions each quarter, and refer to the appropriate Class Schedule and Room Directory for filing procedures. 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. Graduate students must have their adviser's approval in order to drop courses. A course which is on your study list and for which you did no work that could be graded is reflected on your official transcript. A verification of your study list is available some time during the fourth week of each quarter.

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 "I" grade or late drop was not taken during the quarter in which the problem occurred. The instructor's signature is required on the petition. A $3.00 fee is applicable on all retroactive drops.

Retroactive 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.

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. Students failing below this required average will be subject to academic disqualification. 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.

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 time 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 enrolled in ten units (including workload units) or fewer per quarter, and graduate students must be enrolled in six units or fewer per quarter. Minimum progress requirements are waived for part-time students. A petition, available at the Office of the Registrar, must be approved by the dean of your college (certain verifications are required), and then filed with the Office of the Registrar no later than the tenth day of instruction in the quarter of enrollment. Part-time students have use of the same facilities and are eligi-
able 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 one 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 one unit of credit.

In most courses at Davis the standard procedure prevails, so that a three-unit course meets for three hours a week, a four-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 which will be required, you can plan your course-load more systematically and realistically.

Credit by Examination

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

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

The credit received for the examination may not duplicate any credit you have already earned toward your degree. 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 enrolled as a full-time student at UCD. A variance can be obtained only by petitioning the dean of your college well in advance of the desired enrollment. In those instances in which a
variance is granted, units earned are counted toward minimum progress for the term in which the dual enrollment occurs. Summer session courses are exempt from this regulation.

It is possible for students to 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 the Admissions Office for evaluation. On your transcript UCD Summer Sessions courses are identified by the letter "S" preceding course numbers.

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 will 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 both your adviser and/or Advising Associate and the Dean 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 applying to the College of Engineering must declare a major on their applications. 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 will be placed on your registration materials. The hold will be removed only when your Declaration of Major petition is on file in the Dean's Office. Petitions can be obtained from faculty advisers, department offices, or the Registrar's Office. As a part of the declaration procedure, you must, in consultation with a faculty adviser, prepare a projected plan of study. You are accepted into the major when your adviser and the dean have approved the petition.

To be accepted into a major, you must have a C average in all courses you have completed that are a requirement for that major, as well as a C average in the upper division courses you have taken toward the major. 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 rec-ommendation from the chairperson 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 of graduation.

College of Engineering. The above provisions do not apply to students in the College of Engineering, whose freedom to change majors is limited.

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, 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 only submit petitions for a transfer into the College of Engineering from another UCD college 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, and 4) have completed Mathematics 21A, 21B, and 21C and Physics 9A (or their equivalents) on a letter-grade basis.

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 specific majors.

Multiple Majors

College of Agricultural and Environmental Science. 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. You may also request that your transcript
note that you have completed all the requirements for study of a major in addition to your selected major.

College of Engineering. Enrollment in combinations of engineering 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 the 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, botany, genetics, microbiology, physiology, and zoology;

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, botany, genetics, microbiology, physiology, or zoology.

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. The proposed program should be submitted 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. In order 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 consent of their advisers, develop minors in either the College of Letters and Science or the College of Agricultural and Environmental Sciences. The Undergraduate Office in the College of Engineering has the primary responsibility for certifying minors 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 Science, you must pick up a minor petition in the office of the college that offers the minor you want, and have it 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 enrolled in the course. A student who does not consent in writing to the different time must be permitted to take the examination (or submit the take-home examination) at the officially scheduled time. A student who consents in writing to the change of examination time waives the right to take the midterm at the officially scheduled time.

Final Examinations

Scheduling. The Class Schedule and Room Directory lists the times that final examinations are to be held. These are set up according to the day-and-hour periods in which the classes are given during the quarter. This information is available at the beginning of the 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 enrolled in the course. 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 earlier than the time and date published in the Class Schedule and Room Directory. 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 which 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 of them, until the end of the next quarter, during which period students may pick them up.

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. The University of California, 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 enrolled in a course. The following grades are used to report the quality of a student's work at UCD:

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

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. 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 can petition to take specific courses on a Passed/Not Passed basis. Petitions are available in deans' offices as of dates published in the Class Schedule and Room Directory and must be filed before the end of the fifth week 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 1/3 of the units completed in residence on the Davis campus. Consequently, at least 2/3 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 enroll in a maximum of one course per quarter in which you choose the Passed/Not Passed (P/NP) grading option; you must be enrolled 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 (a) the unrestricted electives requirements, or (b) the Humanities-Social Sciences electives (not GE) and the English and rhetoric requirements, or (c) the technical electives requirement may be taken on a Passed/Not Passed basis. In addition, certain design courses may be taken on a Passed/Not Passed basis; consult the Dean's Office for information about which design 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.

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:** 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 which otherwise would receive a grade of B- or better, and in undergraduate courses for work which 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 Division and must be signed by your graduate adviser. (See also Individual Study courses.) A 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 P/NP grading.)

**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, serious 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 course work as specified by the instructor. In order to change your records, you must obtain a petition from the Registrar's Office and present it to your instructor for completion and mailing.

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

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

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

**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 repeat any course in which they received a D, F, or NP. Up to a maximum of 16 units, the grades for both the first and second time a course is taken will appear on the student's transcript, but only the grade earned the second time a course is taken will be calculated into the student's GPA. After the 16-unit maximum is reached, the grades for both the first and second time a course is taken will be calculated into the student's GPA. However, the units completed after the 16-unit maximum is reached are credited toward the student's degree only once.

Repeat units of English A are not counted against the 16-unit maximum. Courses in which students received
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 opportunity for the qualified student to experience aspects of the major that are representative of advanced study in the field.

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. Successful completion of the honors program requires that a minimum of six units of credit be earned in coursework for the project.

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 North Hall, (916) 752-2393.

Graduation Honors

Honors at graduation are awarded to students who have a grade-point average in the top percent of their college or school as shown in the table below.

<table>
<thead>
<tr>
<th>Total Quarter Units Completed at UC</th>
<th>Highest Honors</th>
<th>High Honors</th>
<th>Honors</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>45-89</td>
<td>2%</td>
<td>2%</td>
<td>4%</td>
<td>8%</td>
</tr>
<tr>
<td>90-134</td>
<td>3%</td>
<td>3%</td>
<td>6%</td>
<td>12%</td>
</tr>
<tr>
<td>135+</td>
<td>4%</td>
<td>4%</td>
<td>8%</td>
<td>16%</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 1991. These averages will be used through winter 1992.

<table>
<thead>
<tr>
<th>Percent Determining Cut-Off Point</th>
<th>Grade-Point Average by College</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Agricultural and Environmental Sciences</td>
</tr>
<tr>
<td>2%</td>
<td>3.833</td>
</tr>
<tr>
<td>3%</td>
<td>3.838</td>
</tr>
<tr>
<td>4%</td>
<td>3.780</td>
</tr>
<tr>
<td>6%</td>
<td>3.670</td>
</tr>
<tr>
<td>8%</td>
<td>3.630</td>
</tr>
<tr>
<td>12%</td>
<td>3.517</td>
</tr>
<tr>
<td>16%</td>
<td>3.407</td>
</tr>
</tbody>
</table>

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

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 Col-
lege Honors Program and who meet the grade-point requirement for graduation with honors may be rec-
commended by their departments for graduation with high honors or highest honors on the basis of an eval-
uation of their academic achievements in the major
and in the honors project in particular. Graduating stu-
dents will not be awarded honors with the bachelor's
degree if more than eight units of grade I (Incomplete)
appear on their transcripts. The College Committee on
Honors may consider exceptions to this condition.
Petitions for this purpose should be submitted to the
Dean's Office.

Prizes
The University Medal is the highest honor awarded to
a graduating senior in recognition of superior scholar-
ship 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 achieve-
ment and scholarship.

College of Agricultural and Environmental Sciences.
Each year the outstanding graduating senior in the Col-
lege is awarded a silver medal, known as the "Agricultu-
ral and Environmental Sciences Medal." Scholastic
excellence (in a minimum of six quarters at UC Davis) is
the primary basis for choosing the recipient.

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 pri-
mary basis for selecting the recipient of the award.

College of Letters and Science. Graduating seniors
with a distinguished academic record may be recom-
manded 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 con-
ferred upon the outstanding graduate from a disci-
plinary area other than that of the College medalist.
Academic excellence is the primary basis for select-
ing the recipients of these awards.

The Lawrence J. Andrews prize is awarded to a stu-
dent entering the senior year who not only has
achieved academic excellence, but who also has
interests outside of pure scholarship.

Honorary Societies
Election to an honorary society is one of the most pre-
stigious awards a student can receive. At UC Davis, the
following honorary societies are represented:

Alpha Epsilon (Agricultural Engineering)
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)
Omicron Delta Epsilon (Economics)
Omicron Nu (Applied Behavioral Sciences)

Order of the Colf (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 and
schools—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 approval must first be obtained from the
dean of the student's 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 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 the student's 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 Registrar's Office. 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. PELP is not to be used for a medical leave. If you cannot attend school because of medical reasons, you should request a Petition for Withdrawal available in the Office of the Registrar.

Any registered student on the Davis campus, undergraduate or graduate, is eligible to enroll in the Planned Educational Leave Program. 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.

Applicants for enrollment in PELP are required to file an application available at the Office of the Registrar, including a brief written explanation of the reason for leaving the campus, and must state when they intend to resume academic work. Applications for Planned Educational Leave should be filed with the Office of the Registrar (Admissions Office for new students) no later than the tenth day of instruction.

A fee of $40 is charged, payable when you enroll in the program. This fee is identical to that paid by a student who withdraws and is required to pay a readmission fee upon return.

The minimum Planned Educational Leave is one full quarter; the normal maximum leave is one full academic year. You may, however, request an extension of your leave. For purposes of this program, leave of one full quarter is defined as a leave beginning no later than the tenth day of instruction in a quarter. You should be entitled to a partial refund of fees paid. (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 enroll 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 qualitative standards of scholarship require that a student maintain a C average (2.0) or better for all work undertaken in the University and for the work undertaken in any one quarter.

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

- is less than 2.0, but not less than 1.5, for the quarter.
- 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 I (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 must be satisfactorily completed. 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 “minimum progress—subject to academic disqualification,” will be noted on the grade report the first time the total number of units passed at UCD 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 prior to 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 UCD or at another accredited school and transferred to UCD will be counted as units passed (applied to quarter of enrollment 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 examination 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. Advising assistance should be obtained either through the student’s faculty advisor or in the college Dean's Office.

Dismissal

Dismissal for either qualitative or quantitative reasons (defined above) is based on the decision of the dean of the college in which a student is 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 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

Information:
44 Mrak Hall
(916) 752-1641

Summer affords students the opportunity to accelerate progress toward a degree, to tackle problem courses and meet prerequisites, to take special study courses, or to do research. Although it is possible to complete up to 24 units by attending both summer sessions, 7 units per session is an average load.

Summer sessions at Davis offers a wide variety of lower division and upper division courses that provide full University credit. Special programs are also available in Great Britain, France, Japan, China, and Chile. Admission is open to all university students, high school graduates, and other qualified applicants. However, admission to a summer session does not constitute admission to the University's regular sessions.

In 1992 there will be two six-week sessions at UC Davis: June 22 through July 31, and August 3 through September 11. For the Summer Sessions Bulletin and application materials (available about mid-March), write to the address above.
Bachelor’s Degree Requirements
UNIVERSITY REQUIREMENTS

Subject A: English Requirement

The University requires every undergraduate student to demonstrate college-level proficiency in English composition. Satisfaction of the Subject A requirement is a prerequisite to all other undergraduate courses in English.

The requirement, as determined by Undergraduate Admissions, may be met in one of the following ways:

- By achieving a score of 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 CSULB 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. 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 UCD campus during the orientation period each quarter. For the time and location consult the "Fee Payment, Enrollment, and Orientation Information Bulletin," 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 A during your first quarter of residence at the University, or as soon thereafter as space is available in the course. If the requirement has not been satisfied by the end of your third quarter of enrollment, a hold will be placed on your registration. The English A course must be taken for a letter grade and passed with a grade of C or higher. Students receiving a grade of C- or lower must repeat the course. This 2-unit course counts as 4 units on your study load and toward minimum progress.

Students whose native and school language is not English, and some students whose schooling combines work in the United States and in another country, must demonstrate proficiency in English. The level of proficiency must meet the standards of both the non-native speakers of English program and the Subject A program. The results of the Subject A Examination and a special examination in English administered during the orientation period each quarter determine whether a student has met the Subject A requirement or must take specific course work before meeting that requirement.

Bachelor's Degree Requirements

University Requirements

All students must fulfill the following University of California requirements:

Subject A
American History and Institutions
Unit Requirement
Residence Requirement
Scholarship Requirement

General Education Requirement
Students are required to complete a certain number of courses in the two areas of General Education other than the one which contains their major field.

College Requirements

College of Agricultural and Environmental Sciences
Unit
Residence
Scholarship
English Composition

College of Engineering
Unit
Residence
Scholarship
English Composition
Design

College of Letters and Science
Unit
Residence
Scholarship
English Composition
Area (Breadth)
Foreign Language (A.B. and B.A.S. degrees)

Major Requirements
Course requirements for each major are listed in the Programs and Courses section of this catalog.
American History and Institutions

The American History and Institutions requirement ensures that every graduating student will have at least a minimum knowledge of the background of this country's development and an understanding of the political, economic, and social interrelationships of its way of life.

You may meet this requirement in any of the following ways:

- By offering one high school unit in American history, or ¼ high school unit in American history and ½ 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:
  - Afro-American Studies 10, 100, 120, 121
  - Asian American Studies 1, 2
  - Economics 111A, 111B
  - Native American Studies 1, 10, 55, 116, 130A, 130B, 130C
  - Political Science 1, 5, 100, 101, 102, 103, 104, 105, 106, 108, 109, 113, 130, 131, 160, 163

Students electing to offer one of the above courses are subject to the rules 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 the Office of Admissions. 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 quar-
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. Enrollment 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 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 for all courses you have attempted in the University. An exception to this rule is authorized 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: (1) to offer a choice of courses in all major fields of learning; (2) to stimulate intellectual growth through the study of important methods as well as significant material in a particular discipline; (3) to involve students in the learning process by requiring considerable writing and participation in class activities; and (4) to encourage students to apply the concepts and methods of a discipline in appropriate advanced-level courses.

General Education (GE) courses are grouped into three broad areas of knowledge:

1. Civilization and Culture. Courses in this area foster knowledge of the dominant intellectual traditions, achievements, and socio-political institutions of humankind and stimulate awareness of cultural diversity within the Western tradition 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 provide students with knowledge of major scientific ideas and discoveries and some perception of the methods, scope, power, limitations, and appeal of science.

Fulfilling the General Education Requirement

The only way that you can fulfill the GE requirement is by completing a required number of approved GE courses at UCD (see the exceptions in the paragraph below). If you have transferred from a community college or other post-secondary institution, or enter with Advanced Placement (AP) units, you still have to complete some of Davis' GE courses, but the number of required courses may be reduced depending upon the number of transfer or AP units you have brought with you.

Transfer Credit. The following courses and transfer credits will be used in determining the General Education requirement for transfer students:

- UCD Extension courses if they are accepted for transfer by the Office of Undergraduate Admissions.
- Advanced Placement credit.
- Transfer work from other community colleges and four-year institutions.

UCD Summer Sessions courses completed before entry do not count as "transfer credit" for determining your GE requirement. Successful completion of an approved GE course during a UCD Summer Session before entry, however, will count toward satisfaction of the GE requirement.

You should consult the "Transfer Credit Evaluation" form prepared by the Office of Undergraduate Admissions to determine your transfer credits.

You are exempt from the UCD General Education Requirement if

- you come from a California community college or other institution of higher education and have completed the "Transfer Core 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.
Determined Your General Education Requirement

Each academic major and degree program has been assigned to one of the three areas of General Education. 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 which contains your major field.

GE courses may be either introductory or non-introductory. Introductory courses assume no prior knowledge or exposure to the field. Non-introductory courses require some background course work or familiarity with the subject. You should consult the course descriptions contained in the Programs and Courses section of this catalog for the courses recommended as preparation for non-introductory courses.

The specific General Education requirements for students entering UCD from the 1984-85 to 1986-87 academic years and from 1987-88 and thereafter are detailed in the General Education Requirements table below.

<table>
<thead>
<tr>
<th>Student Status</th>
<th>1984-85</th>
<th>1985-86</th>
<th>1986-87</th>
<th>1987-88, and thereafter</th>
</tr>
</thead>
<tbody>
<tr>
<td>Freshman or transfer student with 40 or fewer transfer units(^1)</td>
<td>2 GE courses: • may be in same or different areas; • may be Introductory or non-Introductory</td>
<td>4 GE courses: • maximum of 3 in one area; • maximum of 2 Introductory</td>
<td>6 GE courses: • 3 courses in each of two areas; • must have 1 Introductory and 2 non-Introductory courses in each area</td>
<td>Same as for 1986-87</td>
</tr>
<tr>
<td>Transfer student with more than 40 but fewer than 84 units(^2)</td>
<td>No GE requirement</td>
<td>2 GE courses: • may be in the same or different areas; • may be Introductory or non-Introductory</td>
<td>4 GE courses: Option 1: 2 courses in each of two areas: • only 1 course in each area may be Introductory Option 2: 3 courses in one area and 1 in the other: • must have 1 Introductory and 2 non-Introductory in the area with 3 courses; • the single course in the other area may be Introductory or non-Introductory</td>
<td>Same as for 1986-87</td>
</tr>
<tr>
<td>Transfer student with 84 or more units</td>
<td>No GE requirement</td>
<td>No GE requirement</td>
<td>2 GE courses: • may be in the same or different areas; • may be Introductory or non-Introductory</td>
<td>2 or 3 GE courses: Option 1: 1 course in each of two areas: • both courses must be non-Introductory Option 2: 3 courses in one area: • must have 1 Introductory and 2 non-Introductory courses</td>
</tr>
</tbody>
</table>

\(^1\) For the academic years 1984-85 through 1986-87, this category of GE requirements applied to freshman or transfer students with fewer than 41 units; the unit cutoff 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 cutoff was changed fall 1987.
Contemporary Societies (CS)

Afro-American Studies
Agrarian Studies
Agricultural and Managerial Economics
Agricultural Education
Anthropology (A.B. degree)
Applied Behavioral Sciences
Asian American Studies (non-degree program)
Chicano (Mexican-American) Studies (Sociology emphasis)
Economics
Environmental Biology and Management

Environmental Policy Analysis and Planning
Geography (A.B. degree—emphasis I, II, III, V)
Human Development
International Agricultural Development
International Relations
Native American Studies
Political Science
Public Service
Sociology
Sociology—Organizational Studies
Textiles and Clothing
Women’s Studies

Nature and Environment (NE)

Agricultural Science and Management
Animal Science
Anthropology (B.S. degree)
Applied Science
Atmospheric Science
Avian Sciences
Biochemistry
Biological Sciences
Botany
Chemistry
Community Nutrition
Computer Science
Consumer Food Science
Dietetics
Engineering (all majors)
Entomology
Environmental Toxicology
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
Physical Education
Physics
Physiology
Plant Science
Psychology
Range and Wildlands Science
Resource Sciences
Soil and Water Science
Statistics
Wildlife and Fisheries Biology
Zoology

If you have declared multiple majors where all of your majors are classified in the same area of General Education, you complete the General Education requirement just as you would if you had a single major. If your majors are classified in two or more different areas of General Education, you are required to complete only the appropriate number of courses in the one area of General Education in which you do not have a major.

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 General Education area to which your major is assigned, consult your college dean’s office.

Approved General Education Courses

A list of the courses and course sequences which 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.

Restrictions Applicable to GE Courses

Effective with the fall quarter 1986, there are two restrictions that apply to GE courses.

1. Letter grading. No GE credit will be awarded for a course that is taken on a Passed/Not Passed basis.

2. Subject A. This requirement must be completed before you begin your GE course work. Exception: GE credit may be earned before completing the Subject A requirement for the following course sequences which have been approved for the General Education Program: Chemistry 1A-1B, Economics 1A-1B, Psychology 15-16, 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.

General Education Literature Preparation List

The recommended General Education preparation listed in the course descriptions of some non-introductory courses states “any course from the GE Literature Preparation List.” This list consists of the following courses: English 3, Comparative Literature 1, 2, 3, French 25, German 52, and Integrated Studies 2D.

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.

You may earn credit for having satisfied the entire requirement in an area of General Education by completing an approved cluster which allows you to substitute Introductory for any required non-introductory courses.
GENERAL EDUCATION COURSES FOR 1991-92

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

Introductory
American Studies 1B
Art 14/1AG1, 1B/1BG1, 1C/1CG1, 1D/1DG1, 25/25G1
Classics 4A, 17A, 17B, 17C, 20
Comparative Literature 1, 2, 3, 4, 5, 6, 7, 12, 13, 25
English 3, 4
French 25
German 4B, 52
History 3, 4A, 4B, 4C, 5, 8, 9A, 17A, 17B, 72B, 161A
Integrated Studies 2B4, 2D4, 3B4, 3C4, 8B4
Italian 50
Linguistics 1
Music 3A-3B2, 10
Philosophy 1, 10B, 10D, 13, 14, 17, 21, 22, 23, 24, 31
Political Science 4
Religious Studies 21, 40
Russian 44

Civilization and Culture

Non-Introductory
Art 178C
Classics 140, 141, 143
Dramatic Art 156, 157
Education 120
French 112, 113, 114
Italian 140, 142
Landscape Architecture 140
Medieval Studies 20A, 20B, 20C, 120E
Music 110A, 110B, 110C, 110D, 129
Native American Studies 130A, 130B, 156, 181A, 181B, 181C
Philosophy 101, 102, 105, 107, 108, 151
Religious Studies 141A, 141B, 141C
Rhetoric and Communication 110
Russian 130, 131, 151, 166
Spanish 149
Veterinary Medicine 170

Contemporary Societies

Introductory
American Studies 1A
Anthropology 2, 4
Economics 1A-1B2
Environmental Studies 10
Geography 2-2G1, 5-5G1
History 10, 72B
Integrated Studies 3A4, 3D4, 3E4, 8C4
Native American Studies 10
Political Science 1, 2
Psychology 15-162
Religious Studies 1, 2
Sociology 2, 3

Contemporary Societies

Non-Introductory
Afro-American Studies 100, 133
Agricultural Economics 120, 141, 141M
American Studies 45, 120, 130
Anthropology 25, 101, 117, 124, 129, 130, 133, 178

Applied Behavioral Sciences 2, 151, 153, 154, 178
Chicano Studies 132
Consumer Science 100
Economics 106
Education 110, 122, 132
Engineering; Civil 160
Environmental Studies 101, 133, 161, 165, 166
Geography 124, 155, 170, 171
History 165, 188B
Human Development 15
International Agricultural Development 10
Linguistics 113
Native American Studies 130C, 180
Philosophy 117
Psychology 175, 177
Resource Sciences 10-1G1
Rhetoric and Communication 152
Russian 132
Sociology 25
Textiles and Clothing 107
Veterinary Medicine 170
Women’s Studies 50

Nature and Environment

Introductory
Anthropology 1
Astronomy 10
Avian Sciences 11
Biological Sciences 10
Botany 10
Chemistry 1A-1B2, 10
Engineering 20
Engineering: Computer Science 15
Entomology 17
Food Science and Technology 2
Genetics 10
Geology 1-1G1, 3-3G1
Human Development 19
Integrated Studies 1A4, 1B4, 8A4
Nutrition 10-119, 20
Philosophy 31
Physics 10
Plant Science 10
Pomology 10
Wildlife and Fisheries Biology 10

Nature and Environment

Non-Introductory
Agrarian Studies 2
Animal Science 1, 2
Anthropology 15, 23, 152, 153
Atmospheric Science 10
Avian Sciences 13
Botany 101
Engineering 160
Engineering: Applied Science 137
Engineering; Civil 30
Entomology 111, 119, 147, 153
Environmental Studies 30-3G1, 116-116G1
Fiber and Polymer Science 110
Geology 43, 113, 116-116G1, 131, 135, 144
Landscape Architecture 155
Microbiology 20
Philosophy 108
Physics 137, 160
Plant Pathology 140
Resource Sciences 2, 3-3G1, 131
Water Science 10, 100
Zoology 138

1 These GE courses must be taken concurrently for General Education credit and will satisfy the requirement for one GE course.
2 This is a two-course sequence of non-GE courses which will satisfy the requirement for one GE course.
3 Nutrition 10 and 11 must both be completed to satisfy the requirement for one GE course. These courses may be taken concurrently, if offered, or sequentially (10 than 11).
4 GE 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

• 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 prior to 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 enrolling. 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

As of fall quarter 1984, 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 Committee on Majors and Courses of Instruction and printed in this catalog, or (b) an individual major approved by the Individual Major Committee.

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 UCD courses have been approved for satisfaction of this requirement:

a. one course must be selected from English 1, 3, 20, or 103 (courses with primary emphasis in writing skills); and

b. one course selected from the courses not selected above, or from English 102, 104, Comparative Literature 1, 2, 3, or Rhetoric and Communication 1 (courses emphasizing either writing or speaking skills).

General Education

You should consult your Dean's Office, faculty adviser and/or Advising Associate in advance to determine exactly how your General Education courses will apply toward your major.
Degree Requirement Changes

On occasion, the faculty makes changes in the requirements that students must satisfy to obtain the baccalaureate degree. So that you will not be penalized by changes that may work to your disadvantage and so that you will benefit by changes that assist you in completing your degree requirements, it is College policy that you may choose to fulfill the University, College, and major requirements in effect at the time you were enrolled at UC Davis. If you have transferred to UCD from a community college, college, or university, you may follow the requirements as stated in any UCD catalog in effect either during the three years immediately preceding your transfer to Davis or at the time you first enrolled 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 (a) the acquisition of prerequisite knowledge for courses to be taken in subsequent quarters, (b) the fulfillment of College and major requirements, (c) a proper balance between the demands of the courses and your ability to master the subject matter, and (d) meeting the minimum progress regulation (see the Academic Information section).

In conjunction with a faculty adviser and/or Advising Associate, 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 individual adviser and/or Advising Associate 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). Your adviser and/or Advising Associate will then notify the dean that you have filed your plan.

You will 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 adviser and/or Advising Associate 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 transfer into 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.

Subject Areas

<table>
<thead>
<tr>
<th>Subject Area</th>
<th>Minimum Quarter Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mathematics (calculus, differential equations, vector analysis)</td>
<td>18</td>
</tr>
<tr>
<td>Physical and biological sciences (at least 10 units must be in general chemistry and at least 12 units in physics for engineering and science students)</td>
<td>26</td>
</tr>
<tr>
<td>Engineering (lower-division subjects such as graphics, properties of materials, surveying, computer programming, statics, and circuit theory. Chemical Engineering majors may elect to take only 9 units of engineering in their Lower Division Program)</td>
<td>15</td>
</tr>
<tr>
<td>Written and oral expression (courses that are equivalent to English 1, and Rhetoric and Communication 1 or 3)</td>
<td>8</td>
</tr>
<tr>
<td>Humanities-social sciences (courses must be selected from a list of course groups approved by the Committee on Undergraduate Study)</td>
<td>9</td>
</tr>
<tr>
<td>Unspecified subjects (Chemical Engineering majors should take quantitative analysis and one course in organic chemistry with laboratory during their sophomore year; Agricultural Engineering—Forest Engineering option majors should take courses in biology, botany and statistics; Agricultural Engineering—Food Engineering option majors should take courses in Microbiology and Biology)</td>
<td>8</td>
</tr>
<tr>
<td>Total</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 Lower and Upper Division Programs varies, with the curriculum, from 180 to 212.5.

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 solving 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 under University Extension may be used for degree credit. Simultaneous enrollment in resident courses and Extension courses requires prior approval by the Associate Dean for Undergraduate Studies of the College. 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 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 upper division required courses in your major.

English Composition Requirement (Upper Division)

After completing 84 quarter units, you must satisfy the upper-division English Composition requirement in one of four ways:

1. 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.)

2. by completing an English 102 adjunct to an upper division course in the College of Engineering with a grade of C- or higher.

3. by completing 3 units of English 104 with a grade of Pass.

4. by completing English 103A with a grade of C- or higher.

This requirement is in addition to the expository writing course requirement (English 1 or 3, or Comparative Literature 1, 2, or 3 [English 1 only for students in Agricultural Engineering]) specified in the Lower Division Programs.

During the 1991/92 academic year, the English Composition Examination will be offered on the following three Saturdays: October 26, February 1, and April 25. Sign-up rosters will be posted on the College of Letters and Science’s bulletin board, Mrak Hall foyer, 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 advisor 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.
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 are emphasized 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 from subjects in the humanities and social sciences areas. Subjects that are vocationally oriented or skills oriented, such as management and accounting, or that contain a preponderance of scientific or mathematical content, are not suitable for HSS credit even though a course may be offered by a department ordinarily classified as a humanities or social science department. Foreign language courses must stress literature, not skills, and fine arts courses must emphasize the history and appreciation of forms of expression, not development of performance or other technical skills. You may petition to have a non-literature course in a foreign language which is not your native language count as a humanities course. You may petition for HSS credit for 92, 98, 99, 192, 197, 198, and 199 courses in appropriate cases. If you repeat any of the courses which may be repeated for credit, not more than 4 units in any such courses can be counted toward your HSS requirement.

Your HSS electives should be designed to include a comprehensive and coherent set of courses and may, in some cases, be integrated with your General Education electives, as described in the next section. HSS electives must be selected from the following list:

- Afro-American Studies 10, 15, 50, 58, 100, 101, 107, 110, 120, 121, 123, 133, 145A, 145B, 150A, 150B, 151
- Agricultural Economics 1, 100A, 100B, 120, 141, 141M, 150, 169
- American Studies 1A, 1B, 1C, 1E, 1F, 2, 10, 45, 101A-H, 120, 128, 130, 151, 152, 153
- Anthropology 2, 3, 4, 5, 101, 110, 111, 112, 114, 117 through 149, 170 through 179
- Applied Behavioral Sciences 1, 2, 17, 18, 140, 151 through 154, 157, 161 through 165, 170, 171, 172, 175 through 179, 190
- Art 1A, 1B, 1C, 1D, 10H, 10S, 5, 25, 25 through 188C, 190 (also Art 1AG, 1BG, 1CG, 1DG, and 25G when taken concurrently with Art 1A, 1B, 1C, 1D, and 25)
- Asian American Studies 1, 2, 20, 100, 101, 110, 111, 112, 133, 130, 150, 155
- Chicano Studies 10, 20, 102, 132
- Chinese 10, 11, 104 through 107, 109A-I, 111 through 116, 130, 131, 132, 140
- Classics 4A, 10, 17A, 17B, 17C, 20, 140, 141, 142, 143, 174, 175
- Comparative Literature 1 through 53B, 135 through 170
- Consumer Science 100
- Design 140, 142A, 142B, 143, 144
- Dramatic Art 15 (but not 15L), 20, 70, 115, 150 through 159
- East Asian Studies 113
- Economics 1A-1B, 100, 101, 105, 106, 110A through 136B, 151A through 175
- Education 110, 117, 118, 120, 122, 123, 130, 132, 142, 145, 151, 153
- English 3, 4, 30A, 30B, 45, 48A, 46B, 46C, 105C, 107, 110A through 189
- Environmental Studies 101, 133, 160 through 167, 169
- French 25, 45, 101, 102, 103, 107, 112 through 123, 140 through 150, 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, 141 through 162, 168, 170 through 173, 175
- German 48, 50, 51, 52, 106, 110 through 133
- History 1 through 90A, 101 through 191B, 193 through 196B
- Human Development 15, 100A through 103, 110, 130, 131, 132, 151, 160
- Integrated Studies 2A, 2B, 2C, 2D, 2E, 3A, 3B, 3C, 3D, 3E, 8, 8B, 8C (Open only to students accepted to the Integrated Studies Program)
- International Agricultural Development 10, 103
- Italian 25, 50, 107 through 139C, 145
- Japanese 10, 15, 25
- Landscape Architecture 140
- Linguistics 1, 100, 102, 113, 115, 120, 135, 138, 150
- Medieval Studies 20A, 20B, 20C, 120A-F
- Native American Studies 1, 10, 32, 33, 55, 70, 101 through 161, 180, 181A, 181B, 181C, 188, 190, 191
- Nutrition 20
- Philosophy 1, 10A, 13, 14, 17, 18, 21, 22, 23, 24, 100 through 106, 109, 114A through 123, 127, 137, 143 through 177, 190
- Physical Education 36A, 36B
- Political Science 1 through 7, 100 through 113, 115 through 167, 189-191
- Portuguese 103A-118
- Psychology 1, 16, 112, 114, 115, 120, 130, 131, 132, 135, 136 through 150, 165, 168, 171, 175, 177, 180C, 183
- Religious Studies 1, 2, 4 through 75, 100 through 172, 178A-E
- Rhetoric and Communication 10, 42, 103 through 143, 152
- Russian 30, 41, 42, 44, 120 through 154, 166
- Scandinavian 110, 111
- Sociology 1, 2, 3, 25, 102, 107, 110 through 165B, 170 through 185
- Spanish 34, 35, 100, 103A through 109, 111 through 129, 134, 135, 136, 138, 149, 150, 151
- Textiles and Clothing 107
- Women's Studies 50, 100, 102

General Education electives are used to satisfy a campus requirement and are chosen from the General Education Courses for 1991-92 list 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 list of HSS courses above and the GE courses 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 course work at both the introductory and non-introductory 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 A requirement before you begin your GE course work. 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 8 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 (restricted to one unit of technical elective), 194H, 195, 197T, 198, 199
Chemistry 194H, 197, 198, 199
Mathematics 192, 197TC, 198, 199
Statistics 102

In addition to chemistry, engineering, mathematics, physics and statistics courses, the following courses may be taken as technical electives:

Agricultural Economics 113, 140, 147, 148, 157, 176
Agricultural Engineering Technology 161A, 161B
Animal Science 1, 105, 133
Art 121A
Atmospheric Science 105, 121A, 121B, 124, 133, 149A
Biochemistry and Biophysics 101A, 101B
Biological Sciences 1A, 1B, 1C

Chemistry 1C, 4C, 5, 8A, 8B
Economics 11A, 11B
Environmental Biology and Management 110
Environmental Toxicology 131
Food Science and Technology 100A, 100B, 102, 104, 108, 111, 131, 150
Genetics 100
Geography 106, 110
Geology 1, 1L, 17, 50, 50L, 60, 105, 116, 117A, 117B, 123, 124, 134, 150A
Microbiology 102, 130A
Physiology 110, 120B, 120E, 149
Resource Sciences 100, 131
Soil Science 100, 102, 107, 120
Textiles and Clothing 100
Vegetable Crops 101
Water Science 41, 103, 104, 122, 141, 142, 150, 154, 160, 172, 180
Wildlife and Fisheries Biology 120, 121

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. Transfer students who have not completed the Physical and Biological Science electives requirement should choose courses from the following list of areas:

Atmospheric Science
Biological Science
Botany
Chemistry
Biochemistry
Geology
Microbiology
Physics
Physiology
Zoology

Degree Requirement Statements
As engineering is a rapidly developing profession, curricular changes are made by the faculty from year to year. In order 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
You should 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 degree check for you (preferably at the end of your junior year). In order to have this degree check prepared, you must submit a signed Degree Check Request. You can obtain further information concerning this service and forms for requesting it in the Engineering Undergraduate Office.
College of Letters and Science

Unit Requirements
A minimum of 180 units is required for the bachelor's degree (see Unit Credit Limitations below). Of these units, 64 must be upper division units which include 48 units from Letters and Science teaching departments and programs. For the A.B. degree, a minimum of 12 of 48 units of upper division Letters and Science courses must be from outside the major department or program. All upper division General Education courses will be accepted in satisfaction of this requirement. Nonstandard courses (see Area Requirement List in this section) do not count toward these 12 units.

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, you may register only with the permission of the dean. Permission may be granted for sound educational reasons and for a limited time. 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 course enrollment materials can be made available to you 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 for 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 which 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 which 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 prior to enrollment. 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 8 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. Following are additional courses that have limits on the number of units that can be counted toward your degree.

Internship courses (numbers 92, 192): 12 units maximum including internship units taken at other institutions. (See under Nonstandard courses below.)

Nonstandard courses (92, 97T, 97TC, 99, 192, 194H, 197T, 197TC, 199 and similar courses): 30 units maximum or one-sixth of the units taken at UCD, whichever is the smaller. (Note separate unit limits on internship, special study, and tutoring courses; and major limitations.)

Physical Education 1: 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 enrolled in the Education Abroad Program does not satisfy campus or College Residence requirements.)

Scholarship Requirement

The minimum grade-point average 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 UCD will be included in the grade-point computations. To obtain these minimal averages in the major, you may, with approval from your adviser, 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, or 3;

   and

   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 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 Davis.

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

October 26, 1991
February 1, 1992
April 25, 1992

There are no examinations administered during the summer.

Sign-up rosters will be posted on the College of Letters and Science's bulletin board, Mgrs Hall foyer, 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 Let-
ters and Science department or program other than the major;

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 credit, internship courses, non-standard courses, directed group study courses, and courses used to satisfy the College English Composition Requirement.

Twelve units of upper division courses must be completed in Letters and Science teaching departments other than the major department or program. Courses numbered 92, 97T, 97TC, 98, 192, 197T, 197TC, 198, and from 200 through 498 cannot be counted toward satisfaction of the 12-unit requirement; not more than 10 units in special study courses (194H, 199) may be counted.

**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**

Anthropology 1, 5, 15, 151, 152, 153, 154A, 154B, 155, 156, 157, 158

Astronomy

Avian Sciences 13

Biochemistry and Biophysics

Biological Sciences, All courses except 19

Botany

Chemistry

Engineering 20

Engineering: Civil 30

Engineering: Computer Science 10, 30, 32, 40, 100, 110, 120, 122, 140, 170

Engineering: Electrical and Computer Science 171

Entomology 10, 100

Environmental Studies 30

Food Science and Technology 2

Genetics

Geography 1, 3, 108, 110, 112, 115, 116, 117

Geology

Human Anatomy 101

Integrative Studies 1A, 1B, 8A

Mathematics

Microbiology

Nutrition 10

Physical Education 101, 102, 103, 110, 111, 112, 113, 115

Physics

Physiology


Resource Sciences 2, 131

Statistics

Textiles and Clothing 110

Wildlife and Fisheries Biology 10

Zoology

**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 UCD, or for which transfer credit is allowed from another academic institution, with the exception of 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.** The Foreign Language requirement should be completed 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 Status Card, which is issued by the Dean's Office prior to admission to the College.

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.

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.

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**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 UCD *General Catalog* in effect at any time you were enrolled 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 these matters are handled, check with the department or major program office if you have any questions about which requirements are applicable to you.

**Degree Check**

Before the beginning of your senior year, you should take some time to consider your goals and to plan the academic program for your final year as an undergraduate. To plan properly and insure 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, informational materials are available in the Letters and Science Advising Office providing instructions on evaluating 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, a hold will be placed on your registration materials requiring that you contact the Letters and Science Advising Office and your faculty adviser for a degree check.
The Graduate Division offers advanced degrees in more than 80 graduate programs. Students' graduate study is guided by either departments or graduate groups. Graduate groups are composed of individual faculty members with similar disciplinary or research interests. The group structure, used extensively at Davis, permits faculty to be affiliated with graduate programs in more than one discipline and offers students flexibility and breadth by crossing the administrative boundaries of the various departments, colleges, schools and sometimes campuses. Conforming well to UCD's progressive spirit, the group structure also allows for expansion of established degree programs and facilitates development of new ones. Almost half of the graduate programs at Davis are sponsored by graduate groups. You will find a list of the graduate degrees available at UCD in the front of this catalog.

Graduate study and research are administered by the Graduate Council, a standing committee of the Davis Division of the Academic Senate, and by the dean of the Graduate Division. A Universitywide Coordinating Committee on Graduate Affairs determines general policies and establishes common procedures.

PREPARING FOR AN ADVANCED DEGREE

Admission to a graduate program at the University of California requires a bachelor's degree that is comparable to a degree from the University of California both in distribution of academic subject matter and in scholarship achievement.

The primary requirement for admission to any program is evidence of intellectual achievement and promise. Your application will be evaluated primarily on the basis of your transcript to assure that your qualifications meet minimum standards as set by Universitywide and UC Davis Graduate Councils. Generally, you must have a minimum B average in undergraduate course work from an institution of acceptable standing to be considered for admission. Graduate programs frequently require submission of additional materials such as a separate application form, Graduate Record Examination (GRE) scores, letters of recommendation, portfolios, or examples of written work to assist them 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.

UCD 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 applicants' 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.

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**DEADLINES**

<table>
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<tr>
<th>Deadline for filing applications for admission to graduate standing, with complete credentials, with the Dean of the Graduate Division</th>
<th>FALL 1991</th>
<th>WINTER 1992</th>
<th>SPRING 1992</th>
<th>FALL 1992</th>
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<tr>
<td>United States residents</td>
<td>June 1</td>
<td>June 1</td>
<td>June 1 (for Sept.'92)</td>
<td>June 1 (for Sept.'92)</td>
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<tr>
<td>International students</td>
<td>April 1</td>
<td>April 1</td>
<td>Oct. 1 (for Dec. '92)</td>
<td>Oct. 1 (for Dec. '92)</td>
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| Deadline for filing applications for readmission to graduate status with the Graduate Division | Aug. 1 | Nov. 1 | Feb. 3 | Aug. 3 |

| Deadline for students who expect to complete work for master's degrees to file applications for candidacy with the Dean of the Graduate Division | Oct. 1 | Jan. 10 | Mar. 2 | June 1 (for Sept.'92) |

| Deadline for candidates for master's degrees to file theses with the chair of the committee | Nov. 1 | Feb. 7 | May 4 | July 20 (for Sept. '92) |
| Deadline for candidates for master's degrees to file theses or final report on comprehensive examination with the Dean of the Graduate Division | Dec. 13 | Mar. 26 | June 19 | Sept. 11 (for Sept.'92) |
| 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 the Graduate Division | Aug. 15 | Nov. 11 | Feb. 3 | May 18 (for Sept.'92) |
| Deadline for candidates for the degrees of Doctor of Philosophy and Doctor of Engineering to file theses with the chair of the committee | Oct. 1 | Jan. 6 | Apr. 1 | July 1 (for Sept.'92) |
| Deadline for candidates for the degrees of Doctor of Philosophy and Doctor of Engineering to file theses with the Dean of the Graduate Division | Dec. 2 | Mar. 2 | June 1 | Sept. 1 (for Sept.'92) |
APPLYING FOR ADMISSION

Applications are accepted for fall quarter only. Combined admission and fellowship application forms are available from the Graduate Division, 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 June 1, unless otherwise indicated by the program, or until your proposed major 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 the Graduate Division. Supplemental application materials required by the major program must be sent directly to the graduate adviser for that program.

When all application materials have been received by the Graduate Division, 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 the Graduate Division; final admission decisions rest with the dean of the Graduate Division. 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 enrolled at UCD as a graduate student and wish to return, you must apply for reentry and pay the readmission application fee of $40 at least six weeks before the beginning of the quarter in which you plan to enroll (see the Academic Calendar at the front of this catalog). The application is obtained from the Graduate Division 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 April 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. The minimum score required for admission to graduate study at UC Davis is 550.

Visas. If you need a certificate of eligibility for a student visa issued by UC Davis, you will be required to complete a certification of finances form showing the availability of sufficient funding for your graduate program (see under International Student Services in the Academic Advising 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 enrollment 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 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 Announcement. 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 the 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 the Graduate Division, 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 which must be completed prior to admission to the qualifying examination.

The qualifying examination is administered by a committee appointed by the dean of the Graduate Division. The examination is intended to demonstrate the student's 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 is advanced to Candidacy for the degree. At this time, a committee is appointed to direct the student's 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 which 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: Feminist Theory & Research, International Nutrition, Computational Science, and Critical Theory.

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 the Graduate Division 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 the Graduate Division and should be submitted six weeks prior to the beginning of the quarter in which you wish to participate in the program.

FELLOWSHIPS, ASSISTANTSHIPS, AND LOANS

Fellowships are awarded by the Fellowship Committee of the Graduate Council on the basis of scholarship and promise of outstanding academic and professional contribution. Applicants who plan to enter in a fall quarter and wish to be considered for a fellowship or graduate scholarship must file the combined Application for Admission and Fellowship no later than January 15 preceding the fall quarter to be attended. These applications are considered only once a year. If you are continuing in graduate status at Davis you must file an application for fellowship and graduate scholarship for continuing students with the chairperson of your graduate program or before January 15. Applications for both new and continuing students may be obtained from the Graduate Admission/Fellowship Office, 252 Mirk Hall. International students are not eligible for fellowship consideration until they have completed one year as a graduate student at
UC Davis. Information regarding graduate fellowships, which are supported by various federal and outside agencies, is available at the Graduate Division.

A limited number of Nonresident Tuition Fellowships are awarded each year to new nonresident U.S. citizens, permanent residents of the U.S., and continuing international students based on academic merit. The available fellowships are allocated to graduate programs which choose individual recipients from among their graduate students. These fellowships are for the full amount of the nonresident tuition. A minimum grade-point average of 3.25 is required for eligibility. Application forms for Nonresident Tuition Fellowships are available at the Division, and must be filed with the chairperson of your graduate program by January 15. Students receiving any funding from a government or other outside agency, whether or not the fees are paid directly to the University of California, are not eligible for a fellowship.

Teaching assistantships and research assistantships are available in many departments. Interested students should inquire at the office of the program in which they wish to work.

The Financial Aid Office has information about loans and work-study for graduate students.

GRADUATE CERTIFICATE PROGRAM
FOR ENGINEERS

For engineers who already have a degree, the College of Engineering offers a Graduate Certificate Program. This program consists of course work in selected engineering subjects, and requires fewer units than the degree programs. The purpose of the Graduate Certificate Program is to provide practicing engineers with an opportunity to develop additional expertise in specific areas and to explore new fields of technical interest.

General requirements for the program are:

- 15 or 16 units of specified graduate course work, or a combination of specified graduate and undergraduate course work
- Admission to the Graduate Division

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

TEACHER CREDENTIAL PROGRAM

The teacher education program at UC Davis is administered by the Graduate Division.

Acceptance into the multiple-subject (elementary) teaching credential program, with either a regular or a bilingual emphasis (Spanish), does not require any specific campus major. If you are accepted to this program, you can meet the state requirements for a diversified major by completing a regular University major and one of the two following alternatives:

- the additional requirements for the approved UC Davis Diversified Waiver Program (must be completed by August 31, 1994, in addition to having completed the teaching program and applied for the credential); OR

- achieving a passing score on the National Teachers Examination (General Knowledge section only).

California state single-subject (secondary) teaching areas for which Davis students can qualify are: agriculture, English (including drama and speech), foreign languages, government, history, home economics, life science, mathematics, music, physical education, physical science, and social science. For information concerning University majors and campus waiver programs which satisfy requirements for these state single subjects, or state-approved examinations available to test competence in subject areas, consult the appropriate adviser in the Division of Education or the Department of Applied Behavioral Sciences.

While admission to the teacher education program is by the Graduate Division, applications and filing deadlines should be obtained from the Division of Education, 174 Kerr Hall, University of California, Davis 95616 or the Department of Applied Behavioral Sciences (home economics and agricultural education), 106 AOB 4, University of California, Davis 95616. A scholarship record of B (3.0) is required for admission to the program.

- The California Basic Educational Skills Test (CBEST) must be taken prior to acceptance by the Graduate Division.

The teacher education program is available to upper division students also. With careful planning, it is possible for students to finish the requirements for a non-renewable preliminary credential at the same time the bachelor's degree is completed. This credential allows recipients to teach for five years, but within that time an additional ("fifth") year of study must be completed for the professional clear credential. Specific requirements may be obtained from 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.
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 Cofl.

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-law 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, South Hall, 916-752-3009.

For additional information, see the Official Guide to U.S. Law Schools—Pre-Law Handbook, published annually and prepared by the Law School Admission Council and the Association of American Law Schools. This book includes material on the law and lawyers, pre-law preparation, applying to law school, and the study of law, together with individualized information on all ABA-approved law schools. It may be found at college bookstores or ordered from Law Services, Box 2000, Newtown, PA 18940.

APPLYING FOR ADMISSION

February 1 Deadline for filing applications for admission for 1992-93 to the School of Law

1. Application forms and the School catalog may be requested from the Office of Admissions, School of Law, University of California, Davis, CA 95616. The completed application must be returned to that same office, accompanied by a $40 nonrefundable application fee in the form of a check or money order made payable to The Regents of the University of California. The last date for filing completed application forms, together with all supporting documents, including LSAT scores, Law School Data Assembly Service (LSDAS) reports, and letters of recommendation, is February 1 of the year in which admission is sought. Early filing of all application materials is strongly recommended and will materially assist the School of Law Admissions Committee in its considerations. Applications postmarked after February 1 will be returned to the applicant.

2. You must take the Law School Admission Test and 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 in no event later than December preceding the year in which admission is sought.

Testing centers have been established for the convenience of applicants 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 at least 30 days before the date of the test to ensure the applicant's being registered.

To obtain application forms, information about the test, specific test dates, and the location of testing centers, write to: Law School Admission Test, Law Services, Box 2000, Newtown, PA 18940. The information booklet is also available in the Law School Admission Office and the Prelaw Advising Office on campus.

3. You should register with the LSDAS no later than December 1 by completing and mailing the registration form supplied with each LSAT information packet. A transcript from each college or university attended must be sent directly to the Law School Data Assembly Service, Law Services, Box 2000, Newtown, PA 18940.

4. An official transcript of college work completed during the first semester or quarter of your senior year must be submitted 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 are required to submit directly to the School of Law a final transcript showing the award of a bachelor's degree.

5. Two letters of recommendation from objective and responsible persons to whom you are well known must be provided. At least one of these letters should come from a faculty member under whom you studied while in college. These letters of recommendation must come directly from the writer or 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 commu-
nity 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 the Graduate Division 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 the Graduate Division prior to 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. 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 UCD 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, 818 18th Street N.W., Suite 940, Washington, D.C. 20006.

Scholarships for Indian and Alaskan natives are available from American Indian Scholarships, Inc., 5106 Grant Avenue N.E., Albuquerque, New Mexico 87108. Applicants must be members of federally recognized Indian tribes or Alaskan native villages and must demonstrate need. The deadline for the fall term is June 1.

The Mexican-American Legal Defense and Education Fund (MALDEF) has monies available for Chicano students who have applied to law school. Applications may be obtained by writing to: Mexican-American Legal Defense and Education Fund, 28 Geary Street, 6th Floor, San Francisco, CA 94108.
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 with interests in areas such as anti-trust, business, labor law, criminal law, or environmental law, 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, course work may be divided between the Law School and the related discipline. You must satisfy the admission requirements for both programs and file applications with both units.

Students have pursued degree programs in combination with the UC Berkeley School of Business for the M.B.A. degree, and with UCD 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 prior to 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 1991-92

<table>
<thead>
<tr>
<th>FALL 1991</th>
<th>SPRING</th>
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</thead>
<tbody>
<tr>
<td>1992</td>
<td></td>
</tr>
<tr>
<td>First-year Introductory Program</td>
<td>Mon-Fri, Aug 19-23</td>
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<tr>
<td>Law School Instruction begins</td>
<td>Mon, Aug 26</td>
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<tr>
<td>Labor Day holiday</td>
<td>Mon, Sept 2</td>
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<tr>
<td>Thanksgiving holiday period</td>
<td>Thurs-Fri, Nov 28-29</td>
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<tr>
<td>Martin Luther King, Jr. holiday</td>
<td></td>
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<tr>
<td>President's Day holiday</td>
<td></td>
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<tr>
<td>Spring recess</td>
<td></td>
</tr>
<tr>
<td>Law School Instruction ends</td>
<td>Fri, Dec 6</td>
</tr>
<tr>
<td>Reading period</td>
<td>Sat-Tues, Dec 7-10</td>
</tr>
<tr>
<td>Law School examination period</td>
<td>Wed-Sat, Dec 11-21</td>
</tr>
<tr>
<td>Last day of semester</td>
<td>Sat, Dec 21</td>
</tr>
<tr>
<td>Law School Commencement</td>
<td></td>
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</tbody>
</table>

*Friday, February 21 is treated as a Monday for class schedule purposes.
School of Management
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 course work prior to enrollment in the program:

Accounting—introductory course which discusses basic concepts.
Economics—the introductory courses in micro- and macroeconomics, and one upper division course in microeconomics.
English—reading and writing skills are essential for success in the program.
Mathematics—an introductory course in calculus.
Statistics—one course in elementary statistics.

APPLYING FOR ADMISSION

April 1 Deadline for filing applications for admission for 1992-93 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 and must be completed and returned, 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 personal statement which discusses career objectives and educational reasons for seeking admission to the program.

Personal interviews are not a requirement, 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.
School of Medicine

Cholesterol

- Normal: < 200 mg/dL
- Desirable: 200-240 mg/dL
- High risk: > 240 mg/dL
The Doctor of Medicine degree requires the satisfactory completion of a four-year course of study comprised of 15 consecutive quarters. Course work is conducted on the Davis campus, at the University of California, Davis, Medical Center, Sacramento; and in nearby affiliated hospitals.

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 prior to application. Information can be obtained at your undergraduate institution or directly from MCAT Registration, Box 414, Iowa City, Iowa 52243. To be acceptable for the entering class of fall 1992, the new MCAT must be taken no later than fall 1991. No scores previous to 1991 will be accepted.

Applicants must also meet the following academic requirements:

A. Must have completed at least three years of study in an accredited college or university in the United States or Canada. A minimum of 90 semester hours or 135 quarter units of college-level work is required. Courses in highly specialized fields are acceptable only at the discretion of the medical school.

B. Must have completed satisfactorily before matriculation each of the following courses:

<table>
<thead>
<tr>
<th>Quarter Units</th>
<th>Semester Units</th>
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<tbody>
<tr>
<td>1. English, 1 year or its equivalent.</td>
<td>12</td>
</tr>
<tr>
<td>2. Biological science, 1 year including laboratory, or its equivalent.</td>
<td>12</td>
</tr>
<tr>
<td>3. General chemistry, 1 year including laboratory, or its equivalent.</td>
<td>12</td>
</tr>
<tr>
<td>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.</td>
<td>12</td>
</tr>
<tr>
<td>5. Physics, 1 year or its equivalent.</td>
<td>12</td>
</tr>
<tr>
<td>6. Mathematics, course work sufficient to satisfy prerequisites for integral calculus. (Course work through integral calculus is recommended).</td>
<td>6</td>
</tr>
</tbody>
</table>

(You will find helpful experience and knowledge gained in biochemistry, genetics, and embryology.)

C. Must demonstrate the potential to perform academically at least as well as the average of the current first year class. This reflects the School of Medicine’s generally higher standards and our emphasis on potential as judged from the application as a whole, including but not limited to MCAT and GPA scores.

For additional information, contact the School of Medicine Admissions Office and request A Guide for Prospective Students.

APPLYING FOR ADMISSION

November 1 Deadline for filing applications for admission for 1992-93 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. The completed application and other required credentials should be submitted 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, two letters of recommendation along with a nonrefundable application fee of $40. These items should be sent 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. It is required that one letter be from a science instructor and the other from a non-science instructor.

Applications will be accepted by the Admissions Committee between June 15 and November 1. It is strongly recommended 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 notifies you of receipt of your completed application from AMCAS. 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 P, Boulder, CO 80302.

The School of Medicine selects students for admission with a view to meeting the needs of society, of the medical profession, and of the School. Because we live in a pluralistic society, and the educational experience is enhanced by the interaction of students from various backgrounds, the School desires diversity in its student body. This is reflected in the School's commitment to expand opportunities in medical education for individuals from groups 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 National Board Examination at their current institution. Available spaces may be filled by the Admissions Committee based upon the entire content of an application, or they may request additional information including letters of recommendation and a personal interview. All applicants for transfer must meet the usual requirements for admission, as well as satisfactorily completing the equivalent of two years of study at the medical school. Applicants will be notified of the Admissions Committee's decision starting April 30.
PROGRAM OF STUDY
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 UCD medical students, provide an ideal setting for hands-on clinical experience.

In addition to the Doctor of Medicine degree, the School of Medicine at the University of California, 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 the Graduate Division, University of California, Davis, CA 95616.

SCHOOL OF MEDICINE CALENDAR

<table>
<thead>
<tr>
<th>Quarter</th>
<th>Instructions for</th>
<th>Dates</th>
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</thead>
<tbody>
<tr>
<td>SUMMER QUARTER 1991</td>
<td>3rd- and 4th-year students</td>
<td>Mon, July 1</td>
</tr>
<tr>
<td></td>
<td>2nd-year students (electives)</td>
<td>Mon, July 1</td>
</tr>
<tr>
<td></td>
<td>2nd-year (regular curriculum)</td>
<td>Mon, July 29</td>
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<tr>
<td></td>
<td>2nd-year students</td>
<td>Mon, Sept 9</td>
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<tr>
<td></td>
<td>2nd-year students</td>
<td>Sept 11-13</td>
</tr>
<tr>
<td></td>
<td>3rd- and 4th-year students</td>
<td>Fri, Sept 20</td>
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<tr>
<td></td>
<td>Academic and administrative holidays</td>
<td>Thurs, July 4</td>
</tr>
<tr>
<td></td>
<td>Academic and administrative holidays</td>
<td>Mon, Sept 2</td>
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<thead>
<tr>
<th>FALL QUARTER 1991</th>
<th></th>
<th></th>
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</thead>
<tbody>
<tr>
<td>Instruction begins for 3rd- and 4th-year students</td>
<td>Mon, Sept 23</td>
<td></td>
</tr>
<tr>
<td>Instruction begins for 1st- and 2nd-year students</td>
<td>Thurs, Sept 26</td>
<td></td>
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<tr>
<td>Exam and study period for 1st-year students</td>
<td>Nov 4-8</td>
<td></td>
</tr>
<tr>
<td>Exam and study period for 2nd-year students</td>
<td>Oct 31-Nov 6</td>
<td></td>
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<tr>
<td>Instruction ends for 1st- and 2nd-year students</td>
<td>Fri, Dec 6</td>
<td></td>
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<tr>
<td>Final exams for 1st- and 2nd-year students</td>
<td>Dec 9-13</td>
<td></td>
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<tr>
<td>Instruction ends for 3rd- and 4th-year students</td>
<td>Fri, Dec 13</td>
<td></td>
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<tr>
<td>Academic and administrative holidays</td>
<td>Nov 28-29</td>
<td></td>
</tr>
<tr>
<td>Academic and administrative holidays</td>
<td>Dec 24-25</td>
<td></td>
</tr>
<tr>
<td>Academic and administrative holidays</td>
<td>Dec 31-Jan 1</td>
<td></td>
</tr>
</tbody>
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<table>
<thead>
<tr>
<th>WINTER QUARTER 1992</th>
<th></th>
<th></th>
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</thead>
<tbody>
<tr>
<td>Instruction begins for 2nd-year students</td>
<td>Thurs, Jan 2</td>
<td></td>
</tr>
<tr>
<td>Instruction begins for 1st-, 3rd-, and 4th-year students</td>
<td>Mon, Jan 6</td>
<td></td>
</tr>
<tr>
<td>Exam and study period for 2nd-year students</td>
<td>Feb 6-12</td>
<td></td>
</tr>
<tr>
<td>Exam and study period for 1st-year students</td>
<td>Feb 10-14</td>
<td></td>
</tr>
<tr>
<td>Instruction ends for 2nd-year students</td>
<td>Wed, Mar 11</td>
<td></td>
</tr>
<tr>
<td>Final exams for 2nd-year students</td>
<td>Mar 13-18</td>
<td></td>
</tr>
<tr>
<td>Instruction ends for 1st-year students</td>
<td>Fri, Mar 13</td>
<td></td>
</tr>
<tr>
<td>Final exams for 1st-year students</td>
<td>Mar 16-20</td>
<td></td>
</tr>
<tr>
<td>Instruction ends for 3rd- and 4th-year students</td>
<td>Fri, Mar 27</td>
<td></td>
</tr>
<tr>
<td>Academic and administrative holidays</td>
<td>Mon, Jan 20</td>
<td></td>
</tr>
<tr>
<td>Academic and administrative holidays</td>
<td>Mon, Feb 17</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>SPRING QUARTER 1992</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Instruction begins for 3rd- to 4th-year students</td>
<td>Tues, Mar 31</td>
<td></td>
</tr>
<tr>
<td>Instruction begins for 2nd-year students</td>
<td>Mon, Mar 23</td>
<td></td>
</tr>
<tr>
<td>Instruction begins for 1st-year students</td>
<td>Mon, Mar 31</td>
<td></td>
</tr>
<tr>
<td>Exam and study period for 2nd-year students</td>
<td>April 20-22</td>
<td></td>
</tr>
<tr>
<td>Exam and study period for 1st-year students</td>
<td>April 27 - May 1</td>
<td></td>
</tr>
<tr>
<td>Instruction ends for 2nd-year students</td>
<td>Wed, May 20</td>
<td></td>
</tr>
<tr>
<td>Final exams for 2nd-year students</td>
<td>May 22-27</td>
<td></td>
</tr>
<tr>
<td>Instruction ends for 4th-year students</td>
<td>Thurs, June 11</td>
<td></td>
</tr>
<tr>
<td>Instruction ends for 1st-year students</td>
<td>Fri, June 5</td>
<td></td>
</tr>
<tr>
<td>Final exams for 1st-year students</td>
<td>June 8-12</td>
<td></td>
</tr>
<tr>
<td>Instruction ends for 3rd-year students</td>
<td>Fri, June 19</td>
<td></td>
</tr>
<tr>
<td>Academic and administrative holidays</td>
<td>Mon, Mar 30</td>
<td></td>
</tr>
<tr>
<td>Academic and administrative holidays</td>
<td>Mon, May 25</td>
<td></td>
</tr>
</tbody>
</table>
School of Veterinary Medicine
The mission of the School of Veterinary Medicine is to provide the best possible health care for animals through teaching, research, and public service. Students are offered a rigorous four-year program of study which prepares them for diverse career opportunities in veterinary medicine.

**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

<table>
<thead>
<tr>
<th>Course</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>General Chemistry</td>
<td>15</td>
</tr>
<tr>
<td>Organic Chemistry</td>
<td>6</td>
</tr>
<tr>
<td>Physics</td>
<td>6</td>
</tr>
<tr>
<td>Biological Sciences</td>
<td>10</td>
</tr>
</tbody>
</table>

### Upper Division Required Sciences

<table>
<thead>
<tr>
<th>Course</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>Embryology</td>
<td>4</td>
</tr>
<tr>
<td>Genetics</td>
<td>4</td>
</tr>
<tr>
<td>Required English</td>
<td>12</td>
</tr>
<tr>
<td>Required Humanities and Social Sciences</td>
<td>12</td>
</tr>
<tr>
<td>Required Statistics</td>
<td>4</td>
</tr>
</tbody>
</table>

(To convert semester units to quarter units, multiply by 1.5. 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. Those individuals are encouraged to take courses (for example, computer science, agricultural economics, molecular and biochemical genetics) which 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 accumulative. 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 General Aptitude and upper 30th percentile for the 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 (4.5 weeks). This experience should also include working with veterinarians, so that the applicant understands the duties and responsibilities of a practitioner and the breadth of veterinary medicine.

**APPLYING FOR ADMISSION**

November 1 Deadline for filing applications for admission for 1991-92 to the School of Veterinary Medicine

Students are admitted to the School of Veterinary Medicine in the fall only. Applications may be obtained any time after July 1 by writing to the Office of the Associate Dean—Student Services, School of Veterinary Medicine, University of California, Davis, CA 95616-8731 or by calling 916-752-1383. Applications, accompanied by a nonrefundable application fee of $40 must be received by this office no later than November 1.

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 Director of Student Affirmative Action by writing to the Office of the Associate Dean—Student Services or by calling 916-752-1806.

**Letters of Evaluation.** Three letters of evaluation are required in addition to your application and 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 for determining residency are explained in the Statement of Legal Residence in the Appendix of this catalog. Specific questions should be addressed to the Legal Analyst — Residence Matters, 590 University Hall, University of California, Berkeley, CA 94720. No other persons are qualified to give rulings on residency.

If you attended college out-of-state, you must include courses descriptions of all required science courses with your application. You can do this by sending the current college catalog or by copying the relevant pages.

If you are from a country other than the United States, you must include a certified English version of your college transcript, and, if English is your second language, the official scores from the Test of English as a Foreign Language (TOEFL) taken within five years of the date when your application is submitted.

Criteria for Selection

I. Academic Factors (50-60%)

A. College course work:
   1. GPA of all undergraduate and graduate course work
   2. GPA of required science course work
   3. GPA of last two years of undergraduate 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 (MPVM) degree program must have completed the Doctorate in Veterinary Medicine or the equivalent; final admission decisions rest with the Admissions Committee, MPVM program. For advising purposes an option should be selected from the four listed below at the time of application. Completed application materials must be submitted no later than ninety days prior to the quarter of planned enrollment. Application forms can be requested from the Director, MPVM Program, School of Veterinary Medicine, University of California, Davis, CA 95616.

Candidates for the MPVM degree must satisfactorily complete a total of 50 units of course work while in residence. This includes 24 units of required courses and 26 units of approved electives which include 8-10 units of research in a field appropriate to the chosen option. One requirement of the MPVM program is to complete a research study which culminates in a written report and oral presentation. A committee, consisting of three faculty members, reviews each paper for acceptability and assigns an appropriate grade.

The degree program extends over a minimum of twelve months to a maximum of two years. Students who intend to complete the program in one calendar year must enroll in August unless they have recently completed and performed satisfactorily in a statistics course that has been approved by the MPVM Director and the Epidemiology and Preventive Medicine 400 Instructor at the time of the student's acceptance into the program. Students meeting this requirement may enroll at the beginning of the fall quarter in late September. Students who intend to remain in the program for more than one year may enroll in the optimal course sequencing, but arrival in August is recommended.

Four options offered under the MPVM Program permit students to select an area of study that best identifies their individual interests and needs. The options and advisers are as follows:

1. Epidemiology and Public Health Management: statistics, epidemiology, animal health economics, and disease control
Adviser: T. B. Farver, I. A. Gardner, D. W. Hird

2. Veterinary Public Health: veterinary medicine applied to food safety and zoonoses
Adviser: C. Genigeorgis

3. Laboratory Science: design and execution of a laboratory or a laboratory/field-based project relevant to animal health
Adviser: K. M. Lam

4. Veterinary Programs Administration: administration of programs for control of animal diseases, veterinary laboratories, research, or educational veterinary service (As the intent of this option is to permit
veterinarians to spend a mid-career sabbatic leave for leadership training, enrollment is limited to individuals with demonstrated record of success in some area of veterinary medicine

Advisor: R. H. McCapes

Inquiries regarding the program should be directed to the Director, MPVM Program, School of Veterinary Medicine, University of California, Davis, CA 95616.

Combined Program. Students may enroll in the combined DVM/MPVM program in which the MPVM 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 DVM and MPVM 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 DVM 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 the Graduate Division, which may be obtained from the Graduate Division, 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
CALENDAR 1991-92

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

THUR-FRI, SEPT 5-6
MON, SEPT 9
TUES, SEPT 10
MON, SEPT 23
MON, SEPT 23
THUR-FRI, NOV 28-29
FRI, DEC 6
SAT, DEC 14

WINTER QUARTER
Instruction begins
M. L. King Holiday
President's Holiday
Research Day
Instruction ends
Finals end

MON, JAN 6
MON, JAN 20
MON, FEB 17
TBA
TUES, MAR 17
THUR, MAR 26

SPRING QUARTER
Instruction begins
Memorial Day Holiday
Instruction ends for 3rd-year students
Instruction ends for 1st- and 2nd-year students
Finals end for 3rd-year students
Finals end for 1st- and 2nd-year students
Commencement

MON, APRIL 6
MON, MAY 25
FRI, JUNE 5
FRI, JUNE 12
FRI, JUNE 12
FRI, JUNE 19
SAT, JUNE 13
Programs and Courses
COURSE DESIGNATIONS

Here is a sample of how a course is listed in this catalog.

190 Proseminar in International Agricultural Development (1) I, II, III. The Staff
Seminar—1 hour. Presentation and discussion of current topics in
international agricultural development by visiting lecturers, staff, and
students. May be repeated for credit. (F/P/NP grading only)

Top line: course number; title; units; quarters offered; instructor(s).

Paragraph following: course setup; prerequisite; description; grading if other than letter grading.

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 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 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, ordinar-
ily 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 exam-
ple, Economics 160A and 160B), the A course is not
a prerequisite to B, unless it is specifically mentioned
in the list of prerequisites.

California Articulation Number (CAN) System

This system uses a common number to identify some
of the transferable, lower division, introductory courses
commonly taught within each academic discipline
on California college campuses. The system assures
students that CAN courses on one participating cam-
pus will be accepted “in lieu of” the comparable CAN
courses on another participating campus. For exam-
ple: CAN Economics 2 on one campus will be accept-
ed for CAN Economics 2 on another participating
campus. Each campus, however, retains its own num-
bering system.

In this catalog, the CAN designator is found at the end
of the course description of each approved CAN
course (e.g., CAN Anth 2, CAN Econ 1A).

For additional information contact the Relations with
Schools/EOP Outreach Office, (916) 752-6302.

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 stu-
dents 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, depart-
mental 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.
Afro-American Studies

College of Letters and Science

John Stewart, Ph.D., Director
Program Office, 467 Kerr Hall (916-752-1548)

Committee In Charge
Cynthia Brantley, Ph.D. (History)
Richard T. Curley, Ph.D. (Anthropology)
Carl C. Jorgenson, Ph.D. (Sociology)
Clarence Meador, Ph.D. (English)
Pattie Turner, Ph.D. (Afro-American Studies)
Clarence E. Walker, Ph.D. (Political Science)
David Scott Wilson, Ph.D. (Afro-American Studies)
Chairperson

Faculty
John Stewart, Ph.D., Professor
Pattie Turner, Ph.D., Assistant Professor

The Major Program

The Afro-American Studies Program exposes students to the ideas, lifestyles, history, and political behavior of African-Americans. Though the courses offered by the program are concerned with Afro-American issues, affiliated courses in other departments allow students to study other African experiences throughout the diaspora.

The Program. There are two main areas of emphasis within the Afro-American major. The emphasis in "Culture of the Afro-American" stresses the black experience within the United States and might include everything from the study of jazz to social movements such as "Back to Africa." The emphasis in "Africafocused on the African experience, and might include a particular study of a tribal grouping, or of one African nation's political movement. In addition, students may choose to do special research projects.

Career Alternatives. Afro-American studies majors are well prepared for employment opportunities in the Office of Education, human service units, county social service programs, and counseling services. Afro-American studies is also an appropriate background for work in community organizations like the Urban League, NAACP, Urban Affairs, and Office of Economic Opportunity. The major also provides a strong background for future study in graduate school.

A.B. Major Requirements:

- Preparatory Subject Matter .........................................................36
  Afro-American Studies 10 .........................................................4
  Two courses from Anthropology 2, Economics 1A, 1B; Geography; 2; Sociology 1; Political Science 1; Psychology 18
  Two courses from Chicano Studies 10, Native American Studies 1, 10; American 45; Asian American Studies 1, 2, 27A, 27B
  History 18, 28, 46A, or Psychology 41 ........................................4
  Total Units for the Minor .........................................................12

Minor Program Requirements:

- Culture of Afro-Americans emphasis: Afro-American Studies 10, 110, 120, 121; Anthropology 140A, 140B; History 177A, 177B; Political Science 115A, 115B; Political Science 133, 146.
- African studies: Afro-American Studies 107, 120, 121; Anthropology 140A, 140B; History 115A, 115B; Political Science 134, 146.

Related Upper Division Courses

Student who complete major in Afro-American Studies are advised that the following courses are offered by faculty members in other disciplines and focus on African and African-American people and their culture:

- Anthropology 104, 139A, 139B, 140, 153; Applied Behavioral Sciences 151, 152, 153, 159A, 159B, 172; Art 150; Dramatic Arts 125; English 179, 181; Geology 125A, 125B; History 102, 115A, 115B, 115C, 116, 177; Music 133B; Political Science 134, 138, 146, 167, 176, 190; Psychology 156; Sociology 120, 130.

Minor Major Requirements:

- Units: 30

- Afro-American Studies: 10, 107, 120, 121, 123, 133, 145A, 145B, 150A, or 150B

- American History and Institutions: University requirement can be satisfied by completion of Afro-American Studies 100, 100, 120, 121. (See also under University requirement.)

Courses in Afro-American Studies

Lower Division Courses

- Afro-American Culture and Society (4) I. Turner
  Lecture—4 hours. Introduction to the contemporary Black American experience by critically examining historical, political, social, and economic factors that have affected the development and status of Black Americans.
- Afro-American Humanities (4) II. Major
  Lecture—4 hours. Introduction to Afro-American cultural tradition as it evolved from West Africa to the Caribbean, South America and North America via slavery.
- Afro-American Image in Popular Culture (4) III. Turner
  Lecture—4 hours. Discussion—2 hours. A review of the depictions of blacks in popular culture (popular press, stage, radio, film, television, advertising) from the middle of the sixteenth century to the present.
- History of Afro-American Dance (4) I. Winbildt
  Lecture—2 hours; discussion—2 hours. Evolution of Afro-American dance, tracing its history and development from West Africa through the Caribbean and to the United States. Investigates the social relevance of Afro-American dance and the artistic merits and contributions of Afro-American choreographers and performers.
- Introduction to Black Politics (4) I. The Staff
  Lecture—4 hours. Introduction to the analysis of Afro-American politics, using conceptual frameworks from political science and other social sciences.
- 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

- Survey of Ethnicity in the U.S. (4) II. Turner
  Lecture—4 hours. The history, culture, philosophy, and current problems of groups considered ethnic minorities in the United States as viewed by the groups themselves. General Education credit. Contemporary Societies/Non-Introductory. Recommended GE preparation: Anthropology 2 or Sociology 2.
- Introduction to Research in the Afro-American Community (4) III.
  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.
- African Cultural Heritage in the Americas (4) III.
  The Staff
  Lecture—4 hours. Prerequisite: course 110 or consent of instructor. Analysis of African cultural systems as they adapted to the slave regimes in the New World and their respective mechanisms in the postbellum Americas.
- West African Social Organization (4) II. The Staff
  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.
- Afro-American Pre-Emancipation (4) II. The Staff
  Lecture—4 hours. Prerequisite: course 10 or consent of instructor. Analysis of contemporary Afro-American cultural adaptations and social organizations within the United States.
- The Black Female Experience in Contemporary Society (4) III. The Staff
  Lecture—4 hours. Prerequisite: upper division standing or consent of instructor. Analysis of the social science research to examine relationships between Black family, education, medical, and psychological development. Black women's contributions in history, literature, and science; life experiences of Black women and philosophical underpinnings of the feminist movement.
- The Black Family in America (4) III. The Staff
  Lecture—4 hours. Prerequisite: upper division standing or consent of instructor. Analysis of the social science research to examine relationships between Black family, education, medical, and psychological development. Black women's contributions in history, literature, and science; life experiences of Black women and philosophical underpinnings of the feminist movement.

B. Black Social and Political Thought (4) III.
  The Staff
  Lecture—4 hours. Prerequisite: course 10 or 80, or consent of instructor. Exploration and analysis of Black social and political thought in the Americas.
- Black Intellectuals (4) III. The Staff
  Lecture—4 hours. Prerequisite: course 10, 80, 45A, or consent of instructor. Exploration of critical analysis of selected theoretical writings of Black intellectuals, and especially political and social thinkers, in the Americas.
- The Afro-American Visual Arts Tradition: A Historical and Cultural Study (4) I. The Staff
  Lecture—4 hours. Prerequisite: upper division standing, Afro-American visual arts tradition, folk and formal, in historical and cultural context, from 1800 to the present.
- The Afro-American Visual Arts Tradition: A Historical and Cultural Study (4) II. The Staff
  Lecture—4 hours. Prerequisite: upper division standing, Afro-American visual arts tradition, folk and formal, in historical and cultural context, from 1800 through Reconstruction.
Agrarian Studies (College of Agricultural and Environmental Sciences)

The Major Program

The agrarian studies major provides a broad view of agriculture and its relationship to humanity.

Courses in the social sciences and humanities are selected to develop an understanding of agriculture in the context of humanity: anthropology, geography, philosophy, and economics. Courses in the natural sciences are selected to give students an understanding of the scientific disciplines, and biological systems important to modern agriculture. These courses include chemistry, biochemistry, mathematics, soil science, biology, and ecology. For their agricultural specialization, students choose a major emphasis in either agricultural economics, animal sciences, food science, plant sciences, resource sciences, or another closely allied field. In addition to their major area of emphasis, students choose a minor emphasis in either the natural sciences or the social sciences.

Career Alternatives. The agrarian studies major provides a solid background for careers in agriculture, agribusiness, government, international services, and teaching.

B.S. Major Requirements:

(For convenience, in program planning the usual courses taken to satisfy the requirements are shown in parentheses. Equal or more comprehensive courses are acceptable.)

**UNITS**

- English Composition Requirement: 0-8
- See College requirement
- Social Sciences and Humanities: 42
- Cultural anthropology or geography (Anthropology 2 or Geography 2-3): 4
- Philosophy of biological sciences (Philosophy 10G or 10H): 4
- Introduction to economics (Economics 1A or 1B, Agricultural Economics 120): 14
- Restricted Electives: 20
- Additional courses selected in consultation with adviser in 3 or more of the following fields: agricultural economics, American studies, anthropology, classics, economics, geography, history, languages, political science, rhetoric, sociology.

Natural Sciences: 67-68
- Chemistry (Chemistry 1A, 1B, 1A-1B, 1A-1B): 16
- Biochemistry (Biochemistry 101A, 101B) and/or upper division plant or animal physiology: 8
- Mathematics (Mathematics 18A plus two of the following: Mathematics 18B, Agricultural Science and Management 21, 150, Computer Science Engineering 30): 10-11
- Soil science (Soil Science 100): 4
- Ecology (Plant Science 101 or Environmental Studies 100): 4
- Biological sciences (Biological Sciences 1A, 1B, or 1C): 15
- Restricted electives: 12
- Additional courses in 2 or more fields of science fundamental to agricultural pursuits, e.g., biochemistry, botany, genetics, microbiology, nutrition, physiology, soils, water science, zoology.

Agrarian Studies Emphasis:

- Perspectives on agriculture (Agrarian Studies 2): 4
- Geography of agriculture (Geography 142): 4
- Food and culture (Food Science and Technology 20): 4
- History of U.S. agriculture (History 188A, 188B): 4

Agricultural Specialization:

- Major field: 18
- Courses chosen to provide depth of understanding in one of the following or closely allied fields: animal sciences, food sciences, plant sciences, resource sciences, or another closely allied field. In addition to their major area of emphasis, students choose a minor emphasis in either the natural sciences or the social sciences.

Career Alternatives. The agrarian studies major provides a solid background for careers in agriculture, agribusiness, government, international services, and teaching.

Independent study: 2-6 hours; thesis: Prerequisite: Agrarian Studies major; senior standing; overall GPA of 3.0 or higher; consent of master adviser. Two or three successive quarters of guided, scientific and/or scholarly research on an agriculturally-related subject of special interest to the student. (P/NP grading only.) (Deferred grading only, pending completion of thesis.)

Agricultural and Environmental Chemistry (A Graduate Group)

You-Lo Heilh, Ph.D., Chairperson of the Group

Group Office, 109 Food Science and Technology Building (916-752-1415)

Faculty. Includes members from various departments in the Colleges of Agricultural and Environmental Sciences, Engineering, and Letters and Science.

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, fibers/polyesters, pesticides, and environmental pollution. Detailed information regarding graduate study may be obtained by writing the Group Chairperson.


Courses in Agricultural and Environmental Chemistry

Graduate Courses

290. Seminar (1) I, II, III. The Staff (Chairperson in charge)
- Seminar—1 hour. Selected topics in agricultural and environmental chemistry, presented by students. (S/U grading only.)

295. Group Study (1-5) I, II, III. The Staff (Chairperson in charge)
- Prerequisite: consent of instructor. The chemistry and biochemistry of foods, nutritional chemicals, pesticides, and other special topics as they apply to agricultural and environmental chemistry.

299. Research (1-12) I, II, III. Summer. The Staff (Chairperson in charge)
- Arrangements should be made well in advance with a faculty member of the Group in Agricultural and Environmental Chemistry. (S/U grading only.)

Agricultural and Managerial Economics (College of Agricultural and Environmental Sciences)

The Major Program

The major in agricultural and managerial economics teaches students to apply economics and quantitative principles to problems in agricultural production, management, and marketing.

The Program. Each student must specialize in at least one of three options: agricultural economics, which focuses on topics related to the production of agricultural products; agricultural business economics, which deals with the economic aspects of the agricultural industry; and agricultural and consumer economics, which covers topics related to consumer behavior and the economics of food and fiber products. The program requires the completion of a thesis or a comprehensive examination.
and marketing of foods and fibers; consumer economics, which focuses on issues related to consumer supervision and management, and welfare or managerial economics, which focuses on topics related to evaluating, financing, and managing business activities.

Internships and Career Alternatives. Students in agricultural economics have opportunities to gain additional career information and preparation through internships in a variety of private business and governmental agencies. Graduates qualified for supervisory and management positions in farm and ranch production, food and agricultural processing, agricultural sales and service, banking, finance, commodity and stock brokerage in both private and public arenas, and 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. 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>3-12</td>
</tr>
<tr>
<td>Preparatory Subject Matter</td>
<td>35-38</td>
</tr>
<tr>
<td>Accouting (Economics 11A-11B)</td>
<td>8</td>
</tr>
<tr>
<td>Computer Science (Economics 120, 121, Computer Science Engineering 10 or 30)</td>
<td>3-4</td>
</tr>
<tr>
<td>Economic principles (Economics 1A-1B)</td>
<td>10</td>
</tr>
<tr>
<td>Calculus (Mathematics 18A-18B or 21A-21B)</td>
<td>6-8</td>
</tr>
<tr>
<td>Statistics (Statistics 13A, 13B)</td>
<td>8</td>
</tr>
</tbody>
</table>

Breadth/General Education Requirement: 40 units (see undergraduate handbook in Department Advising Office for complete list of courses)

Agricultural and environmental sciences (excluding agricultural economics, consumer economics, and applied behavioral sciences).

Natural sciences (including mathematics beyond preparatory subject matter).

Social sciences (excluding economics).

Note: Approved General Education courses must simultaneously satisfy breadth for the major and the campus General Education requirement.

Depth Subject Matter: 19-21 units

Micro theory, Agricultural Economics 100A, 100B, 100C, 100D.

Quantitative methods, Agricultural Economics 106, 155, 156.

Macroeconomics, Agricultural Economics 101 or 130, 131, 133, 135, 143, 144, 145, 150.

Restricted Electives: 28-32 units

(a) Agricultural Economics: 28 units

At least 15 units must be chosen from Agricultural Economics 120, 130, 131, 132, 139, 140, 145, 150. The remaining 13 units must be selected from upper division courses in Agricultural Economics and/or Economics.

(b) Consumer Economics: 32 units

At least 15 units must be chosen from Agricultural Economics 118A, 130, 132, 141M, 142, 143, Consumer Science.

Students graduating with this major are required to attain at least a C average (2.0) in all upper division Agricultural Economics, Consumer Economics, and Economics courses, plus any other upper division courses taken at the University in the depth subject matter.

100, 135. The remaining 17 units may be chosen from the above-recommended courses, or any of Agricultural Economics 120, Applied Behavioral Sciences 171, Economics 121A, 121B, 125, 130, Environmental Studies 160, 168A, 168B, Environmental Toxicology 101, 129, 138, Philosophy 100, 101, 174.

(c) Managerial Economics: 32 units

Agricultural Economics 18.


Unrestricted Electives: 37-48 units

Total Units for the Degree: 180

Advising Center for the major is located in University House Annex (916-3312).

Major Adviser: S. H. Osnick (Agricultural Economics).

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

Agricultural Economics

(Comme of Agricultural and Environmental Sciences)

Hoy F. Carman, Ph.D., Chairperson of the Department

Department Office, 118 Viocheles Hall (916-752-1517)

Faculty

Julian M. Alston, Ph.D., Associate Professor

Steven Blank, Ph.D., Lecturer

Oscar R. Burt, Ph.D., Professor

Bayford C. Butler, M.S., Lecturer

Leslie J. Butler, Ph.D., Assistant Professor

Michael R. Caputo, Ph.D., Assistant Professor

Hoy F. Carman, Ph.D., Professor

Colin A. Carter, Ph.D., Professor

Harold G. Carter, Ph.D., Professor

Robert L. Cook, Ph.D., Lecturer

D. Barton DeLoach, Ph.D., Professor Emeritus

Jerry Foxhoven, Ph.D., Professor

Benjamin C. Frisch, Ph.D., Professor Emeritus

Varden Fuller, Ph.D., Professor Emeritus

Richard D. Green, Ph.D., Professor

Arthur Haweiner, Ph.D., Professor

Thomas W. Hazlitt, Ph.D., Associate Professor

Maia M. Hein, Ph.D., Professor

Eva R. Hendrickson, Ph.D., Assistant Professor

Richard E. Howitt, Ph.D., Lecturer

Robert D. Innes, Ph.D., Assistant Professor

Lovell S. Jarvis, Ph.D., Associate Professor

Warren E. Johnston, Ph.D., Professor

Desmond A. Johnson, Ph.D., Assistant Professor

Gordon A. King, Ph.D., Professor Emeritus

Catherine L. King, Ph.D., Assistant Professor

Karen Klobucar, Ph.D., Lecturer

Sylvia Lane, Ph.D., Professor Emeritus

Douglas M. Luedtke, Ph.D., Professor Emeritus

Elnor W. Lear, Ph.D., Professor

Samuel H. Logan, Ph.D., Professor

John B. Loomis, Ph.D., Associate Professor

(Agricultural Economics, Environmental Studies)

Marc S. Mangel, Ph.D., Professor (Agricultural Economics, Zoology)

Phillip L. Martin, Ph.D., Professor

Alexander F. McGorry, Ph.D., Professor Emeritus

Chester C. McCorley, Jr., Ph.D., Professor Emeritus

Quinton Paris, Ph.D., Professor

Refugio I. Rochin, Ph.D., Associate Professor

(Agricultural Economics; Chicano Studies)

Richard J. Sexton, Ph.D., Associate Professor

Lancaster E. Shepard, Ph.D., Professor

J. Herbert Snyder, Ph.D., Professor Emeritus

Stephen H. Sosinski, Ph.D., Professor Emeritus

Joe J. Stastila, Ph.D., Lecturer

J. Edward Taylor, Ph.D., Assistant Professor

Raymond D. Whitten, Ph.D., Assistant Professor

James E. Wilen, Ph.D., Professor (Agricultural Economics, Environmental Studies)

Major Program and Graduate Study. See the major in Agricultural and Managerial Economics; and for graduate study, see the Graduate Division section in this catalog.

Major Advisers. See Class Schedule and Room Directory.

Related courses. See Environmental Biology and Management 110; Environmental Studies 160, 168A, 168B, 173; and courses in Consumer Economics and Economics.

Courses in Agricultural Economics

Lower Division Courses

104, Economic Basis of the Agricultural Industry (4) I. Learn

Lecture—4 hours. Agriculture and man: the agricultural industry in U.S. and world economies; production and supply, marketing and demand; agricultural land, capital, labor, and management, the economic and social problems of agriculture in an urban and industrialized society emphasizing California. 18, Business Law (4) I, III, Alcalde, summer.

Lecture—4 hours. Prerequisite: sophomore standing. General principles of business law in the areas of contracts, business organization, real property, uniform commercial code, sales, commercial paper, employment relations, and creditor-debtor against a background of the history and functioning of our present legal system.

49A, 49B, 49C. Field Practice (1) I, II, III. Stastila Discussion—1 hour; three field trips. Prerequisite: consent of instructor. Field trips and experiences to observe the various management aspects of Agricultural Production. Emphasis will be placed on developing the student's understanding and awareness of economics and managing and their application in agricultural production. (P/NP grading only)

98. Directed Group Study (1-5) I, II, III. The Staff (Chairperson in charge)

Prerequisite: consent of instructor. (P/NP grading only).

99. Special Study for Undergraduates (1-5) I, II, III. The Staff (Chairperson in charge)

Prerequisite: consent of instructor. (P/NP grading only).

Upper Division Courses

100A, Intermediate Microeconomics: Theory of Production and Consumption (4) I. Kung; II. Carman; III. Holloway

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 to students who have completed Economics 100 or the equivalent; however, Economics 100 will not serve as prerequisite to course 100B.)

100B. Intermediate Microeconomics: Imperfect Competition, Market Failure and Public Policy Economics (4) I, Marti; II. Helfand; III. Hazlett

Lecture—3 hours; discussion—1 hour. Prerequisite: course 100A. Pricing, output determination, and employment of resources under conditions of monopoly, oligopoly, and monopolistic competition.

106. Quantitative Methods in Agricultural Economics (4) I. Kung; II. Holloway; III. Havenner

Lecture—3 hours; discussion—1 hour. Prerequisite: Economics 100A.
112. Fundamentals of Business Organization (4) I. Logan: III. The Staff; summer.
Lecture—2 hours; discussion—2 hours. Prerequisite: unlimited. 3 hours. Cp: Use of the role of organizational design and behavior in business and public agencies. Principles of planning, decision making; individual behavior, motivation, leadership, management; formal groups; conflict and change in the organization.

113. Fundamentals of Marketing Management (4) II. Butler; Bay Lecture—4 hours. Prerequisite: Economics 1A. For non-majors only. Nature of product marketing by the business firm. Customer-product relationships, pricing and demand; new product development and marketing strategy; promotion and advertising; product life cycles; the distribution system; manufacturing, wholesaling, retailing; Government regulation and restraints. (Not open for credit to students who have completed course 130.)

114A-114B. Tax Accounting (3-3) I-II. Serick Lecture—2 hours; discussion—1 hour. Prerequisite: Economics 1B. Determination of the federal income tax of employees, proprietors, partners, and corporations; and the tax implications of alternative business decisions and organizing.

120. Agricultural Policy (4) III. The Staff Lecture—3 hours; discussion—1 hour. Prerequisite: Economics 1A. Analytical treatment of historical and current agricultural 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/Non-Introductory. Recommended GE preparation: Economics 1A-1B.

120. Agricultural Marketing (4) I. C. Carter; II. Whitney Lecture—3 hours; discussion—1 hour. Prerequisite: Economics 1A or the equivalent. The nature, function, organizational structure, and operation of agricultural markets; prices, costs, and margins; market information, regulation, and controls; cooperative marketing.

131. Agricultural Markets, Prices and Trade (3) III. Whitney Lecture—3 hours. Prerequisite: course 100B; course 130 Recommend. Analysis of economic interdependence among countries, geographically dispersed markets, alternative product forms and markets separated in time.

132. Cooperative Business Enterprises (3) II. Sexton Lecture—3 hours. Special current and historical applications of cooperative business enterprises in the United States and elsewhere; economic theories of behavior, principles of operation, finance, decision-making, and taxation.

136. Managerial Marketing (4) II. The Staff Lecture—4 hours. Prerequisite: course 100A; Statistics 102. Application of economic theory and statistics in the study of marketing. Marketing measurement, market segmentation, determination of optimal product market mix; sales and cost analysis, conduct of marketing research, marketing models and systems.

139. Futures and Options Markets (3) I. C. Jarig Lecture—3 hours. Prerequisite: course 100A; Statistics 103. History, mechanics, and economic functions of futures and options markets; hedging; theory of inter-temporal price formation and behavior of futures and options prices; price forecasting; futures and options as policy tools.

140. Farm Management (5) III. H. Carter Lecture—5 hours. Prerequisite: Economics 1A. Farm organization and resources; economic and technological evaluation of management techniques and management control; problems in organizing and managing the farm business.

141. Consumers and the Market (4) I. Helen Lecture—4 hours. Prerequisite: Economics 1A. Factors affecting consumer expenditures. Structure of the market and the effects of its performance on consumers. Aggies 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 must enroll for course 141M or 154A.) Credit: Containment 141M; Special credit: Containment 154A; Special credit: Computer Societies/Non-Introductory. Recommended GE preparation: non-GE introductory course sequence Economics 1A-1B.

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 must enroll for this 3-unit course instead of course 141.) General Education credit: Contemporary Societies/Non-Introductory. Recommended GE preparation: non-GE introductory course sequence Economics 1A-1B.

142. Personal Finance (3) I. Shepard; III. 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 Consumer Economics 142.)

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

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

147. Natural Resource Economics (4) I. Helfand Lecture—3 hours; discussion—1 hour. Prerequisite: Economics 1A or the equivalent. Natural resource use problems emphasizing past and current policies and institutions affecting resource use; determinants, principles, and patterns of natural resource use; conservation; and public issues. (Students who have had or are taking course 100A, Economics 100, or the equivalent, may receive only 3 units of credit, so must enroll in course 147M instead.)

147M. Natural Resource Economics (2) I. Helfand Lecture—3 hours; discussion—1 hour. Prerequisite: Economics 1A; enrollment open to non-major only. Natural resource use problems emphasizing 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 147M.

148. Economic Planning for Regional and Resource Development (3) II. Lecture—3 hours. Prerequisite: Economics 1A and 1B; Mathematics 18A recommended. Relation of resource use problems to regional problems; planning economic development with particular emphasis on resource use in agriculture; regional and national planning by both centralized and decentralized systems.

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

155. Quantitative Analysis for Business Decisions (4) I. Parli; II. Howitt; III. The Staff Lecture—3 hours; discussion—1 hour. Prerequisite: course 100A; Statistics 103. Introduction to selected topics in management science and operations research: decision analysis for management, mathematical programming, competitive analysis, and others.

156. Introduction to Mathematical Economics (4) I. Caputo Lecture—4 hours. Prerequisite: course 100A and 155. Linear algebra for economists; necessary and sufficient conditions in static optimization problems; implicit function theorem; economic methodology and mathematics; comparative statics; envelope theorem; Le Chatelier's principle; applications to production and consumption models.

157. Analysis for Production Management (4) III. Logan 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.

169. Economics of Energy (4) II. Wilen Lecture—4 hours; discussion—1 hour. Prerequisite: course 100B or the equivalent; introductory course in calculus recommended. Economic concepts necessary to study energy issues. Topics include: petroleum economics, cartel behavior, exploration and development, economics of alternative energy sources, risk and uncertainty, transition to alternative sources, subsitutability. Offered in alternate years. Same course as Environmental Studies 169.

171A. Financial Management of the Firm (4) I. Sorsick Lecture—3 hours; discussion—1 hour. Prerequisite: course 106; Economics 11A-11B. Financial analysis at the firm level: methods of depreciation; influence of the tax structure; inventory, cash, and accounts receivable management; sources of short-term and long-term financing, and financial problem solving using a computer spreadsheet program. (Students who have had or are taking Economics 134 may not receive credit for this course.)

171B. Financial Management of the Firm (4) II. Hazelwood Lecture—3 hours; discussion—1 hour. Prerequisite: course 171A. Financial analysis at the firm level: methods of capital budgeting; calculating the cost of capital; dividend policies; mergers and acquisitions; and special current topics in finance.

176. Economic Analysis In Resource Use (3) III. Larson Lecture—3 hours. Prerequisite: course 100A. Analytical treatment of resource use problems including public policy issues; economic productivity and natural resources; determinants, principles and patterns of natural resource use; resource conservation; land tenure problems and policies.

150A. Senior Research Project (2) I. 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.)

150B. Senior Research Project (2) II. Lecture—1 hour; discussion—1 hour. Prerequisite: course 150A or consent of Instructor. The research report begun in course 150A will be completed and, after evaluation by the instructor, be revised and resubmitted by the student prior to the end of 150B. (Deferred grading only, pending completion of sequence.)
182. Internship (1-6) I, II, III, summer. The Staff (Chairperson in charge) Internships provide experience and on campus in all subject areas offered in the Department of Agricultural Economics. Internships are supervised by a member of the staff. (PINP grading only)

187. Tutoring in Agricultural Economics (1-3) I, II, III. The Staff (Chairperson in charge) Hours and duties will vary depending upon the course being tutored. Prerequisite: senior standing in Agricultural Economics; the courses of the Department Chairperson will lead small discussion groups affiliated with one of the department's regular courses, under the supervision of the instructor in charge of the course. (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

200A. Microeconomic Theory (5) I. Roemer (Economics), Silvestre (Economics)
Lecture—4 hours; discussion—1 hour. Prerequisite: graduate standing. Linear and non-linear optimization theory with emphasis on the theory of the profit-maximizing firm and the utility-maximizing consumer. (Same course as Economics 220A)

200B. Microeconomic Theory (5) III. Heims (Economics)
Lecture—4 hours; discussion—1 hour. Prerequisite: graduate standing. Characteristics of market equilibrium under perfect competition, simple monopoly, and oligopoly. Emphasis on general equilibrium and welfare economics. (Same course as Economics 220A)

200C. Microeconomic Theory (5) M. Maloweski (Economics)
Lecture—4 hours; discussion—1 hour. Prerequisite: course 200A. Uncertainty and information in economics. Individual decision making under uncertainty. Introduction to game theory with emphasis on applications to markets with imperfect competition. (Same course as Economics 220C)

204. Microeconomic Analysis (5) I. Altman (Economics)
Lecture—4 hours; discussion—1 hour. Prerequisite: Economics 100 or course 200A or 200B. Ecological Economics 101; Agricultural Economics/Economics 204 and Economics 100A. Emphasis on the economic framework of the open developing country. The basic analytical focus is real exchange rate and its impact on sectoral allocation of resources. (Same course as Economics 204B)

215. Open Macroeconomics of Development (4) I. Kanada
Lecture—3 hours; discussion—1 hour. Prerequisite: Agricultural Economics/Economics 200A or 204, 200D, 202B, and 215A. Models and policy approaches regarding trade, monetary, and fiscal issues, capital flows, and debt are evaluated in the macroeconomic framework of an open developing country. The basic analytical focus is real exchange rate and its impact on sectoral allocation of resources. (Same course as Economics 215B)

215C. Economic Approaches to Development Analysis (4) II. Staff
Lecture—3 hours; discussion—1 hour. Prerequisite: Agricultural Economics/Economics 215A, 215B. Extension of development models for policy analysis including household-farm models, models of resource allocation under uncertainty. (Same course as Economics 215C)

220. Economic of Consumer Policy (3) III. Sonick
Lecture—3 hours; discussion—1 hour. Prerequisite: one graduate course in economics and one course in economics or the equivalent. Policy criteria: sources of market failure; consumer policy alternatives; empirical evaluation of selected economic policies.

221. Agricultural Policy in Developing Countries (4) I. McGee
Lecture—4 hours; discussion—4 hours. Economic policy, its nature, formation and analysis; characteristics of agricultural sectors in developed countries; comparative analysis of policies relating to production, marketing, price, income, and resource adjustment; international trade policies for temperate zone agricultural commodities.

222. International Agricultural Trade and Policy (4) I. Lecture—4 hours; discussion—1 hour. Prerequisite: course 210B or Economics 204; Economics 100 or the equivalent. Analysis of country interdependence through world agricultural markets. Partial equilibrium analysis is used to study the impacts of national intervention on world markets, national policy choices in an open economy and multilateral policy issues. Offered in alternate years.

240A. Econometric Methods (4) I. Green
Lecture—4 hours; discussion—1 hour. Prerequisite: Statistics 133 and a course in linear algebra or the equivalent. Least squares, instrumental variables, and maximum likelihood estimation and inference for single equation linear regression model; linear restrictions; heteroskedasticity; autocorrelation; lagged dependent variables. (Same course as Economics 240A)

240B. Econometric Methods (4) III. Hageman (Economics)
Lecture—4 hours; discussion—1 hour. Prerequisite: Economics 240A. Covers the variety of topics including analysis of variance, pooled time-series, cross-section estimation, seemingly unrelated regression, classical hypothesis tests, and identification of simultaneous equation models. (Same course as Economics 240B)

240C. Econometric Theory (4) II. Wegge
Lecture—3 hours; discussion—1 hour. Prerequisite: course 240B. Finite sampling theory; nonlinear and dynamic econometric models; distribution theory. (Same course as Economics 240C)

240D. Topics In Econometrics (4) III. Cameron
Lecture—3 hours; discussion—1 hour. Prerequisite: course 240B. Topics in nonlinear econometric modelling. Contents may vary from year to year. (Same course as Economics 240D)

252. Applied Linear Programming (4) I. Howitt
Lecture—3 hours; discussion—1 hour. Applied linear programming methods emphasizing use for business applications. Matrix notation, diet, blending, network and related problems.

253. Optimization Techniques with Economic Applications (4) I. Paris
Lecture—3 hours; discussion—1 hour. Prerequisite: Agricultural Economics/Economics 200M. Optimization techniques and methods including linear and nonlinear programming and dynamic models. Numerical applications to household, firm, general equilibrium and economic growth problems.

254. Dynamic Optimization Techniques for Economic Systems with Applications (4) I. Cooco
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. Logan
Lecture—3 hours. Dynamic model formulation and computer simulation of economic systems.

256. Applied Econometrics (4) I. Helen
Lecture—4 hours; discussion—1 hour. Prerequisite: Master students in agricultural economics or economics. Emphasis on regression analysis, problems of specification, and model development. (Same course as Economics 256)

257. Analysis and Applications in Production Economics (4) III. But
Lecture—4 hours; discussion—1 hour. Prerequisite: course 240, 252, and 256 or the equivalent. Micro-level analysis of decision problems in agricultural production processes, e.g., investment, resource conservation, pest management, and irrigation scheduling. Covers static and dynamic models under uncertainty and some aggregate aspects of production.

258. Demand and Market Analysis (3) III. Alston
Lecture—3 hours. Prerequisite: course 204 and 256 or consent of instructor. Quantity and theoretical analysis of the factors affecting supply, demand and price determination for agricultural products. Emphasis on analytical tools for assessing the impact of changes in government policies and macroeconomic variables.

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

263. Agricultural Firm Analysis (3) III. McCormick
Lecture—1 1/2 hours; discussion—1 hour; summer field trips—one 5-day, and one 5-hour. Prerequisite: graduate standing in Agricultural Economics. Review and analysis of production, marketing, and resource issues facing agricultural firms in California. Application of production, economic theory and measurement to individual firm decisions in an economic context.

271. Financial Management (3) III
Lecture—3 hours. Prerequisite: course 171B or the equivalent. Sources and costs of capital; optimal capital structure; project evaluation; investment policy; risk management; dividend policy; measurement of working capital; mergers and acquisitions.

276. Institutional and Economic Analysis of Natural Resources (3) II. Larson
Lecture—4 hours; discussion—1 hour. Prerequisite: course 100A or Economics 100. Natural resources are developed and allocated in a multiple of institutional arrangements that significantly affect their economic yields: demand and enforcement of property rights; information and the market externalities, transactions and adjustment costs. Applications to land/water policy.

286. Analysis of Research in Production Economics (3) IV. Parisi
Lecture—3 hours; discussion—1 hour. Current problems and methods of analysis in agricultural production economics research. Emphasizes both firm and industry.

287. Analysis of Research in Agricultural Marketing (4) II. Sexton
Lecture—4 hours. Current problems and methods in agricultural market analysis with emphasis on marketing sector firm behavior. Topics included market definition, marketing margins and prices, supply and demand elasticity, technology analysis, models of imperfect competition, cooperatives, and marketing orders.
Agricultural Education

(College of Agricultural and Environmental Sciences)

Faculty
See under the Department of Applied Behavioral Sciences.

Major Programs and Graduate Study. An undergraduate program leading to a bachelor of science degree is offered in Agricultural Education. For graduate study refer to the Graduate Division section in this catalog.


Courses in Agricultural Education

Questions pertaining to the following courses should be directed to the instructor or the Department of Applied Behavioral Sciences, Advising Center, 101 AOB 4.

The Major Program

The agricultural education major trains students to teach agricultural sciences in high schools or community colleges. In addition, it prepares students for service in rural agriculture. This program combines practical experience and technical coursework in agriculture with courses from the natural, physical, and social sciences.

The Program: Students who enroll in agricultural education benefit from UC Davis resources as a world-famous agricultural center. Students may choose to emphasize such areas as plant production, animal production, environmental horticulture, agricultural science, or agricultural engineering. It is also possible to complete the requirements for a single-subject credential in general agriculture.

Internships and Career Alternatives: Internships can be arranged in private industries such as nurseries, with farmers or ranchers, in laboratories, and with the Forest Service. As part of the teaching credential program, there are opportunities to observe and work with teachers in high schools. Many agricultural education graduates enter agriculture teaching or pursue a master's degree in agricultural education. Others enter a variety of advanced degree programs in agriculture or environmental sciences.

Requirements for a Single-Subject Credential in Agricultural Science: This major is not a preparation for the future grower, orchardist, or ranch manager. Students can also assume positions in agricultural businesses, such as seed, fertilizer, feed, and machinery businesses, and with agriculture finance firms.

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.)

<table>
<thead>
<tr>
<th>Course Title</th>
<th>Units</th>
</tr>
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<tbody>
<tr>
<td>English Composition Requirement</td>
<td>4-12</td>
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<tr>
<td>See College requirement</td>
<td>0-8</td>
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<tr>
<td>Rhetoric (Rhetoric and Communication 1 or 3)</td>
<td>4</td>
</tr>
<tr>
<td>Preparatory Subject Matter</td>
<td>50-51</td>
</tr>
<tr>
<td>Biological sciences (Biological Sciences 1A, 1B, and 1C)</td>
<td>15</td>
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<tr>
<td>Chemistry (Chemistry 1A-1B, and 9A-9B or 128A-128B)</td>
<td>16</td>
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<tr>
<td>Computer science (Agricultural Science and Management 21)</td>
<td>3</td>
</tr>
<tr>
<td>Economic principles (Economics 1A or 1B)</td>
<td>5</td>
</tr>
<tr>
<td>Genetics (Genetics 10 or 100)</td>
<td>4</td>
</tr>
<tr>
<td>Mathematics (Mathematics 16A or 21A).</td>
<td>3-6</td>
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<tr>
<td>Statistics (Agricultural Science and Management 150)</td>
<td>4</td>
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<tr>
<td>Breadth/General Education</td>
<td>6-24</td>
</tr>
<tr>
<td>Satisfaction of General Education requirement</td>
<td>6-24</td>
</tr>
</tbody>
</table>

Specialization | 30-32 |

*Courses not offered this academic year.

Unrestricted Electives | 10-49 |

Total Units for the Degree | 180 |


Advising Center for the major is located in 101 AOB 4 (916-752-2244).

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 Applied Behavioral Sciences departmental office, 113 AOB 4. Since many majors in the College do not offer the minimum preparation necessary for entering the Agriculture Credential program, you are encouraged to seek counseling as early as possible. See also the Teacher Education Program.

Graduate Study. The Department of Applied Behavioral Sciences offers a program of study leading to the M.Ed. degree. Further information may be obtained from the Department and the Graduate Announcement.


Lower Division Course
92. Internship (1-12). I, II, III. The Staff (Chairperson in charge).
Internship—3-36 hours. Prerequisites: lower division standing; consent of instructor. Supervised internship on and off campus in areas of agricultural education. (P/NP grading only.)

Upper Division Courses
Concepts in Education—3-36 hours. Prerequisites: lower division standing with consent of instructor. Supervised internship on and off campus in areas of agricultural education. (P/NP grading only.)

I, II. The Staff
Measurement and Evaluation in Teaching—3 hours. Philosophy and organization of educational testing, with particular reference to educational principles for agriculture, commerce, home economics, and industry.

171. Audio Visual Communications (2).
I, II. The Staff
Audio Visual Communications—3 hours. Audiovisual concepts and principles of audio-visual communications related to education. (P/NP grading only.)

172. Multi-Media Production (3).
I, II. The Staff
Multi-Media Production—3 hours. Production and application of producing multi-media educational programs.

180. Consumer Education (3).
I, II. The Staff
Consumer Education—3 hours. Prerequisites: Agricultural Economics 141 or 142 or Consumer Science 100. Examination of values, decision-making processes, lifestyle needs of individuals and communities as a basis for teaching of consumer education in various subject areas at all age levels.

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

192. Internship (1-12).
I, II, III. The Staff (Chairperson in charge).
Internship—3-36 hours. Prerequisites: upper division standing; consent of instructor. Supervised internship on and off campus in various areas of agricultural education. (P/NP grading only.)

109 Agricultural Education

(Unrestricted Electives | 10-49 |

Total Units for the Degree | 180 |


Advising Center for the major is located in 101 AOB 4 (916-752-2244).

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 Applied Behavioral Sciences departmental office, 113 AOB 4. Since many majors in the College do not offer the minimum preparation necessary for entering the Agriculture Credential program, you are encouraged to seek counseling as early as possible. See also the Teacher Education Program.

Graduate Study. The Department of Applied Behavioral Sciences offers a program of study leading to the M.Ed. degree. Further information may be obtained from the Department and the Graduate Announcement.


Lower Division Course
92. Internship (1-12). I, II, III. The Staff (Chairperson in charge).
Internship—3-36 hours. Prerequisites: lower division standing; consent of instructor. Supervised internship on and off campus in areas of agricultural education. (P/NP grading only.)

Upper Division Courses
Concepts in Education—3-36 hours. Prerequisites: lower division standing with consent of instructor. Supervised internship on and off campus in areas of agricultural education. (P/NP grading only.)

I, II. The Staff
Measurement and Evaluation in Teaching—3 hours. Philosophy and organization of educational testing, with particular reference to educational principles for agriculture, commerce, home economics, and industry.

171. Audio Visual Communications (2).
I, II. The Staff
Audio Visual Communications—3 hours. Audiovisual concepts and principles of audio-visual communications related to education. (P/NP grading only.)

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Consumer Education—3 hours. Prerequisites: Agricultural Economics 141 or 142 or Consumer Science 100. Examination of values, decision-making processes, lifestyle needs of individuals and communities as a basis for teaching of consumer education in various subject areas at all age levels.

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

192. Internship (1-12).
I, II, III. The Staff (Chairperson in charge).
Internship—3-36 hours. Prerequisites: upper division standing; consent of instructor. Supervised internship on and off campus in various areas of agricultural education. (P/NP grading only.)
Agricultural Engineering

(College of Agricultural and Environmental Sciences)

Henry E. Studer, M.S., Chairperson of the Department

Department Office, 2030 Bainer Hall (916-752-0102)

Faculty
Norman B. Alexson, M.S., Professor Emeritus
William J. Chancellor, Ph.D., Professor
R. Paul Chen, Ph.D., Professor
Michael J. Delkwell, P.E., Associate Professor
Roger E. Garrett, Ph.D., Professor
D. Van Gies, Ph.D., Associate Professor
John R. Goss, M.S., Professor Emeritus
Mark E. Grimmer, Ph.D., Associate Professor
George F. Hama, M. Ed., Lecturer Emeritus
Bruce R. Hartsook, Ph.D., Associate Professor
S. Milton Henderson, M.S., Sc.D., Professor Emeritus
David J. Hill, Ph.D., Professor
Bryan M. Jenkins, Ph.D., Associate Professor
Robert A. Kepner, B.S., Professor Emeritus
John M. Krocha, Ph.D., Professor
Coby Lorenzen, Jr., M.S., Professor Emeritus
Kathryn McCarthy, Ph.D., Assistant Professor
Michael J. McCarthy, Ph.D., Assistant Professor
R. Larry Merson, Ph.D., Professor
John A. Mills, Ph.D., Professor
Stanton R. Monroe, Ph.D., Professor Emeritus
Michael W. Neubauer, Ph.D., Professor Emeritus
R. Paul Sikh, Ph.D., Professor
David G. Slaughter, Ph.D., Assistant Professor
Henry E. Studer, M.S., Professor
Shrinivas K. Unadhyaya, Ph.D., Associate Professor
William W. Wallender, Ph.D., Associate Professor
Wesley E. Yates, M.S., Professor Emeritus

Courses. Courses are listed under Agricultural Engineering Technology (below), Consumer Technology, and Engineering: Agricultural.

Upper Division Courses
101. Hydraulic Power and Controls (1, 2) 1-2 hours. Prerequisite: upper division standing, Physics 5A. Principles of operation and construction of hydraulic systems. Function and application of pumps, motors, and valves for controlling machines.

105. Farm Equipment Management (1) 1-2 hours. Prerequisite: Agricultural Practices 48, or concurrent enrollment in one of the following: course 101AT, 102AT, 104AT, Agricultural Practices 49; or consent of instructor. Farm machinery performance, selection, scheduling and maintenance as affected by technical features, costs and operational ability, as well as by crop and weather characteristics. Discussions link technical information from accompanying autotutorial or practice courses to management principles.

110L. Experiments in Food Engineering (1) 1-2 hours. Laboratory—3 hours. Prerequisite: Food Science and Technology 110B (may be taken concurrently). Use of temperature sensors; measurement of thermal conductivity and heat transfer coefficients; heat exchangers; transient heat transfer in foods; refrigeration, freezing, concentration and dehydration of foods. (P/NP grading only)

112. Plant and Animal Environmental Control (2) I. Study Lecture—2 hours. Prerequisite: Plant Science 2, or Animal Science 1 or 2; or Environmental Horticulture 6. Maintaining optimum environments for plants and animals; animal energetics; psychrometrics; heat and vapor transmission in buildings; temperature and humidity control; greenhouse design; energy conservation; lighting systems; heating, cooling, ventilating principles and equipment.

134. Pesticide Application Techniques (1) I. Giles Lecture—1 hour. Prerequisite: one course in environmental toxicology, entomology, botany or plant physiology recommended. Basics of agricultural pesticide application. Mechanical systems for safe and effective application of pest control materials. Biological, legal and environmental considerations of pesticide application. Selection and calibration of spray equipment.

141. Technology for Agriculture in Developing Regions (2) I. Chancellor 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 International Agricultural Development 141.)

141AT. Equipment Technology for Developing Agriculture (1) I, II. Chancellor 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)

143. Turf and Landscape Irrigation (2) II. 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. Course emphasis is on hardware associated with sprinkler and drip-irrigation systems.

161A. Fundamentals of Aquacultural Engineering (3) II. Piedrahita Lecture—3 hours. Prerequisite: Biological Sciences 1A, Mathematics 1A, Chemistry 1B. Basic principles of water chemistry and water treatment processes as they relate to aquatic systems.

161B. Fundamentals of Aquacultural Engineering (3) III. Piedrahita Lecture—3 hours. Prerequisite: course 161A Design of aquatic systems: design methodology, principles of fluid mechanics, site selection and facility planning, management operations, computer modeling.

Agricultural Engineering Technology

(College of Agricultural and Environmental Sciences)

Faculty. See under Department of Agricultural Engineering.

Major Programs and Graduate Study. For the Bachelor of Science program see the major in Engineering; for graduate study see the Graduate Division section in this catalog.

Courses in Agricultural Engineering Technology

These courses are intended primarily for students not majoring in Engineering. Majors in Engineering should refer to courses in Engineering: Agricultural.

Questions pertaining to the following courses should be directed to the instructor or to the Department Office, 2030 Bainer Hall.

Lower Division Courses

98. Directed Group Study (1-5) I, II, III. The Staff (Student in charge) Prerequisite: consent of Instructor. (P/NP grading only)

99. Special Study for Lower Division Students (1-5) I, II, III. The Staff (Student in charge) (P/NP grading only)

*Course not offered this academic year.
192. Internship in Agricultural Engineering Technology (1-5) I, II, III. The Staff (Studier in charge) Internship—3–15 hours. Prerequisites: upper division standing; approval of project prior to period of internship. Supervised internship in agricultural engineering technology. May be repeated for credit. (P/NP grading only)

198. Directed Group Study (1-6) I, II, III. The Staff (Studier in charge) Prerequisite: consent of Instructor. (P/NP grading only)

199. Special Study for Advanced Undergraduates (1-6) I, II, III. The Staff (Studier in charge) (P/NP grading only)

Graduate Courses

233. Pest Control Application Technology (3) II. Giles Lecture—2 hours; laboratory—3 hours. Prerequisite: Plant Protection and Pest Management 202A or the equivalent. Practical and theoretical considerations of pesticide application systems and techniques. Design, selection, and use of mechanical spray systems for field, orchard, greenhouse, and vector control. Biological, legal, and environmental considerations in pesticide application.

298. Group Study (1-5) I, II, III. The Staff (Studier in charge)

299. Research (1-12) I, II, III. The Staff (Studier in charge) (S/U grading only)

Professional Course


Agricultural Practices

(College of Agricultural and Environmental Sciences)

Courses in Agricultural Practices

Questions pertaining to the following courses should be directed to the Instructor or to the Office of the Department of Agricultural Engineering, 3030 Bather Hall.

Lower Division Course

49. Field Equipment Operation (2) I, III. J. Runsey Lecture—1 hour; laboratory—3 hours. Operation, adjustment, and troubleshooting of farm tractors and field equipment. Principles of operation, equipment terminology, and uses of tilling, cultivating, thining, and planting equipment. Typical cultural practices sequences. (P/NP grading only)

50. Harvesting Machinery Laboratory (1) III. Runsey Laboratory—3 hours. Prerequisite: course 49 (may be taken concurrently). The function, construction, and operating principles of machines for harvesting, cutting, cutting, and field crops. Laboratories will include operation of the machines to demonstrate correct and efficient operation. End of quarter field exercise on grain harvesting and baling.

Upper Division Course

149. Field Equipment Maintenance (2) II, III. J. Runsey Lecture—1 hour; laboratory—3 hours. Prerequisite: Consumer Technology 16 and 101 or consent of Instructor. Troubleshooting and major repair of farm equipment. Intermediate welding to include hardfac ing and inert gas welding. Class projects on maintenance, repair and fabrication. (P/NP grading only)

Agricultural Science and Management

(College of Agricultural and Environmental Sciences)

The Major Program

The agricultural science and management major prepares students for careers in agriculture. This program provides students with the knowledge and skills necessary for success in the agricultural industry. Students will be prepared for positions in research, teaching, or extension work. Graduates of the program will be able to work in a variety of settings, including government agencies, research institutions, and private companies.

B.S. Major Requirements:

For convenience in program planning, the usual courses taken to satisfy the requirements are shown in parenthesis. Equal courses are acceptable; and a more comprehensive course treatment (e.g., Physics 1A and 1B rather than 1A only) will be useful for some. Students should consider using some portion of their unreacquired elective units to go beyond the minimum requirements shown for the Preparatory and Depth Subject Matter areas.

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<th>Units</th>
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<th>Requirement</th>
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<tbody>
<tr>
<td>0-8</td>
<td>English Composition</td>
<td>Preparatory Subject Matter</td>
</tr>
<tr>
<td>0-8</td>
<td>Accounting (Economics 1A, 1B)</td>
<td>Preparatory Subject Matter</td>
</tr>
<tr>
<td>10</td>
<td>Biological sciences (Biological Sciences 1A, 1B, 1C)</td>
<td>Preparatory Subject Matter</td>
</tr>
<tr>
<td>15</td>
<td>Chemistry (Chemistry 1A, 1B, 2A, 2B)</td>
<td>Preparatory Subject Matter</td>
</tr>
<tr>
<td>10</td>
<td>Economic principles (Economics 1A, 1B)</td>
<td>Preparatory Subject Matter</td>
</tr>
<tr>
<td>4</td>
<td>Mathematics (Mathematics 16A-16B or the equivalent)</td>
<td>Preparatory Subject Matter</td>
</tr>
<tr>
<td>4</td>
<td>Statistics (Agricultural Science and Management 150)</td>
<td>Preparatory Subject Matter</td>
</tr>
<tr>
<td>24</td>
<td>Satisfication of General Education requirement</td>
<td>Preparatory Subject Matter</td>
</tr>
<tr>
<td>24</td>
<td>Depth Subject Matter</td>
<td>Preparatory Subject Matter</td>
</tr>
</tbody>
</table>

Areas of Specialization

1. Animal Science
2. Animal Science Option
3. Animal Science 2 (Animal Science 1 recommended)
4. Genetics 100, Animal Genetics 107
5. Nutrition 116
6. Physiology 110
7. Animal Science
8. Restricted Electives

Courses in Agricultural Science and Management

Questions pertaining to the following courses should be directed to the Instructor or to the Advising Center, 317 Hunt Hall.

Lower Division Course

21. Applications of Mediums for Agriculture (3) I, III. The Staff (Agronomy and Range Science)

(Agricultural Economics 155, 157); and business organization (Agricultural Economics 18B, 110), (P/NP grading only)

Agricultural Science and Management

(College of Agricultural and Environmental Sciences)

The Major Program

The agricultural science and management major prepares students for careers in agriculture. This program provides students with the knowledge and skills necessary for success in the agricultural industry. Students will be prepared for positions in research, teaching, or extension work. Graduates of the program will be able to work in a variety of settings, including government agencies, research institutions, and private companies.

B.S. Major Requirements:

For convenience in program planning, the usual courses taken to satisfy the requirements are shown in parenthesis. Equal courses are acceptable; and a more comprehensive course treatment (e.g., Physics 1A and 1B rather than 1A only) will be useful for some. Students should consider using some portion of their unreacquired elective units to go beyond the minimum requirements shown for the Preparatory and Depth Subject Matter areas.

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<td>Accounting (Economics 1A, 1B)</td>
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</tr>
<tr>
<td>10</td>
<td>Biological sciences (Biological Sciences 1A, 1B, 1C)</td>
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<td>Statistics (Agricultural Science and Management 150)</td>
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Areas of Specialization

1. Animal Science
2. Animal Science Option
3. Animal Science 2 (Animal Science 1 recommended)
4. Genetics 100, Animal Genetics 107
5. Nutrition 116
6. Physiology 110
7. Animal Science
8. Restricted Electives

Courses in Agricultural Science and Management

Questions pertaining to the following courses should be directed to the Instructor or to the Advising Center, 317 Hunt Hall.

Lower Division Course

21. Applications of Mediums for Agriculture (3) I, III. The Staff (Agronomy and Range Science)
Lecture—2 hours; laboratory-discussion—2 hours. Prerequisite: high school algebra. Concepts of computing in an agricultural context applications of microcomputers using BASIC, spreadsheets, database management, word processing and communications.

Upper Division Courses
121. Analysis and Management of Agricultural Systems (4) I. Plant (Agronomy and Range Science)
Lecture—3 hours; discussion—laboratory—1 hour. Prerequisite: course 21 or the equivalent experience with computers; Mathematics 18B. The process of systems analysis, dynamic simulation of crops and biological populations, constructions and use of simulation models for agricultural systems, and an introduction to expert systems and their applications in agriculture.

Lecture—3 hours; discussion—laboratory—2 hours. Applications of statistical methods to the analysis and interpretation of research data in plant, animal, behavioral, food and nutritional sciences. Lectures cover basic concepts and statistical methods. Specialized laboratory sections cover procedures, data processing and interpretation.

Agronomy
(College of Agricultural and Environmental Sciences)
Faculty, See under Department of Agronomy and Range Science.

Major Program. See the major in Plant Science or Range and Wildlands Science.

Graduate Study. A program of study is offered leading to the M.S. degree in Agronomy. Information can be obtained from the Advising Office at 137 Hunt Hall. Also see the Graduate Division section in this catalog.

Graduate Adviser. R.L. Travis.

Related Courses. See Plant Science and Range Science.

Courses in Agronomy
Questions pertaining to the following courses should be directed to the Instructor or to the Advising Center, 137 Hunt Hall.

Lower Division Courses
92. Agronomy Internship (1-12) II, I, III, summer.
The Staff (Chairperson in charge)
Internship—3-36 hours. Prerequisite: consent of instructor. Internship on or off campus in all subject areas pertaining to agronomy. Internships supervised by a member of the faculty.

Upper Division Courses
100. Principles of Agronomy (4) III. Travis
Lecture—3 hours; discussion—demonstration—1 hour. Prerequisite: a course in general botany and/or Plant Science 2 or consent of Instructor. Fundamentals of field crop production and agronomic problem solving using ecological, physiological, and genetic principles.

100L. Principles of Agronomy Laboratory (1) III. Travis
Laboratory—3 hours. Prerequisite: course 100 (may be taken concurrently). Field-oriented introduction to principles of agronomic crop production.

110. Pesticides in Biotechnology (3) III. Valentine
Lecture—2 hours; discussion—1 hour. Prerequisite: Biological Sciences 10 or Genetics 10. Current issues in biotechnology will be related to their role on the biological sciences and society. Examples of genetic manipulation through transformation and transfer in agriculture and medicine will be stressed.

111. Cereal Crops of the World (4) III. Quaile
Lecture—3 hours; laboratory—3 hours. Prerequisite: courses 100, 100L; Biological Sciences 1C. Contribution of cereal crops to man's diet; adaptation, production, utilization and storage; determinants of kernel quality; wheat, barley, rice, corn, and sorghum. Emphasis is on recent developments and scientific improvements.

112. Forage Crop Ecology (3) III. Raguse
Lecture—3 hours. Prerequisite: Biological Sciences 1C or consent of Instructor. Forages as a world resource in food production. Ecological principles governing the establishment, establishment, growth, management, and animal utilization of forages, including pastures, rangelands, and hay: aspects of forage quality which affect feeding value to livestock. Offered in alternate years.

113. Fibers, Oil and Sugar Crops in a Changing World (4) I. Raines
Lecture—3 hours; laboratory—3 hours. Prerequisite: courses 100, 100L; Biological Sciences 1C. Industrial crops as world resources of feed, fiber, and consumer goods. The relationship of crops to their physical and biotic environment; cultural changes, socioeconomic and political forces that shape crop production, and utilization practices. Offered in alternate years.

120. Morphology and Reproduction of Agronomic Crops (3) III. Webster
Lecture—2 hours; laboratory—3 hours. Prerequisite: Biological Sciences 1C or equivalent. Study of growth development of crop plants with emphasis on reproductive structure and pollination. Techniques for morphological analysis of crop plant growth. Offered in alternate years.

192. Internship (1-12) II, I, III, summer.
The Staff (Chairperson in charge) Internship—3-36 hours. Prerequisite: completion of 84 units and consent of Instructor. Internship on or off campus in all subject areas pertaining to agronomy. Internships supervised by a member of the faculty.

197T. Tutoring in Agronomy (1-5) I, II, III. The Staff (Chairperson in charge) Tutoring—1-5 hours. Prerequisite: course 212 or consent of Instructor. Theory and application of selection to plant populations for improvement of quantitative characters. Statistical genetic analysis and methods for obtaining maximum efficiency in plant breeding schemes. Offered in alternate years.

224. Quantitative Genetics and Plant Improvement (4) II. The Staff
Lecture—4 hours. Prerequisite: Plant Science 113; Genetics 105; or consent of Instructor. Genetic effects on plant populations. Introduction to breeding plans based on principles of population and quantitative genetics. Offered in alternate years.

225. Quantitative Genetics and Plant Improvement (4) II. The Staff
Lecture—2 hours; discussion—1 hour. Prerequisite: course 222 or consent of Instructor. Theory and application of selection to plant populations for improvement of quantitative characters. Statistical genetic analysis and methods for obtaining maximum efficiency in plant breeding schemes. Offered in alternate years.

228. Chromosome Evolution (3) I. Dvornik
Lecture—3 hours. Prerequisite: Genetics 100 or the equivalent. Structure and function of chromosomes. Dynamics of their evolution at the molecular and structural levels. Offered in alternate years.

232. Advanced Topics in the Physiology of Crop and Range Plants (3) III. Hufnagel
Lecture—2 hours; seminar—1 hour. Relationships between fundamental and applied nitrogen-fixation research in biology, genetics, physiology, and ecology. Offered in alternate years.

233. Biological Nitrogen Fixation (3) II. Phillips
Lecture—2 hours; seminar—1 hour. Relationships between fundamental and applied nitrogen-fixation research in biochemistry, genetics, physiology, and ecology. Offered in alternate years.

243. Physiology of Crop Growth and Development (3) I. Jensen
Lecture—3 hours. Prerequisite: Botany 111 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 and function, reproduction, senescence, hormones, and environmental controls of development. Offered in alternate years.

290. Seminar in Crop Growth, Production and Utilization (1-2) I. Webster; II. Jackson
Seminar—1-2 hours. Topics of current interest related to plant growth processes, production and management systems, and utilization of cultivated food, feed and fiber crops.

291. Seminar in Plant Breeding and Evolution of Cultivated Plants (1-2) I. Quaile; III. Jain
Seminar—1-2 hours. Topics of current interest related to plant breeding systems and the origins and evolution of cultivated plants.

297T. Tutoring in Agronomy (1-5) I, II, III. The Staff (Chairperson in charge) Tutoring—1-5 hours. Prerequisite: graduate standing; consent of Instructor; and course to be tutored or the equivalent. Designed for graduate students who desire teaching experience. Tutors are not teaching assistants. May be repeated for credit for a total of 5 credit hours.
Agronomy and Range Science
(105 credit hours)
Donald R. Hiebert, Ph.D., Chairperson of the Department

Faculty
Robert W. Allard, Ph.D., Professor Emeritus
R. William Breidenbach, Ph.D., Lecturer
Ivan W. Buddenhagen, Ph.D., Professor
Beecher Crompton, M.S., Lecturer Emeritus
Montague W. Demmer, Ph.D., Associate Professor
Jan Dvorak, Ph.D., Professor Emeritus
Shu Geng, Ph.D., Professor
Melvin R. George, Ph.D., Lecturer
Paul L. Gepts, Ph.D., Associate Professor
James E. Hix, Ph.D., Lecturer
Ray C. Huffaker, Ph.D., Professor
Leland F. Jackson, Ph.D., Lecturer
Subodh K. Jain, Ph.D., Professor
Judith A. Jernstedt, Ph.D., Associate Professor
Thomas A. Kerby, Ph.D., Lecturer
Horton M. Leude, Ph.D., Professor Emeritus
William M. Longhurst, Ph.D., Professor Emeritus
Robert S. Lootsme, Ph.D., Professor Emeritus
R. Marion Love, Ph.D., Professor Emeritus
John W. Manke, Ph.D., Professor
Duane S. Mikelsen, Ph.D., Professor Emeritus
Maurice L. Peterson, Ph.D., Professor Emeritus
Donald A. Phillips, Ph.D., Professor
Richard E. Pant, Ph.D., Professor
Y. P. Puri, Ph.D., Lecturer
Calvin O. Qualset, Ph.D., Professor
Charles A. Ray, Ph.D., Professor Emeritus
D. William Reins, Ph.D., Professor
Kevin J. Rice, Ph.D., Assistant Professor
Charles W. Scheck, Ph.D., Professor Emeritus
Steven R. Temple, Ph.D., Lecturer
Larry R. Teuber, Ph.D., Associate Professor
Robert L. Traylor, Ph.D., Professor
Raymond C. Valentine, Ph.D., Professor Emeritus
Barbara D. Webber, Ph.D., Professor
Thea A. Wilkins, Ph.D., Assistant Professor
William A. Williams, Ph.D., Professor
Frederick P. Zachelle, Jr., Ph.D., Professor Emeritus

Courses: See the Agronomy and the Range Science course listings.

American Studies
(105 credit hours)
David Scovel Wilson, Ph.D., Program Director

Faculty
Jay Meichling, Ph.D., Professor
Patricia Turner, Ph.D. (Afro-American Studies
American Studies)
David Scovel Wilson, Ph.D., (American Studies)

The Major Program
American Studies offers an alternative approach to the study of American experience for students who feel too limited by departmental approaches. Lower division, introductory classes explore the ways in which cultural systems shape and reflect life in the United States. These classes pay close attention to the ways in which differences of class, race, gender, generation, ethnicity, religion, and sexual orientation uniquely affect American lives.

The Program. American Studies majors take the lower division, in-depth classes (see below) and participate in three smaller seminar classes limited to majors and devoted to close study of major thinkers and of issues crucial to the practice of American Studies. Advanced work in at least two other departments or programs allows each student to emphasize a period, a problem, or a subject tailored to his or her own individual educational goals. Students have the option of writing a senior thesis under this emphasis.

Career Alternatives. As an interdisciplinary program, American Studies provides a liberal arts and science undergraduate education. American Studies majors maximize a student's contact with a variety of subject matter and approaches. This flexibility has meant that our graduates have been able to move into a broad range of career settings, including journalism, law, medicine, nursing, law enforcement, environmental planning, teaching, library science, museum curatorial, and business. Some students discover new career possibilities through their internships in American Studies.

A.B. Major Requirements:

Preparatory Subject Matter

One course from American Studies 1 series

Two courses chosen from History 17A, 17B, 72A, 72B

One course chosen from English 30A, 30B

One course chosen from Anthropology 2, Sociology 2

Depth Subject Matter

American Studies core courses

American Cultural Themes

Choose any two courses from the 150 series

Three Junior Proseminars

American Studies 180

Emphasis

In consultation with an American Studies adviser, the student designs a program of 20 units of upper division coursework around a unifying theme, period, or subject matter in American civilization. The course work should come from at least two disciplines. The student may choose the Senior thesis option (190A-190B) for 8 of these 20 units.

Total Units for the Major

70

Recommended

Completion of the College requirement in English composition before enrollment in American Studies 190A.

Minor Program Requirements:

American Studies 20

American Studies upper division courses 20

Total Units

40

*Course not offered this academic year.

Agriculture and Environmental Sciences
(105 credit hours)

Faculty
Martin A. Allen, Ph.D., Professor Emeritus
R. William Breidenbach, Ph.D., Lecturer
Ivan W. Buddenhagen, Ph.D., Professor
Beecher Crompton, M.S., Lecturer Emeritus
Montague W. Demmer, Ph.D., Associate Professor
Jan Dvorak, Ph.D., Professor Emeritus
Shu Geng, Ph.D., Professor
Melvin R. George, Ph.D., Lecturer
Paul L. Gepts, Ph.D., Associate Professor
James E. Hix, Ph.D., Lecturer
Ray C. Huffaker, Ph.D., Professor
Leland F. Jackson, Ph.D., Lecturer
Subodh K. Jain, Ph.D., Professor
Judith A. Jernstedt, Ph.D., Associate Professor
Thomas A. Kerby, Ph.D., Lecturer
Horton M. Leude, Ph.D., Professor Emeritus
William M. Longhurst, Ph.D., Professor Emeritus
Robert S. Lootsme, Ph.D., Professor Emeritus
R. Marion Love, Ph.D., Professor Emeritus
John W. Manke, Ph.D., Professor
Duane S. Mikelsen, Ph.D., Professor Emeritus
Maurice L. Peterson, Ph.D., Professor Emeritus
Donald A. Phillips, Ph.D., Professor
Richard E. Pant, Ph.D., Professor
Y. P. Puri, Ph.D., Lecturer
Calvin O. Qualset, Ph.D., Professor
Charles A. Ray, Ph.D., Professor Emeritus
D. William Reins, Ph.D., Professor
Kevin J. Rice, Ph.D., Assistant Professor
Charles W. Scheck, Ph.D., Professor Emeritus
Steven R. Temple, Ph.D., Lecturer
Larry R. Teuber, Ph.D., Associate Professor
Robert L. Traylor, Ph.D., Professor
Raymond C. Valentine, Ph.D., Professor Emeritus
Barbara D. Webber, Ph.D., Professor
Thea A. Wilkins, Ph.D., Assistant Professor
William A. Williams, Ph.D., Professor
Frederick P. Zachelle, Jr., Ph.D., Professor Emeritus

Courses: See the Agronomy and Range Science course listings.

Biology
(105 credit hours)

Faculty
David Scovel Wilson, Ph.D., Program Director

The Major Program
American Studies offers an alternative approach to the study of American experience for students who feel too limited by departmental approaches. Lower division, introductory classes explore the ways in which cultural systems shape and reflect life in the United States. These classes pay close attention to the ways in which differences of class, race, gender, generation, ethnicity, religion, and sexual orientation uniquely affect American lives.

The Program. American Studies majors take the lower division, in-depth classes (see below) and participate in three smaller seminar classes limited to majors and devoted to close study of major thinkers and of issues crucial to the practice of American Studies. Advanced work in at least two other departments or programs allows each student to emphasize a period, a problem, or a subject tailored to his or her own individual educational goals. Students have the option of writing a senior thesis under this emphasis.

Career Alternatives. As an interdisciplinary program, American Studies provides a liberal arts and sciences undergraduate education. American Studies majors maximize a student's contact with a variety of subject matter and approaches. This flexibility has meant that our graduates have been able to move into a broad range of career settings, including journalism, law, medicine, nursing, law enforcement, environmental planning, teaching, library science, museum curatorial, and business. Some students discover new career possibilities through their internships in American Studies.

A.B. Major Requirements:

Preparatory Subject Matter

One course from American Studies 1 series

Two courses chosen from History 17A, 17B, 72A, 72B

One course chosen from English 30A, 30B

One course chosen from Anthropology 2, Sociology 2

Depth Subject Matter

American Studies core courses

American Cultural Themes

Choose any two courses from the 150 series

Three Junior Proseminars

American Studies 180

Emphasis

In consultation with an American Studies adviser, the student designs a program of 20 units of upper division coursework around a unifying theme, period, or subject matter in American civilization. The course work should come from at least two disciplines. The student may choose the Senior thesis option (190A-190B) for 8 of these 20 units.

Total Units for the Major

70

Recommended

Completion of the College requirement in English composition before enrollment in American Studies 190A.

Minor Program Requirements:

American Studies 20

American Studies upper division courses 20

Total Units

40

*Course not offered this academic year.
Courses in Anatomy

Upper Division Courses

100. Comparative Organography of Vertebrates (4) II.
Biology 202-3 hours; laboratory—1 hour. Prerequisite: Bio-
logical Sciences 1B. Integrative study of the organiza-
tion of cells and tissues into organs and organ systems
in vertebrates. The following organ systems will be
compared: between fish, birds, and mammalian: muscu-
lotal, gastrointestinal, cardiovascular, respiratory, integu-
mentary, urinary, reproductive, and nervous.

189. 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 de-
velopment, growth patterns, and composition of
selected organs: liver, kidney, lung, mammary gland,
and a skeletal muscle. Offered in alternate years.

205. Ultramicroscopic Anatomy (3) III. The Staff
(Chairperson in charge)
Lecture—3 hours. Prerequisite: histology. The elec-
tron microscopic appearance of cells, tissues, and
organisms of animals emphasizing the structural
basis for their physiological functions. Offered in alternate
years.

207. Perspectives in Morphological Research
(3) III. The Staff (Wu, Tablin in charge)
Lecture—2 hours; discussion—1 hour. Consideration
of the principles and applications of modern mor-
phological methods and their role in biomedical
research. Examples of specific methods include
stereology, computer analysis of images, scanning
and transmission electron microscopy, histochem-
istry, autoradiography, rapid freezing, and vascular
injections. Offered in alternate years.

215. Veterinary Histology (6) II. The Staff (Faulk
in charge)
Lecture—3 hours; laboratory—9 hours. Prerequisite:
Biological Sciences 1B. The microscopic anatomy of
tissues and organs of mammalian and avian species
of veterinary significance.

283. Tumor Biology (3) I. The Staff (Faulkin in
charge)
Lecture—3 hours. Prerequisite: graduate standing
and consent of instructor. Growth, invasion and
metastasis of tumors; mechanisms of carcino-
genesis; intrinsic and extrinsic etiologic factors. Offered
in alternate years.

291. Topics in Biology of Respiratory System
(1) I, II, III. Tyler, Hyde, Plopper, St. George, Wu, Pirkatron
Seminar—1 hour. Prerequisite: graduate standing
and consent of instructor. Topics concerning struc-
ture and function of respiratory system. Possible topi-
cs include: lung growth, pulmonary reaction to tox-
cants, pulmonary inflammation, lung metabolism,
biology of lung cells, tracheobronchial epithe-
lium, nasal cavity structure and function. May be repeated
for credit. (S/U grading only)

298. Group Study (1-5) I, II, III. The Staff (Chair-
person in charge)
Laboratory—6-15 hours. Prerequisite: consent of
instructor.

299. Research (1-12) I, II, III. The Staff (Chair-
person in charge)
Laboratory—6-36 hours. Prerequisite: consent of
instructor. (S/U grading only)

Anatomy

Anatomy (School of Veterinary Medicine)
Dallas M. Hyde, Ph.D., Chairperson of the
Department
Department Office, 1321 Harling Hall (916-752-1174)
Faculty
Geoff H. Cardinet III, D.V.M., Ph.D., Professor
Sharon L. Cummings, Ph.D., Assistant Professor
Leslie J. Faulkin, Jr., Ph.D., Professor
Dallas M. Hyde, Ph.D., Professor
Ralph L. Kitchell, D.V.M., Ph.D., Emeritus
Kent Pirkatron, Ph.D., Assistant Adjunct Professor
Charles G. Plopper, Ph.D., Professor
Judith A. St. George, Ph.D., Assistant Adjunct
Professor
Susan M. Stover, D.V.M., Ph.D., Assistant Professor
Fern Tablin, V.M.D., Ph.D., Assistant Professor
William Thoma, M.D., Adjunct Professor
Walter S. Tyler, D.V.M., Ph.D., Professor
Reen Wu, Ph.D., Associate Adjunct Professor

*Course not offered this academic year.

Anatomy

See Anatomy (below); Cell Biology and Human Anatomy
(Medicine, School of)
Animal Behavior (A Graduate Group)

Benjamin L. Hart, D.V.M., Ph.D., Chairperson of the Group
Group Office, 148 Young Hall (Psychology)
(916) 752-1800/1855

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

Graduate Study. The Ph.D. program in Animal Behavior is an interdepartmental program which trains students for teaching and research in a variety of areas including psychology, zoology, animal science, veterinary science, ecology, and wildlife biology. Students specialize in 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 Primate Research Center and the Agricultural Field Stations. There are no early application deadlines of February 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, anthropology, psychology, wildlife biology, ecology, animal science, veterinary science, 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 requirements: Genetics 100 or the equivalent Statistics: Statistics 102 or Psychology 103, or the equivalent Evolutionary Genetics 103 or Zoology 148, or the equivalent Animal behavior: Psychology 150, Wildlife and Fisheries Biology 140, or Zoology 155, or the equivalent

Students are encouraged to engage in some form of research as early as possible during the first year. This is likely to be a study of a semester during the first year under the guidance of any faculty member of the Group, not necessarily the student’s major professor.

Breadth requirements. The following core courses or the equivalent (22 to 24 units) are required of all students:

Systems physiology: Physiology 110 or Zoology 142 Statistical analysis: one course from Psychology 206, 207, Statistics 106, or 110.

Science approaches to animal behavior research: Animal Behavior 201 Seminar in animal behavior: Animal Behavior 290 Ecology: Entomology 104, Environmental Studies 100, or Zoology 125 College teaching: Biological Sciences 310 or Psychology 390 Comparative psychology: Psychology 250

Specialization. In addition to the requirements listed above, students must also take courses in one of the three areas of specialization with substitution as approved by the adviser.

Courses in Animal Behavior

Graduate Courses

201. Scientific Approaches to Animal Behavior Research (3) I. Lott (Wildlife and Fisheries Biology) Lecture—2 hours. Prerequisite: consent of instructor. Selected topics relating to animal behavior. (3) I. Lott (Wildlife and Fisheries Biology) Lecture—3 hours. Prerequisite: consent of instructor. Selected topics relating to animal behavior. May be repeated for credit with topics differ.

220. Behavioral Aspects of Animal Domestica- tion (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 interactions. Offered in alternate years.

290. Seminar in Animal Behavior (1-3) III. Ovings (Psychology) Seminar—1-3 hours. Prerequisite: consent of instructor. Selected topics in animal behavior. (SU grade 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: graduate standing and consent of instructor. (SU grade only)

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 212, 222, 223; Plant Pathology 215; Plant Science 113; Vegetable Crops 220.

Courses in Animal Genetics

Questions pertaining to the following courses should be directed to the instructor or to the Animal Science Advising Center, 1202 Meyer Hall.

Upper Division Courses

107. Genetics and Animal Breeding (5) III. Gall, Medrano Lecture—4 hours; laboratory—3 hours. Prerequisite: Genetics 100. 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. Gall, Medrano Lecture—3 hours. Prerequisite course 107. Methods and procedures in quantitative animal breeding, including: expected value, single and multiple trait selection index, restricted selection, embedded traits, categorical traits, and best linear unbiased prediction.

110. Introduction to Parameter Estimation (1) II. Farnum Lecture—1 hour. Prerequisite: course 107 or the equivalent; course 108 recommended. Procedures for estimation of repeatability, heritability, and genetic and environmental correlations. Concept of expected value, estimation of components, and the simulation of biological data.

111. Molecular Biology Laboratory Techniques (4) II. Murray, Oberbauer Lecture—2 hours; laboratory—12 hours. Prerequisite: Biological Sciences 100; Genetics 100; Biochemistry 101A-101B or Physical Sciences 101A-101B. 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 one of the most common techniques in molecular biology.

198. Directed Group Study (1-5) I, II, III. The Staff (Bradford in charge) Prerequisite: consent of instructor. Selected topics relating to animal genetics. (P/NP grade only.)

*Course not offered this academic year.

199. Special Study for Advanced Undergraduates (1-5) I, II, III. The Staff (Bradford in charge). Prerequisite: consent of instructor. (P/NP grade only)

Graduate Courses

204. Theories of Quantitative Genetics (3) I. Gall Lecture—3 hours. Prerequisite: course 107 or the equivalent. Theoretical basis of quantitative genetics and the consequences of Mendelian inheritance. Concepts used to estimate quantitative genetic differences and basis for partitioning the phenotypic variance. Offered in alternate years.

206. Advanced Domestic Animal Breeding (3) I. Farnum 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.

207. Quantitative Genetics and Animal Breeding Theory (3) II. Alapanel (Avian Sciences) Lecture—2 hours; laboratory—2 hours. Prerequisite: Statistics 108 and 113 or 120B. Quantitative genetic theory, relating to inbreeding and crossbreeding systems, selection for cross performance, major quantitative genes, control populations, inbreeding and applied to the planning of breeding programs. Offered in alternate years.

208. Estimation of Genetic Parameters (3) III. Touchberry (Avian Science) Lecture—2 hours; laboratory—2 hours. Prerequisite: course 107 and Animal Science 205; courses 204 and 206 recommended. General methods for the estimation of components of variance and covariance and their application to the estimation of heritability, repeatability and genetic correlations are considered. Specific emphasis is given to procedures applicable to livestock populations under selection.

250. Animal Improvement in an International Context (4) III. Bradford Lecture—3 hours; seminar—1 hour. Prerequisite: completion of at least one year of graduate study, including upper division or graduate courses in livestock production and animal breeding. Evaluation, utilization, conservation and exchange of animal germ plasm resources; exploitation of heterosis; improvement schemes in the absence of central data processing; population structure and rate of improvement; roles of governmental-group breeding schemes; research needs. (SU grade only.) Offered in alternate years.

298. Group Study (1-5) I, II, III. The Staff (Bradford in charge). Prerequisite: consent of instructor. Lectures and discussions of advanced topics in animal genetics. (P/NP grade only.)

299. Research in Animal Genetics (1-12) I, II, III. The Staff (Bradford in charge). (SU grade only.)

Animal Physiology

(College of Agricultural and Environmental Sciences)

— —, Ph.D., Chairperson of the Department
Department Office, 196 Briggs Hall (916-752-0203)

Faculty

Marylyn S. Barkley, Ph.D., Associate Professor
James M. Bode, Ph.D., Professor Emeritus
Earl E. Caversick, Ph.D., Professor
Harry W. Colvin, Jr., Ph.D., Professor Emeritus
Perry T. Cappa, Ph.D., Professor Emeritus (Animal Science)
Charles A. Pfister, Ph.D., Professor
Jack M. Goldberg, Ph.D., Associate Professor
John M. Horowitz, Jr., Ph.D., Professor

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Animal Science

(Office of Agricultural and Environmental Sciences)
G. E. Bradford, Ph.D., Chairperson of the Department
Department Office, 2233 Meyer Hall (916-752-1250)

Faculty
Thomas E. Adams, Ph.D., Associate Professor
Gary B. Anderson, Ph.D., Professor
C. Robert Ashmore, Ph.D., Professor
R. Leland Baldwin, Jr., Ph.D., Professor
Patricia K. Berg, Ph.D., Associate Professor
J. G. Bradford, Ph.D., Professor
Dan L. Brown, Ph.D., Associate Professor
C. Christopher Calvert, Ph.D., Associate Professor
Roy D. Carroll, Ph.D., Professor Emeritus
Ernest S. Chagin, Ph.D., Associate Professor
(General Sciences)
Walter H. Clark, Jr., Ph.D., Professor
(Department of Biological Sciences)
Douglas E. Connick, Ph.D., Lecturer
Fred S. Cona, Ph.D., Lecturer
Perry T. Cupp, Ph.D., Professor Emeritus
Edward J. DePeters, Ph.D., Assistant Professor
Serge Duroshlov, Ph.D., Professor
James G. Fadel, Ph.D., Assistant Professor
Thomas R. Fumula, Ph.D., Associate Professor
Graham A. Gell, Ph.D., Lecturer
Ian Garrett, Ph.D., Senior Lecturer
William N. Garrett, Ph.D., Professor
Dennis Hodgecock, Ph.D., Lecturer
Hubert Hieftman, Jr., Professor Emeritus
Sillis O. H. Huang, Ph.D., Associate Professor
Robert C. Laben, Ph.D., Professor Emeritus
Yu-Bang Lee, Ph.D., Professor
Glen P. Lofgren, Ph.D., Professor Emeritus
Joan M. McCoy, Ph.D., Professor
Juan F. Medrano, Ph.D., Assistant Professor
Verne E. Mendel, Ph.D., Professor Emeritus
James H. Meyer, Ph.D., Professor Emeritus
Chancellor Emeritus
Gary P. Moberg, Ph.D., Professor
James D. Murray, Ph.D., Associate Professor
Arla M. Obara, Ph.D., Associate Professor
James W. Ogiliv, Ph.D., Lecturer
Edward O. Price, Ph.D., Professor
Wade C. Rollins, Ph.D., Professor Emeritus
Janet F. Rosen, Ph.D., Lecturer
Roberto C. Saliba, Ph.D., Assistant Professor
Robert W. Tochbery, Ph.D., Professor
William C. Weiss, Ph.D., Professor Emeritus (Animal Science, Nutrition)
Richard A. Zinn, Ph.D., Associate Professor

The Major Program
The animal science major gives students an understanding of animal biology and the proper care of animals and their utilization by people for food, fiber, work, research, companionship, and recreation. The Program. Both aquaculture and domestic animal agriculture specializations are available in the animal science major. Upper division students may also choose from numerous electives to further customize their education. An Animal Science option is also available in the Agricultural and Environmental Management major. This option provides emphasis on economics, business and management than the Animal Science major. Internships and Career Alternatives. Students can arrange internships with the department's staff, faculty, or small animal hospitals at UC field stations or the Bodega Marine Laboratory. Career opportunities for graduates cover a wide range of options from farming and ranching to all of the industries that serve domestic animal agriculture and aquaculture. These include positions in management, sales, financial services, agricultural extension, consulting services, teaching, journalism, laboratory technology, and research. An animal science major is also excellent preparation for veterinary medicine and other professional schools.

B.S. Major Requirements:

<table>
<thead>
<tr>
<th>Course Requirement</th>
<th>UNITS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Preparatory Subject Matter</td>
<td>56</td>
</tr>
<tr>
<td>Biological sciences (Biology)</td>
<td>12</td>
</tr>
<tr>
<td>Chemistry (Chemistry)</td>
<td>14</td>
</tr>
<tr>
<td>Computer science (Computer Science)</td>
<td>3</td>
</tr>
<tr>
<td>Mathematics (Mathematics)</td>
<td>8</td>
</tr>
<tr>
<td>Statistics (Statistical Science and Management)</td>
<td>8</td>
</tr>
<tr>
<td>General Education Requirement</td>
<td>24</td>
</tr>
</tbody>
</table>

Total Units for the Degree | 180

Mandatory Adviser: J.M. Macy

Advising Center for the major is located in 1202 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. Detailed information may be obtained by contacting the graduate adviser. See also the Graduate Division section in this catalog.

Graduate Adviser: C.C. Calvert

Courses in Animal Science

Lower Division Courses

1. Domestic Animals and People (4) I, II, Fall

2. Introductory Animal Science (4) I, II, Berger

3. Introductory Horse Husbandry (3) I, II, Roser

4. Livestock and Dairy Cattle Judging (2) I, II, Van Liew

5. Domestic Animal Production (2) I, II, DePeters

6. Animal Nutrition (2) I, II, DePeters

7. Farm Animal Management (2) I, II, DePeters

8. Animal Behavior (2) I, II, DePeters


10. Animal Genetics (2) I, II, DePeters

11. Animal Reproduction (2) I, II, DePeters

12. Animal Physiology (2) I, II, DePeters


15. Animal Housing (2) I, II, DePeters

16. Animal Housing (2) I, II, DePeters

17. Animal Nutrition (2) I, II, DePeters

18. Animal Reproduction (2) I, II, DePeters

19. Animal Pathology (2) I, II, DePeters

20. Animal Housing (2) I, II, DePeters


22. Animal Reproduction (2) I, II, DePeters

23. Animal Pathology (2) I, II, DePeters


25. Animal Nutrition (2) I, II, DePeters


27. Animal Pathology (2) I, II, DePeters

28. Animal Housing (2) I, II, DePeters


30. Animal Reproduction (2) I, II, DePeters

31. Animal Pathology (2) I, II, DePeters

32. Animal Housing (2) I, II, DePeters

33. Animal Nutrition (2) I, II, DePeters

34. Animal Reproduction (2) I, II, DePeters

35. Animal Pathology (2) I, II, DePeters

36. Animal Housing (2) I, II, DePeters

37. Animal Nutrition (2) I, II, DePeters

38. Animal Reproduction (2) I, II, DePeters

39. Animal Pathology (2) I, II, DePeters

40. Animal Housing (2) I, II, DePeters

41. Animal Nutrition (2) I, II, DePeters

42. Animal Reproduction (2) I, II, DePeters

43. Animal Pathology (2) I, II, DePeters

44. Animal Housing (2) I, II, DePeters

45. Animal Nutrition (2) I, II, DePeters

46. Animal Reproduction (2) I, II, DePeters

47. Animal Pathology (2) I, II, DePeters

48. Animal Housing (2) I, II, DePeters

49. Animal Nutrition (2) I, II, DePeters

50. Animal Reproduction (2) I, II, DePeters

51. Animal Pathology (2) I, II, DePeters

52. Animal Housing (2) I, II, DePeters

53. Animal Nutrition (2) I, II, DePeters

54. Animal Reproduction (2) I, II, DePeters

55. Animal Pathology (2) I, II, DePeters

56. Animal Housing (2) I, II, DePeters
120. Principles of Meat Science (3) III. Bandman
(Food Science and Technology), Lee
Lecture—3 hours. Prerequisite: Biochemistry 101B or the equivalent. Anatomical, physiological, developmental, and biochemical aspects of muscle underlying the conversion of muscle to meat. Includes muscle processing, preservation, microbiology, and public health issues of meat products. Same course as Food Science and Technology 120L.

120L. Meat Science Laboratory (2) III. Lee, Bendor
(Food Science and Technology). Discussion refers to 3 hours. Prerequisite: Biochemistry 101B; course 150 may be taken concurrently. Laboratory exercise and student participation in transformation of live animal to carcass and meat, structural changes related to meat quality, chemical and sensory evaluation of meat, and field trips to packing plant and processing plant. Same course as Food Science and Technology 120L.

123. Animal Growth (4) IV. Ashmore, Oberbauer
Lecture—4 hours. Prerequisite: Genetics 100, Physiological Sciences 101B or Biochemistry 101B. Basic and practical aspects of animal growth and postnatal growth and development. Emphasis on genetic, hormonal, and biochemical control of meat protein acculation.

124. Lactation (4) IV. Baldwin
Lecture—2 hours. Lab—3 hours. Prerequisite: Physiology 110; Nutrition 115 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.

128. Linear Programming in Animal Agriculture (3) IV. Fadde
Lecture—2 hours. Laboratory—2 hours. Prerequisite: upper division standing; Nutrition 110, 115 or the equivalent; understanding of animal production, or consent of instructor. Linear programming in animal agriculture as relating farm planning and ration formulation. Provides experience in understanding, developing and applying linear programs.

131. Reproduction and Early Development in Aquatic Animals (4) IV. Doroshov
Lecture—3 hours. Lab—3 hours. Prerequisite: Zoology 100; Wildlife and Fisheries Biology 120, 121; or consent of instructor. Physiological and developmental functions related to reproduction, breeding efficiency and fertility of animals commonly used in aquaculture.

133. Meat and Meat Animal Evaluation (3) I. Lee
Lecture—1 hour. Laboratory—6 hours. Prerequisite: course 2 or 21 recommended. Correlation of live animal conformation with carcass traits, transformation of live animal to carcass, criteria for evaluation and grading of carcass as related to meat palatability, arte- and post-mortem handling as related to meat quality.

135. Experimental Biochemistry Laboratory (4) I. Ashmore
Lecture—2 hours; laboratory—6 hours. Prerequisite: one course each in biochemistry and physiology; consent of instructor. Designed to introduce student to concepts of research. Experience in research animal care, tissue sampling and handling techniques, a variety of commonly used laboratory analytical methods, manuscript review and publication writing are provided. (Not open to students who have received credit for Biochemistry 101L).

140. Management of Laboratory Animals (4) I. Adams
Lecture—3 hours; laboratory—3 hours. Prerequisite: Animal Genetics 107; Nutrition 110 or 115; Physiology 110. 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.

143. Pig and Poultry Care and Management (4) I. Gennett, Ernst, Berger
Lecture—3 hours, laboratory—3 hours. Prerequisite: Nutrition 115 or 110, Physiology 110. Care and management of swine, turkeys and poultry and their adaptation to environmental physiology, nutrition and metabolism, disease management and reproduction. Saturday field trips.

149. Enterprise Analysis in Animal Industries (4) III, Ganske
Lecture—discussion—4 hours. Prerequisite: course 114 or 116 or 180; course 143. Examination and application of decision making and problem solving in livestock production enterprise. The areas of production analysis, problem solving, risk analysis and cost-benefit analysis will be examined in terms of the total enterprise.

150. Range Livestock Production (3) III. Morris, Ray
gro (Agriculture and Range Science). Lecture—3 hours. Prerequisite: course 2, Range Science 133. Application of principles of animal and range science to the extensive production of live-stock and related products from range. Emphasis on beef and sheep production systems from presessional and annual range types. (Same course as Range Science 180).

193C, Research Group Conference (1) I, II, III, The Staff (Chairperson in charge)
Discussion—1 hour. Prerequisite: advanced standing; consent of instructor. Weekly conference on research problems, progress and techniques in the animal sciences. May be repeated for credit. (P/NP grading only).

192. Internship in Animal Science (1-12) I, II, III, The Staff (Chairperson in charge)
Internship—3-90 hours. Prerequisite: completion of 84 units and consent of instructor. Internship off and on campus in dairy, livestock and aquaculture production, research and management; or in a business, industry, or agency associated with these or other animal enterprises. All requirements of Internship Approval Request Form must be met. (P/NP grading only).

197T, Tutoring in Animal Science (1-2) I, II, III, The Staff (Chairperson in charge)
Tutoring—1-2 hours. Prerequisite: Animal Science or related major; advanced standing; consent of instructor. Tutoring of students in lower division animal science courses; weekly conference with instructors in charge of courses; written critiques of teaching procedures. May be repeated once for credit. (P/NP grading only).

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

Graduate Courses

206. Models in Agriculture and Nutrition (3) II. Fadde
Lecture—2 hours; laboratory—3 hours. Prerequisite: Mathematics 10B, Statistics 106. Basic model building principles and techniques for statistical and systems simulation models. Optimization techniques for non-linear experimental designs and management models are presented. Quantitative analysis and evaluation of linear and non-linear equations used in agriculture and nutrition. Course is offered in alternate years.

211. Genetic Engineering of Animals (2) II. Murray
Lecture—1 hour; lecture-discussion—1 hour. Review of techniques for the genetic engineering of animals and their limitations and applications. Student lead discussions of recent papers in the field and possible future applications of genetic engineering of animals in basic research and applied agricultural and medical research. (SU grading only).

215. Advanced Concepts of Growth Regulation (3) I. Oberbauer
Lecture—3 hours. Prerequisite: Biochemistry 101B; Genetics 102B; Zoology 121A-121B. 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 optional research proposal.

216. Grant Writing Techniques (1) I. Oberbauer
Lecture—1 hour. Prerequisite: course 215. Introduction to the peer-reviewed grant writing process. Sources of funding, proposal description, budget calculations, and the review mechanism will be discussed. Proposals written in course 215 will be revised.

235. Advanced Techniques in Animal Nutrition Research (2) I, II, III. The Staff (Chairperson in charge)
Lecture—1 hour; laboratory—3 hours. Prerequisite: graduate standing and consent of instructor. Application of experimental and statistical techniques to animal nutrition research; use of mechanistic models for experimental design and data analyses; surgical preparations useful in nutrition research; review of current literature. May be repeated for credit when topics differ. (SU grading only)

290. Seminar (1) I, II, III. The Staff (Chairperson in charge)
Seminar—1 hour. Reports and discussions of topics of interest. In general, the topics 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 research problem, 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 and presentation of material. Assistance in laboratories, discussion sections, and evaluation of student work. An evaluation letter sent to the Graduate Advisor 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 on—SU grading only)

299. Research (1-12) I, II, III. The Staff (Chairperson in charge)
(SU grading only)

Center for Comparative Research

Carol A. Smith, Ph.D., Professor
David G. Smith, Ph.D., Professor
Janet S. Smith, Ph.D., Associate Professor
Deborah L. True, Ph.D., Professor
Caroline F. Wall, Ph.D., Senior Lecturer
John T. Walter, Ph.D., Professor (Anthropology, Sociology)
Aran A. Yengoyan, Ph.D., Professor

The Major Program

Anthropology is the systematic study of human beings as they live in groups. It is a diverse field and the courses at Davis are subdivided into four categories—biological, social/cultural, linguistic, and archaeological. Anthropology learns about human social life—past and present—and gains a broad understanding of humans and society. The Program. Students interested in the scientific study of human origins, primates studies, and the fundamentals of biology that as these relate to Homo sapiens should enroll in the Bachelor of Science degree program. Students interested in ethnography and the ethnology of selected culture areas or linguistics (language in culture and society and linguistic field methods) should enroll in the Bachelor of Arts degree program. Students interested in archaeology (prehistoric and the techniques and methods of archaeology) should consult an advisor before choosing one degree program or the other.

Career Alternatives. Although most practicing anthropologists teach in colleges and universities, a bachelor's degree in anthropology can lead to work in museums, in the Park Service, on other aspects of public archaeology. A Bachelor of Science degree is a suitable major for premedical and preental preparation. A degree in anthropology with appropriate courses in education also can be good preparation for high school teaching in social sciences or natural sciences.

A.B. Major Requirements:

Course

Preparatory Subject Matter

Anthropology 1, 2, 3, 4

Foreign language (15 units or the equivalent in one language)

Depth Subject Matter

Anthropology 110, 128, 137

Linguistic anthropology, one course

Biological anthropology, one course

Ethnography, one course

Archaeology, one additional course

An additional 8 units selected from the following: any upper-division anthropology course, Art 150, 151, Genetics 100

Total Units for the Major

64-79

B.S. Major Requirements:

Course

Preparatory Subject Matter

Anthropology 1, 2, 3, 4

Biological Sciences 1A-1B

Chemistry 1A, 1B

Chemistry 13, 32, or 102

Chemistry 8A-8B or Mathematics 16A-16B

Foreign language (10 units or the equivalent in one language)

Depth Subject Matter

Six courses in anthropology, including courses 155, 156, and 154A, and the remaining 3 chosen in consultation with major advisor

Genetics 100 and either Genetics 103 or Zoology 148

Additional units from the list below to achieve a minimum of 45 upper-division units. Include at least one laboratory

Course not offered this academic year.

Anthropology

College of Letters and Science

Aram A. Yengoyan, Ph.D., Chairperson of the Department

Department Office, 330 Young Hall
(916)-752-0745/0746

Faculty

John M. Beaton, Ph.D., Assistant Professor
Robert L. Bettinger, Ph.D., Professor
David J. Boyd, Ph.D., Professor
Daniel J. Crowley, Ph.D., Professor (Anthropology, Art History)
Richard T. Curley, Ph.D., Lecturer
William G. Davis, Ph.D., Professor
Jack D. Forbes, Ph.D., Professor (Anthropology, Native American Studies)
Charles R. Hale, Ph.D., Assistant Professor
Sarah M. Hediyel, Ph.D., Professor
Sudhir Joshi, Ph.D., Associate Professor
Sandra Lavelle, Ph.D., Assistant Professor (Anthropology, Center for Comparative Research)
Henry M. McKenney, Ph.D., Professor
Monika Borghofen Muller, Ph.D., Assistant Professor
David L. Ormrod, Ph.D., Professor
Peter S. Rodman, Ph.D., Professor
G. William Skinner, Ph.D., Professor (Anthropology, Center for Comparative Research)

Recommended

Geology 1, 1L, 3L, 3S; Physics 5A, 5B, 5C; Psychology 1, 15.

Bachelor of Science List of Courses

Biological anthropology, Anthropology 151, 152, 153, 154A, 154B, 155, 156, 157, 158

Upper division courses outside the Department:

Anatomy 100; Biochemistry 101A, 101B; Botany 140; Environmental Studies 100, 120; Epidemiology and Prevention 10; Genetics 100, 120B, 120C, 120D, 120E; Genetics 100, 120A, 120B, 120C, 120D, 120E; Geology 117; Geology 106, 107; Cell Biology and Human Anatomy 101; Physical Education 103, 115; Physiology 101A, 101B; Physiology 110, 110L; Psychology 108, 112, 159; Statistics 104, 106, 108, 110, 130A, 130B; Zoology 100, 106, 108, 125, 138, 141, 147, 148, 155.


Minor Program Requirements:

Course

General emphasis

One course from Anthropology 114, 117, 125, 128

One course from Anthropology 151, 152, 153, 154A, 154B, 155, 156, 157, 158

One course from Anthropology 170, 171, 173, 174, 175

One course from Anthropology 140A, 140B, 141A, 141B, 141C, 142, 143, 144, 145, 146, 147, 148A, 148B, 148C

One course from Anthropology 121, 122, 123, 124, 125, 126, 127, 128, 129, 130, 131, 132, 133, 138, 137, 138

One additional course in the upper-division Anthropology courses

B.S. degree

One course from Anthropology 152, 153, 154A

Two additional upper-division Anthropology courses chosen in consultation with B.S. degree undergraduate advisor

Social-Cultural emphasis

Anthropology 137

One course from Anthropology 140A, 140B, 141A, 141B, 141C, 142, 143, 144, 145, 146, 147, 148A, 148B, 148C

Two courses from Anthropology 101, 114, 117, 118, 120, 121, 122, 123, 124, 125, 126, 127, 128, 129, 130, 131, 132, 133, 135

One additional upper-division Anthropology course chosen in consultation with A.B. degree undergraduate advisor

Teaching Credential Subject Representative.

See also the Teacher Education Program.

Graduate Study. The Department offers a program of study leading to the M.A. and Ph.D. degrees in Anthropology. Further information regarding graduate study may be obtained from the Department Office and at the Graduate Division.

Graduate Advisor. P.S. Rodman.

Courses in Anthropology

Lower Division Courses

1. Human Evolutionary Biology (4) I. McHenry II. D.G. Smith III. P.S. Rodman
Lecture 3 hours; laboratory—1 hour. Introduction to human evolution. Processes and course of human evolution; man's place in nature and the study of primates; the biological variability of living man and the genetic background of racial variation; classical genetics credit. (CAN Anth 2)

2. Cultural Anthropology (4) I. Davis; II. The Staff

Ill. Curley
Lecture—3 hours; discussion—1 hour. Introduction to cultural diversity and the methods used by anthropologists to account for it. Family relations, economic activities, politics, gender, and religion in a wide range of societies. Current problems in tribal and peasant societies. General Education credit: Contemporary Societies/Non-Introductory. Recommended GE preparation: Anthropology 1, 2. Biological Anthropology 10, Environmental Studies 1, 30, Geography 2, or Sociology 2.

(a) Anthropological Linguistics

110. Elementary Linguistic Analysis (4) II. Olmsted Lecture—3 hours; discussion—1 hour. Prerequisite: course 4 or Linguistics 1. Analytical techniques of antithetic phonology, phonemics, morphophonemics, and morphology. Language change. Preferred GE preparation: Anthropology 1, 2. Biological Anthropology 10, Environmental Studies 1, 30, Geography 2, or Sociology 2.

111. Intermediate Linguistic Analysis (4) III. Olmsted Lecture—3 hours; discussion—1 hour. Prerequisite: course 110. Intermediate study of linguistic prehistory, historical linguistics, and reconstruction.

113. Indigenous Languages of North America (4) II. Staff Lecture—3 hours; discussion—1 hour. Prerequisite: course 4, Linguistics 1, or course 2. Communicative analysis of a variety of indigenous languages of North America, including their classification, linguistic characteristics, areal features, and socio-cultural aspects.

114. The Ethnography of Speaking (4) II. Wall Lecture—4 hours; discussion—1 hour. Prerequisite: course 4, or course 2 and Linguistics 1. Description and analysis of language usage in social context and of the sociocultural knowledge it reflects. Structure of speech events and language usage in formal and informal contexts, ritual use of language, and linguistic means of marking social identity.

117. Language and Society (4) III. The Staff Lecture—3 hours; discussion—1 hour. Prerequisite: course 4, or Linguistics 1. Communicative analysis of the role of language in its social context. Methods of data collection and analysis; identification of socially significant linguistic variables. Contributions of the study of contextualized speech to linguistic theory. General Education credit: Contemporary Societies/Non-Introductory. Recommended GE preparation: Anthropology 2 or Linguistics 1.

118. Language and Ethnicity (4) I. J.S. Smith Lecture—3 hours; discussion—1 hour. Prerequisite: course 4, or course 2 and Linguistics 1. Exploration of the role of language in creating and maintaining ethnic identity in multilingual societies. Examination of theoretical approaches to language variation and their utility in the interpretation of patterns of ethnic mother tongue and standard language use across groups.

119. World Writing Systems (4) III. The Staff Lecture—3 hours; discussion—1 hour. Prerequisite: course 4 or Linguistics 1. Survey of major world writing systems, including pictographic, syllabic, and alphabetic scripts used in both the Old and New Worlds in ancient and modern times, examined from linguistic and socio-political aspects.

120. Language and Culture (4) II. The Staff Lecture—3 hours; discussion—1 hour. Prerequisite: course 4, or course 2 and Linguistics 1. Culture, cognition, meaning, and interpretation; language and the classification of communication and learning in crosscultural perspective.

(b) Social-Cultural Anthropology

121. Folklore (4) III. Cowley Lecture—3 hours; discussion—1 hour. Prerequisite: course 2 or literary preparation acceptable to instructor. The anthropological method in the study of folktales, myths, legends, proverbs, riddles, songs, and other forms of verbal tradition.

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

123. Anthropology and Political Economy (4) II. Hale Lecture—3 hours; discussion—laboratory—1 hour. Prerequisite: course 2 or consent of instructor. Survey of the political economy of political organizations; the interrelationships among political institutions, economic infrastructures and cultural complexity.


125. Structuralism and Symbolism (4) II. The Staff Lecture—3 hours; discussion—laboratory—1 hour. Prerequisite: course 2 or consent of instructor. Survey of anthropological approaches to understanding the logic of structuralism and symbolism in cultural analysis. Course focuses on how structural and symbolic interpretations relate to cultural and linguistic universals and to the philosophical basis of relativism and the social sciences.

126. Anthropology of Development (4) I. Boyd Lecture—3 hours; discussion—1 hour. Prerequisite: course 2 or consent of instructor. Survey of theories of social and economic change. Social and economic consequences of technological innovation. Application of anthropological theory to case studies of rural economy and society.

127. Urban Anthropology (4) II. Walton Lecture—3 hours; discussion—1 hour. Prerequisite: course 2 or consent of instructor. Survey of approaches to urban living: political structures, 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) III. 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) III. Joseph Lecture—3 hours; discussion—1 hour. Prerequisite: course 2 or consent of instructor. Comparative exploration of the individual in foraging, agricultural, pastoral, agricultural, and industrial societies. Impact of class and state formation, ethnicity, poverty, ruralization, urbanization, economic, and political change on the individual. General Education credit: Contemporary Societies/Non-Introductory. Recommended GE preparation: Anthropology 2, Psychology 15-16, Sociology 2.


131. Women and Development (4) II. Joseph Lecture—3 hours; discussion—1 hour. Prerequisite: course 2 or consent of instructor. Current Third World and Western development issues concerning women in agriculture, industry, international division of labor, political movements, revolutions, politics of human education, famine and human reproduction in the post-colonial, capitalist, world system, and international feminism and women and development.

132. Festivals and Carnivals (4) III. Cowley Lecture—3 hours; discussion—1 hour. Prerequisite: course 2. Ethnographic and sociological analysis of selected festivals based on ethnic, religious, regional, class, vocational, and other affiliations. (Course not offered this academic year.)
Indian populations in modern times with emphasis upon North America. Attention will be given to contemporary Indian affairs and problems as well as to the background for present-day conditions. (Former course 108.)

141C. Ethnography of California and the Great Basin (4) III. Beltger
Lecture—3 hours; discussion—1 hour. Prerequisite: course 2 or consent of Instructor. Description and analysis of the native peoples of California and the Great Basin and their lifeways at the time of European contact. (Former course 108B.)

142. Peoples of the Middle East (4) II. Lavie
Lecture—3 hours; discussion—1 hour. Prerequisite: course 2. Peoples of the Middle East (including North Africa). Discussions of class relations, kinship organization, sex/gender systems, religious beliefs and behavior, ethnic relations, political systems. Impact of world systems, political and religious movements and social change. (Former course 136.)

143. Ethnology of Southeast Asia (4) I. Yengoan
Lecture—3 hours; discussion—1 hour. Prerequisite: course 2. Comparative study of peasant communities, utilizing historical and ethnographic sources; analysis of urban-rural relations; problems of economic development and culture change. (Former course 162.)

146. Indigenous Peoples of Mexico and Central America (4) II. C. Smith
Lecture—3 hours; discussion—1 hour. Prerequisite: course 2 or consent of Instructor. Ethnographic survey of indigenous peoples of Mexico and Central America: their histories, socio-political organization, mythology, languages, material culture, writing systems.

147. Peoples of the Pacific (4) III. Boyd
Lecture—3 hours; discussion—1 hour. Prerequisite: course 2 or consent of Instructor. Ethnographic survey of aboriginal cultures of Oceania. Comparison of origins, prehistory, and traditional social organization of peoples of Polynesia, Micronesia, and Melanesia. Consideration of recent changes associated with colonialism and national independence.

148. Traditional Chinese Society (4) II. Ethnographic surveys of early and modern China. (Former course 136A.)

149. Communist Chinese Society (4) I. Ethnographic surveys of early and modern China. (Former course 136A.)

14A. Traditional Japanese Society (4) III. S. Smith
Lecture—3 hours; discussion—1 hour. Prerequisite: course 2. Analysis of sociocultural change and economic development in the People's Republic of China, focusing on the case of rural society in China.

148A. Traditional Japanese Society (4) III. S. Smith
Lecture—3 hours; discussion—1 hour. Prerequisite: course 2. Patterns of culture and social organization: from prehistoric to near-modern Japan. Origins, prehistory, and traditional religious and political systems, marriage and kinship, language and culture. Changes and continuities in traditional and contemporary Japan, with attention to traditional and contemporary Japan. Offered in alternate years.
*157L. Laboratory in Anthropological Genetics (2) Ill. D.J. Smith Lecture—1 hour; laboratory—3 hours. Prerequisite: course 103A, or consent of Instructor. Students who do not have Genetics 100 or enrollment in course 157 (concurrently or following). Methods for identifying genetic variation in human blood group antigens, serum proteins and enzymes (hemagglutination), genetic alloenzymes on starch, cellulose acetate and polyacrylamide, immunofluorescence and immunoelectrophoresis on agarose. (P/NP grading only.)

*158. The Evolution of Females and Males: Biological Perspectives (2) I. Hist. Lecture—3 hours; discussion—1 hour. Prerequisite: course 1. Current theoretical frameworks for explaining the evolution of sex differences and for understanding the interrelationships between biological processes and cultural construction of gender roles.

(d) Archaeology and Prehistory

170. Archaological and Ethnology (3) I. I. Bettiger Lecture—3 hours; discussion—1 hour. Prerequisite: course 1 and 3. Introduction to history and development of archeological theory and method, with particular emphasis on the basic dependence of the latter on the former. Stress on historical development of archeology in the New World. (Former course 103A.)

*171. Archeology and the Environment (I). I. Beaton Lecture—3 hours; discussion—1 hour. Prerequisite: course 3. Examines theoretical, methodological and practical aspects of the relationship of environmental histories and their importance in studying human ecology through archeology. Environmental and human population dynamics and their interactions are considered particularly for non-complex societies. Offered in alternate years. (Former course 103B.)

*172. New World Prehistory: The First Arrivals (I) II. True Lecture—3 hours; discussion—1 hour. Prerequisite: course 1 and 3 or consent of Instructor. Survey of early cultures with particular emphasis on the East, Southeast, Midwest, Plains, Southwest, and Northwest. Offered in alternate years. (Former course 103C.)

*173. New World Prehistory: Archaic Adaptations (I) III. Bettiger Lecture—3 hours; discussion—1 hour. Prerequisite: course 3 or consent of Instructor. Survey of early cultures of prehistoric hunting and gathering adaptations across North America with particular emphasis on the East, Southeast, Midwest, Plains, Southwest, and Northwest. Offered in alternate years. (Former course 103D.)

174. New World Prehistory: Formative Life-ways in North and South America (I) III. True Lecture—3 hours; discussion—1 hour. Prerequisite: course 3 or consent of Instructor. Transition from hunting and gathering subsistence to sedentary farming in the American Southwest, Mississippi Valley, and Andean South America. Offered in alternate years. (Former course 103E.)

*175. New World Prehistory: The High Culture Mesoamerica and Andean South America. (I) III. True Lecture—3 hours; discussion—1 hour. Prerequisite: course 3 or consent of Instructor. Urban developments and the rise of civilization in Mexico and Peru. (Former course 103F.)

176. Prehistory of California and the Great Basin (I) II. True Lecture—3 hours; discussion—1 hour. Prerequisite: course 3 or consent of Instructor. Description and analysis of the prehistoric peoples of California and the Great Basin from earliest times to European contact. (Former course 103G.)

*177. Archeology of the Pacific Rim (4) II. Beaton Lecture—3 hours; discussion—1 hour. Prerequisite: course 3, 23, or consent of Instructor. Course 177 recommended. Archeological problems and evidence pertaining to human colonization and subsequent adaptation to various environments found on the Pacific Rim. Explanations are sought for important trajectories, trends and discontinuities in Pacific Rim culture histories. Offered in alternate years.

*178. Hunter-Gatherers (4) III. Bettiger Lecture—3 hours; discussion—1 hour. Prerequisite: course 2, 23, or 103. Study and interpretation of the ancient and modern lifeway in which peoples support themselves with primitive technologies and without benefit of domesticated plants and animals. General Education credit: Contemporary Societies/Non-Introductory. Recommended GE preparation: Anthropology 2. Offered in alternate years.

179. Ethnoarchaeology (4) III. Bettiger Lecture—3 hours; discussion—1 hour. Prerequisite: course 3. Relationships between behavior and its archeological consequences. Ethnography by archeologists examines resilience patterning, site formation processes, hunting/foraging behavior and other artifact creating activities and how these contribute to modern archeological thinking. (Former course 193D)

181. Field Course in Archaeological Method (II) I. Smith Lecture—6 days; daily field investigation. Prerequisite: site course 3. On-site course in archeological methods and techniques held at a field location in the western United States, generally California or Nevada. Includes basic methods of archeological survey, mapping, and excavation. (Former course 195.)

183. Laboratory in Archeological Analysis (4) III. Bettiger Lecture—3 hours; laboratory—6 hours. Prerequisite: course 181 or consent of Instructor. Museum preparation, advanced field investigation, and guidance in preparation of museum material for publication. May be repeated for credit with consent of Instructor. Limited enrollment. (Former course 196.)

*184. Prehistoric Technology: The Material Aspects of Prehistoric Adaptation (4) II. True Lecture—3 hours; discussion—1 hour. Prerequisite: course 3 or 103. Oriental, ceramic, textile and wooden implements as elements in prehistoric survival and development. Emphasis is descriptive, but the significance of material resources as factors in prehistoric adaptation, settlement patterns, and culture change are discussed.

(e) Special Study Courses

1941. Special Study for Honors Students (1-5) I, II, III. The Staff (Chairperson in charge) Prerequisite: open only to juniors of senior standing who qualify for honors program. Independent study of an anthropological problem involving the writing of an honors thesis. (P/NP grading only.)

1977. Tutoring in Anthropology (1-5) I, II, III. The Staff Tutorial—1-5 hours. Prerequisite: upper division standing with major in Anthropology and consent of Department Chairperson. Leading of small voluntary discussion groups affiliated with one of the department's regular courses. May be repeated for credit. (P/NP grading only)

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

198. Special Study for Advanced Undergraduates (1-5) I, II, III. The Staff (Chairperson in charge) (P/NP grading only)

Graduate Courses

201. History of Anthropological Theory (4) I. Yen-guyan 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) III. H. McHenry Lecture—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) II. Buttering Seminar—3 hours. History of thought in archaeology and analysis of research methods.

204. Contemporary Issues in Anthropological Theory (4) II. Devis Seminar—3 hours; term paper. Prerequisite: course 2, 137 or consent of Instructor. Advanced consideration of important problems in anthropological theory. Emphasis on critical examination of major contemporary debates between proponents of competing theories.


206. Research Design and Method in Social Anthropology (5) III. Joseph Seminar—4 hours; individual student-instructor session (in-depth work on proposal writing). Prerequisite: consent of Instructor. Formulation of research problems and preparation of research proposals; relationships between theory and method, funding, pre-fieldwork preparation, carrying out the fieldwork, and field research techniques, and problems of ethics. Intensive work on proposal writing. May be repeated once for credit. Limited enrollment.

209. Objectives and Methods for College Teaching in Anthropology (2) I. Smith Seminar—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) III. — Seminar—3 hours; term paper. Analysis of various phases of culture, such as religion, economics, law, and politics. May be repeated for credit when topic differs.

211. Advanced Topics in Cultural Ecology (3) I. Orlove Lecture—3 hours. Prerequisite: graduate standing; Anthropology/Environmental Studies 133 or the equivalent or consent of Instructor. Discussion and evaluation of theories which relate environment, culture, and social structure. The works of several major theorists will be examined with regard to analytical models, empirical data, research methodologies, and modes of explanation. (Same course as Ecology 211.)

216. Problems in Archeological Method (4) II. Bettiger Seminar—3 hours; term paper. Techniques for analyzing archeological data; application to various prehistoric cultures. May be repeated for credit with consent of instructor.

217. Andean Prehistory: Theory and Method (4) II. True Seminar—3 hours; term paper. Prerequisite: consent of Instructor. Discussion and evaluation of prehistoric occupations in the Andean Region of South America. Emphasis upon Pre-Ceramic and early farming peoples.

218. Topics in North American Prehistory (4) I. True Seminar—3 hours; term paper. Advanced study of current problems in North American prehistory and archaeology. May be repeated for credit only if material is unique for that student, and with consent of Instructor.

220. Field Course in Linguistics (4) III. Claitor 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) II. Orlove Seminar—3 hours; term paper. Prerequisite: courses 223, 265, or consent of Instructor. Problems of rural transformation arising out of political and economic interregnum between national elites and rural regional
and local populations under varying conditions of induced change in postcolonial societies. Attention will be given to the implications of this interaction for rapid economic growth. May be repeated for credit.

222. Problems in Urban Anthropology (4) I. Walton Seminar—3 hours; term paper. Prerequisite: graduate status or consent of instructor. Study of selected critical problems in urban anthropology. Each quarter focuses on the following topics: class, minorities, poverty, migration, religion, politics, kinship, community, sexroles, communication, ideology, consciousness in urban context. May be repeated for credit.

223. Economic Anthropology (4) III. Davis Seminar—3 hours; term paper. Prerequisite: course 122 or consent of instructor. Selects current methodological and theoretical problems in the analysis of economic systems.

224. Problems in Comparative Religion (4) II. Cutley Seminar—3 hours; term paper. Advanced study of current problems in the anthropological study of religion.

225. State and Nation in the Modern World (4) II. C. A. Smith Seminar—3 hours; term paper. A presentation of current anthropological theories of the origins and nature of the modern nation-state in both the First and Third Worlds with special reference to state ideology (nationalism) and forms of control. Offered in alternate years.

226. Consciousness and Resistance (4) II. Hale Seminar—3 hours; term paper. Prerequisite: completion of first-year graduate course work or consent of instructor. Consideration of approaches to the study of social inequality and responses of subordinated groups. Emphasis on situating approaches to contemporary social theory, concrete research problems, and political strategies. Topics include: formation of consciousness and identity; collective action; accommodation to frontal resistance.

232. Political Movements (4) I. Walton Seminar—3 hours; term paper. Prerequisite: completion of first-year graduate course work recommended. Interdisciplinary approach to political movements of protest, reform, and revolution emphasizing historical comparison and evaluation of major theoretical approaches including world systems, resource mobilization, state and culture, rational choice, moral economy, social class and gender.

239. Problems in African Society and Culture (4) I. Curley Seminar—3 hours; term paper. Labanococycles of traditional institutions in sub-Saharan Africa.

240. Problems in Afro-American Studies (4) III. Crowley Seminar—3 hours; term paper. Comparative studies 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. Omelice Seminar—3 hours; term paper. Prerequisite: a reading knowledge of German, Russian, Chinese, or Japanese. Lectures on the culture of the aboriginally found north of the Caucasus-Korea line. Supervised study of the primary and secondary sources. Work with informants when available.

246. Ethnology of Europe (4) II. Omelice Seminar—3 hours; term paper. Prerequisite: reading knowledge of a European language other than English. Supervised study of the primary and secondary sources dealing with the ethnography and ethnology of the peoples of Europe. Emphasis upon folk, peasant, and minority groups.

252. Human Evolution Seminar (4) II. McHenry Seminar—3 hours; term paper. Prerequisite: course 152 or the equivalent; consent of instructor. Study of selected topics in human evolutionary studies. Each year course will focus on one or more of the following: molecular evolution, primate evolution, biology, Tertiary hominoids, Australopithecus, Homo erectus, Homo sapiens, brain evolution. May be repeated for credit.

253. Seminar in Human Biology (4) III. D.G. Smith Seminar—3 hours; term paper. Prerequisite: course 153, 157, or consent of instructor. Study of selected topics in human biology. May be repeated for credit when topics vary. Offered in alternate years.

254. Current Issues in Primate Sociobiology (4) II. Rodman Seminar—3 hours; term paper. Prerequisite: course 154 or the equivalent. Analysis of primate behavior, with particular emphasis on preparation for field studies. May be repeated for credit when different topics covered.

256. Evolution and Human Behavior (4) II. Hrdy Seminar—3 hours; term paper. Prerequisite: course 151; 154 or 154A; 158 or consent of instructor. Focus will be on reproductive strategies and parental investment. May be repeated for credit when topics vary.

258. Concepts and Problems in Applied Anthropology (4) II. The Staff Seminar—3 hours; term paper. Prerequisite: consent of instructor. Advanced study in culture change; case studies of directed culture change; planning of evaluation; uses of anthropological theory and data in professional fields such as agriculture, public health, administration, and international technical assistance.

270. Anthropology Colloquium Seminar (1-10) 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)

280. Ethnological Theory and Method (4) II. Forbes Seminar—3 hours; term paper. Discussion of the ethnological method; the utilization of diverse types of data, especially documentary sources, to reconstruct social-cultural history. Particular attention devoted to the applied uses of anthropological theory in the solution of contemporary social problems.

282. Seminar in Linguistic Anthropology (4) II. The Staff Seminar—3 hours; term paper. Selected topics in linguistic anthropology. May be repeated for credit when topics differ.

289. Group Study (1-4) I, II, II. The Staff (Chairperson in charge) (SU grading only)

296. Research (1-12) I, II, III. The Staff (Chairperson in charge) (SU grading only)

298. Dissertation Research (1-12) I, II, III. The Staff (Chairperson in charge) (SU grading only)

Applied Behavioral Sciences

(College of Agricultural and Environmental Sciences)

Michael P. Smith, Ph.D., Chairperson of the Department

Lawrence V. Harper, Ph.D., Associate Chairperson of the Department

Department Office, 108 AOB 4

Community Studies and Development and Human Development (916-752-0770)

Community Studies and Development

Faculty

Stephen B. Brush, Ph.D., Associate Professor

Tad Fujimoto, M.A., Senior Lecturer S.E.E.

Barbara G. Goldman, Ph.D., Lecturer and Supervisor of Teacher Education

James Grieshop, Ph.D., Lecturer/ICE Specialist

Mark L. Keyney, Ph.D., Associate Professor

E. Dean MacCormick, Ph.D., Professor

Marc P. Sadowski, Ph.D., Professor Emeritus

Michael P. Smith, Ph.D., Professor

Dorothy Thompson, Ph.D., Professor Emeritus

Miriam J. Welsch, Ph.D., Professor

Human Development

Faculty

Carolyn Adkins, Ph.D., Assistant Professor

Laurie M. Bachfeld, Ed.D., Professor Emeritus

Keith Barton, Ph.D., Professor

Brice T. Bryan, Ph.D., Professor

James Chalmers, Ph.D., Associate Professor

Lawrence W. Harper, Ph.D., Professor

Glen C. Hawley, Ph.D., Professor Emeritus

Rosemarie Krutch, Ph.D., Associate Professor

David B. Lynn, Ph.D., Professor Emeritus

Beth O'Brien, Ph.D., Assistant Professor

Kay Jeanne Stockman, Ph.D., Lecturer

Jeanne L. Welter, M.A., Senior Lecturer Emeritus

Emmy W. Werner, Ph.D., Professor

Agricultural Education

Faculty

James G. Lelieger, Ph.D., Lecturer and Supervisor of Teacher Education

The Major Program

The applied behavioral sciences major is concerned with the study of communities and the people in them. The program focuses on community and organizational development, the role of culture and ethnicity shaping community life, and the ways that knowledge can be used to solve social problems and improve the quality of life.

The Program: Principal subjects of study within the major are: community and organizational development, social change processes, the role of culture and ethnicity shaping community life, community research methodologies, the impact of innovation and technology on community development, and the effects of social, economic and political systems on communities. In addition, the Applied Behavioral Sciences major includes a student-designed field of concentration to complement the student's academic and career interests. Examples of recently approved areas of concentration are: organizational planning and management, aging and community development, community health, social change and planning, community development and the Asian American, socio-environmental planning, and community education.

Internships and Career Alternatives: Applied Behavioral Sciences students are required to have an internship in their field before graduation. Internships have been arranged with such agencies as local, county, and state planning units, health departments, schools, housing offices, and community education programs. Applied behavioral sciences graduates are prepared for occupations in community development, social research, program evaluation, organizational and educational counseling, city and regional planning, and community health. The major also provides effective preparation for graduate or professional study in the social and behavioral sciences.

B.S. Major Requirements:

<table>
<thead>
<tr>
<th>Course</th>
<th>Units</th>
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<tbody>
<tr>
<td>English Composition Requirement</td>
<td>4-12</td>
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<tr>
<td>See College requirement</td>
<td>0-8</td>
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<tr>
<td>Additional English (English 103)</td>
<td>4</td>
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<tr>
<td>Preparatory Subject Matter</td>
<td>22-25</td>
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<tr>
<td>Community development (Applied Behavioral Sciences 1)</td>
<td>4</td>
</tr>
<tr>
<td>Computer science (Agricultural Science and Management 21 or Computer Science Engineering 10)</td>
<td>6</td>
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<tr>
<td>Economic theory (Economics 1A or 1B)</td>
<td>5</td>
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Ethnicity and American communities
Courses in Applied Behavioral Sciences

Lower Division Courses

1. The Community (4) I. MacCannell
   Lecture: 2 hours. Basic concepts of community analysis and planned social change. The dynamics of community change through case studies of communities including urban, rural, suburban, and other settings.

2. Ethnicity and American Communities (4) II. 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: Contemplative Societies/Non-Introductory. Recommended GE preparation: Anthropology 2.

17. Population and Community (2) II. Fujimoto
   Lecture: 2 hours. Dynamics and challenges offered by demographic changes in California and the world community. The effects of 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.

18. Science and Society (3) II. The Staff
   Lecture: 2 hours; discussion—1 hour. Assumptions and biases in different fields of knowledge, taboo topics, and the nature of evidence in the public and academic community. Issues between university education and issues of society.

17. Orientation to Community Resources (2) II. Thompson; III. Fujimoto
   Field trip—3 days; seminar—three 2-hour sessions. (Course given during summers. Prerequisite: consent of Instructor. Field trip to educational, social, and welfare agencies in California. Observation and discussion with staff members of different agencies which serve communities for family services and child care. Advance reservations required. (P/NP grading only)

92. Internship (1-12) I, II, III. The Staff (Chairperson in charge)
   Internship—6-36 hours. Prerequisite: consent of instructor. Supervised Internship, off and on campus, in community and institutional settings. (P/NP grading only).

Special Study for Undergraduates (1-5) I, II, III. The Staff (Chairperson in charge)
   (P/NP grading only).

Upper Division Courses

118. Technology and Society (4) II. Kenney
   Lecture: 3 hours; discussion—1 hour. Prerequisite: course 18 or consent of instructor. Impact of technology on labor relations, employment, industrial development and international relations. The internal relations of technology development and deployment.

140. Political Economy of Regional Development (4) II. Kenney
   Lecture: 4 hours. Prerequisite: one undergraduate economics, agricultural economics or political science course, consent of instructor. Political economy of domestic regional development. Technology, labor relations and inter-regional linkages. California and other regions as case studies.

151. Community Research and Analysis (4) I. Fujimoto
   Lecture: 4 hours. Prerequisite: course 1, Sociology 2, Anthropology 2, or Geography 5, Theories of community change and structure. Ethnographic, power structure, and community structure approaches to community studies. Use of research in community development programs. Students work in teams and conduct fieldwork in nearby communities. General Education credit: Contemplative Societies/Non-Introductory. Recommended GE preparation: Anthropology 2, Geography 5, or Sociology 2.

*Course not offered this academic year.
with each other, the organization, and those people who are clients of the organization. Effects of leadership, motivation, group dynamics, communications, and power.

164. Theories in Organizational Change (4) II. The Staff
Lecture—4 hours. Prerequisite: course 1 or 2. Development of approaches to planned change including re-educative, applied systems, and developmental strategies.

168. Program Evaluation and the Management of Organizations (4) I. Goldman
Lecture—4 hours. Prerequisite: courses 160, 161. Role of program evaluation in organizational and program management, internal evaluation in program planning, improvement, and accountability.

170. Communication of Innovations (4) I. The Staff
Lecture—3 hours; discussion—1 hour. Prerequisite: upper division standing and course work in the social sciences; course 1 or Sociology 1 recommended. Information exchange and innovation diffusion in organizational and social settings. Exploration of the role of networks and communication channels in planned social change efforts. Philosophical consideration of the consequences of innovation dissemination.

171. Hours of Social Policy (4) III. Wells
Lecture—4 hours. Social impact, economics, and politics of housing in the United States. Special attention given to alternative policy strategies at the national levels.

172. Social Inequality: Issues and Innovations (4) III. Wells
Lecture—4 hours. Prerequisite: upper division standing; 8 units of sociology or anthropology or combination. Study of the phenomenon of inequality in the U.S. Various approaches to inequality will be examined, including structural and historical explanations, prejudice and discrimination, the "culture of poverty," and arguments concerning race, sex, and genetic potential.

173. The Continuing Learner (4) II. The Staff
Lecture—4 hours. Prerequisite: upper division standing. Theories of adult learning and teaching emphasizing the role of adult education in the community. Designing of adult education programs.

174. Communication for Community Change (4) I. The Staff
Lecture—4 hours. Prerequisite: course 1. Communication as a mechanism and method for creating change in communities. Theories and practices; impact of message on attitudes and behavior; ethics of change induced through communication. Offered in alternate years.

175. Education in the Community (4) I. Griesshop
Lecture—4 hours. Prerequisite: upper division standing and course work in the social sciences; course 1 or Sociology 1 recommended. Function of education in the community. Relationships of community and non-formal education to formal education, school 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) III. The Staff
Lecture—4 hours. Prerequisite: upper division standing; 8 units of sociology or anthropology or combination. Exploration of the role of ethnicity in shaping social systems and interaction. Examination of analytic approaches to and issues arising from the study of ethnicity, through utilization of data from a range of different societies.

178. Social Networks and Community Health (4) III. The Staff
Lecture—3 hours; discussion—1 hour. Prerequisite: course 1 or Sociology 2. Relevance of social ties to the health of the individual, family and community. Multidisciplinary look at forces affecting family and friendship ties, as well as community services; and at how social bonds affect physical and psychological health. General Education credit. Contemporary

190. Current Issues in Applied Behavioral Sciences (1), II. 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. (PAP grading only.)

192. Internship (1-12) I, II, III. The Staff (Chairperson in charge)
Internship—3-36 hours. Prerequisite: completion of 84 units and consent of Instructor. Supervising internship, off and on campus, in community and institutional settings. (PAP grading only.)


199B. Sociology in Applied Behavioral Sciences (1-5) I, II, III. The Staff (Chairperson in charge)
Prerequisite: major in Applied Behavioral Sciences, and consent of instructor. Guided research leading to completion of advanced social research. Prereq. may be repeated for credit. (PAP grading only.)

197T. Tutoring in Applied Behavioral Sciences (1-5) I, II, III. The Staff (Chairperson in charge)
Prerequisite: consent of instructor. Leading of small voluntary discussion groups. (PAP 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 (PAP grading only)

198. Directed Group Study (1-5) I, II, III. The Staff (Chairperson in charge)
(PAP grading only)

199. Special Study for Advanced Undergraduates (1-5) I, II, III. The Staff (Chairperson in charge)
(PAP grading only)

Graduate Courses

201. Planning Processes in Applied Behavioral Sciences (4) I. The Staff
Lecture—3 hours; supervised practice in planning—3 hours. Prerequisite: consent of instructor. Systematic approach to planning, including problem formulation, solutions, implementation and evaluation. Application to selected issues in social and community change.

202. Systems Approach for Organizational Change (4) II. The Staff
Lecture—4 hours. Prerequisite: course 201 or consent of instructor. Organizational structure and processes from systems perspective, organizational-environmental interplay, dynamics of resource allocation, impact of power and environment on structure, communication networks, roles of innovation and determinants of change. Emphasis upon applications of theory for organizational learning.

203. Evaluation and Decision Making (4) II. Goldman
Lecture—4 hours. Prerequisite: graduate standing; knowledge of social science research methodology. Focuses on theoretical formulations and methodological considerations when designing evaluation research studies for social programs. Includes examination of relationship between organizational planning, decision making and evaluation research; value conflicts; multiple information requirements; social and political environment influencing evaluation studies.

240. Community Development: Research and Analysis (4) I. MacCannell
Seminar—4 hours. Prerequisite: course 160 or Sociology 46A or the equivalent and a course in statistics. Methods for analyzing institutional, community and regional social structure, as preparation for planned changes. Research design and the management of large-scale data files.

241. The Economics of Community Development and Planning Strategies (4) II. Kenney
Seminar—4 hours. Prerequisite: course 240 and a principle course in economics. Economic theory and planning strategies affecting metropolitan communities. Human resource, community services and infrastructure, industrialization and technological change, policy and plans for mobilizing resources for community development.

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 city level.

243. Professional Skills for Human Service and Community Development (4) I. The Staff
Lecture—2 hours; seminar—2 hours. Prerequisite: graduate student standing in a social science discipline. Theory of interpersonal communication and small group process as applied to development of professional skills as community developer, program administrator and/or consultant.

244. The Political Economy of Domestic Development (4) III. Kenney
Lecture—4 hours. Prerequisite: course 241. Examination of the politics and institutions affecting the economic growth of regions. Theories of development and change are examined with specific reference to case study material.

245. The Political Economy of Urban and Regional Development (4) II. Smith
Lecture—4 hours. How global policies 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.

250. Seminar (1) I, II, III. The Staff
Seminar—1 hour. Analysis of research in applied behavioral science. (SU grading only.)

257. Practicum in Community Development (2) I, II, III. 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 skills as change agent in community settings. Consideration of the field placement as it relates to relevant research. May be repeated for a maximum of 4 units. (SU grading only)

258. Group Study (1-5) I, II, III. The Staff (Chairperson in charge)
(SU grading only)

259. Research (1-12) I, II, III. The Staff (Chairperson in charge)
(SU grading only)

Applied Mathematics (A Graduate Group)

John K. Hunter, Ph.D., Chairperson of the Group

Office, 525 Kerr Hall (916-752-8131)
Faculty. Consists of members from a variety of departments whose research interests are mathematically oriented. Departments represented include Agricultural Economics, Biological Sciences, Chemistry, Computer Science Engineering, Chemical, Civil, Electrical, and Mechanical Engineering, Environmental Studies, Epidemiology and Preventive Medicine, Genetics, Land and Air and Water Resources, Management, Mathematics, Obstetrics and Gynecology, Statistics, Wildlife and Fisheries Biology, and Zoology.

Graduate Study. Students prepare for careers relat-
The Major Program

Art History is the study of the visual arts in civilization. It examines changing aesthetic and cultural values and significant material and ideological developments as seen in works of art and architecture. It emphasizes visual and verbal intelligence, providing more than the standard advantages of liberal arts training.

The Program: The student majoring in art history begins with courses which survey the arts of Asia, Europe, and America. More specialized courses follow in ancient, Byzantine, medieval, Renaissance, baroque, modern, non-Literate, Oriental, and American art and architecture. At the same time students are encouraged to take classes in related disciplines such as religion, history, philosophy, literature, and foreign languages.

Career Alternatives. The major prepares students for advanced study either in graduate school, or in professional programs. It can also serve as the foundation for careers in teaching, research, museums, galleries, arts administration, art criticism, publishing, and art investment.

A.B. Major Requirements:

- Preparatory Subject Matter: 28
  - Art 1A, 1B, 1C, 1D, 25, 26, 28, 30
  - One art studio course in drawing, graphics, painting, or photography... 4
  - One art studio course in sculpture or ceramics... 4

Depth Subject Matter: 36
Nine upper division art history courses, which must be taken in at least 3 of the following seven areas... 26

- Ancient
- Medieval/Northern Renaissance
- Southern Renaissance/Baroque
- Modern Painting, Sculpture
- Modern Architecture
- China/Japan
- Non-Literate

Total Units for the Major: 60

Minor Program Requirements:

- Art History: 20
  - Five upper division art history courses (one lower division substitute course permissible)... 20
  - Courses selected from at least three of the following subject areas with no more than two courses in any single area:
    - Ancient
    - Medieval/Northern Renaissance
    - Southern Renaissance/Baroque
    - Modern Painting, Sculpture
    - Modern Architecture
    - China/Japan
    - Non-Literate

Honors Program. The Honors Program is available to Art History majors who are seriously considering attending graduate school. To be eligible for the program, a student must have a grade-point average of 3.7 in the major. In addition to meeting the standard major requirements, the honors student completes one quarter of language in German or Chinese, one seminar (courses 190 or 198), and writes an honors thesis (course 199). Students participating in this Program are majoring for Departmental recommendation for graduation with High or Highest Honors. See the Letters and Science section of this catalog and consult the department for more information.

Teaching Credential Subject Representative. Department Chairperson. See also the Teacher Education Program.

Graduate Study. The Department of Art offers programs of study and research leading to the Master of Arts degree in History of Art as preparation for further graduate study or professional work. Further information may be obtained by writing to the Graduate Advisor or consulting the Graduate Announcement.

Courses in Art (History)

Lower Division Courses

1A. Ancient Art (4). L. Staff
Lecture—3 hours; discussion—1 hour. Art of the prehistoric and Mediterraean world from the prehistoric caves to the fall of the Roman Empire. General Education credit with concurrent enrollment in course 1AG: Civilization and Culture/Introductory. (CAN ART Seq A)

1AG. Writing: On Ancient Art (1). L. 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/Introductory.

1B. Medieval and Renaissance Art (4). II. Grigg
Lecture—3 hours; discussion—1 hour. Christian, Baroque, Mosaic, and Classic traditions in European Art from the fourth through the sixteenth centuries. General Education credit with concurrent enrollment in course 1B: Civilization and Culture/Introductory. (CAN ART Seq A)

1BG. Writing: On Medieval-Renaissance Art (1). II. Grigg
Discussion—1 hour; short papers. Prerequisite: course 1B (concurrently). Small group discussions and preparation of short papers for course 1B. General Education credit with concurrent enrollment in course 1B: Civilization and Culture/Introductory.

1C. Baroque and Modern Art (4). III. Macleod
Lecture—3 hours; discussion—1 hour. Major styles and masters of the Western world after the Counter Reformation. General Education credit with concurrent enrollment in course 1C: Civilization and Culture/Introductory. (CAN ART Seq A)

1CG. Writing: On Baroque-Modern Art (1). III. Macleod
Discussion—1 hour; short papers. Prerequisite: course 1C (concurrently). Small group discussions and preparation of short papers for course 1C. General Education credit with concurrent enrollment in course 1C: Civilization and Culture/Introductory.

1D. Asian Art (4). I. Fong
Lecture—3 hours; discussion—1 hour. Introduction to the arts of Asia through a study of Oriental ink painting and architecture, Buddhist sculpture, Indian temples, Chinese ceramics, Japanese prints, and art in China. General Education credit with concurrent enrollment in course 1D: Civilization and Culture/Introductory.

1DG. Writing: On Asian Art (1). I. Fong
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/Introductory.

10H. Introduction to Art: Art and Civilization (4). II. Ruda
Lecture—3 hours; term paper or gallery studies and review. Looking at art to understand how aesthetic experience relates to its cultural context, in a variety of historical situations from ancient to modern times. Information for students not specializing in art. (P/NP grading only)

*15. Women as Artists and Subject (4). III. Macleod
Lecture—3 hours; discussion—1 hour. Assessment of women's contribution to the visual arts. Examines the role of women in context of major artistic and social movements from pre-Romanesque to present. Two midterms; final examination. Offered in alternate years.

25. Introduction to Architectural History (4). I. Wiener
Lecture—3 hours; discussion—1 hour. Formal and
social history of architecture, examining design principles, major traditions, and concepts of architectural history with a focus on issues in Western architecture. Emphasis on nineteenth and twentieth centuries. General Education credit with concurrent enrollment in course 25G: Civilization and Cultural Introducory.

25G: Writing: Introduction to Architectural History (1). I. Weinler

Discussion—1 hour. Prerequisite: course 25 concurrently. Small group discussions and preparation of short papers for course 25. General Education credit with concurrent enrollment in course 25G: Civilization and Cultural Introducory.

98. Directed Group Study (1-5). I, II, III. The Staff (Program Director in charge)

Prerequisite: consent of instructor. Restricted to lower division students. (P/NP grading only.)

99. Special Study for Undergraduates (1-5). I, II, III. The Staff (Program Director in charge)

Prerequisite: consent of instructor. (P/NP grading only.)

Upper Division Courses

150. Arts of Sub-Saharan Africa (4) III. Crowley

Lecture—3 hours; term paper or gallery studies and review. African traditional arts and crafts of sub-Saharan Africa; particular attention to the relationships between sculpture and culture in West and Central Africa.

151. Arts of the Indians of the Americas (4) II. The Staff

Lecture—3 hours; term paper or gallery studies and review. Development of art in North America, emphasizing ancient Mexico. South American relationships and parallels. Recent and contemporary Indian arts and crafts from Alaska to Chile.

152. Arts of Oceania and Prehistoric Europe (4) III. Crowley

Lecture—3 hours; term paper. Traditional arts of aboriginal Australia, Melanesia, Polynesia, and Micronesia, as seen in their cultural contexts. Prehistoric art of Europe and the Near East.

154A. Early Greek Art and Architecture (4) II. Howard

Lecture—3 hours; gallery study and term paper. Prerequisite: upper division standing. Examination of history and significance of major monuments in Greek art and architecture from the Hellenic, Geometric Age to the Golden Age and the death of Socrates.

154B. Later Greek Art and Architecture (4) III. Howard

Lecture—3 hours; gallery studies and term paper. Prerequisite: upper division standing. Examination of the history and significance of monuments in Greek art and architecture from the Silver Age of Aristotle to Alexander the Great to the Hellenistic Age and the death of Alexander the Great.

155. Roman Art (4) III. Howard

Lecture—3 hours; term paper or gallery studies and review. The art of Republican and Imperial Rome.

162. History of Printmaking (4) II. Ruda

Lecture—3 hours; term paper or gallery studies and review. History of printmaking. Examination of the invention of the movable type and graphic art in the Western World from the fifteenth century to the present.

163A. Chinese Art (4) III. Fong

Lecture—3 hours; term paper or gallery studies and review. A survey from the beginning to the twelfth century focusing on the major art forms that are traditionally known as well as newly discovered through archaeological China.

163B. Chinese Painting (4) II. Fong

Lecture—3 hours; term paper or gallery studies and review. The unique form of ink painting, with or without colors, depicting human and animal figures, flowers-and-birds, and landscape—the favorite and enduring theme of the Chinese scholar-painter.

163C. Painting in the People's Republic of China (4) III. Fong

Lecture—3 hours; term paper. Prerequisite: course 163A or 163B. Analysis of the interaction between art and politics in the emergence of China into the modern world. Integration of Western Influence, Implementation of Mao Zedong's thought on art, and the formation of contemporary Chinese painting.

164. The Arts of Japan (4) III. Fong

Lecture—3 hours; term paper and/or gallery studies and review (determined by instructor) each quarter course. Offered each spring quarter. Significant achievements in architecture, painting, sculpture, and decorative arts from prehistoric age to nineteenth century.

165. Great Cities (4) III. Weinler

Lecture—3 hours; term paper. Examination of architecture and art in the ancient cities of Rome, London, Venice 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.

176A. Art of the Middle Ages: Early Christian and Byzantine Art (4) I. Grigg

Lecture—3 hours; term paper or gallery studies and review. Painting, sculpture and architecture of the Early Christian era and Byzantine Empire through the later Roman Empire in the West and to the final capture of Constantinople in the East.

176B. Art of the Middle Ages: Early Medieval and Romanesque Art (4) III. 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. Grigg

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. Grigg

Lecture—3 hours; term paper or gallery studies and review. Painting and sculpture of the fifteenth century in Austria, Germany, France and the Lowlands, including such artists as Jan van Eyck and Hieronymus Bosch.

177B. Northern European Art (4) III. Grigg

Lecture—3 hours; term paper or gallery studies and review. Painting and sculpture of the sixteenth century in Germany, France and the Lowlands, including such artists as Albrecht Dürer and Pieter Bruegel.

178A. Italian Renaissance Art (4) II. Grigg

Lecture—3 hours; term paper or gallery studies and review. Giotto and the origins of the Renaissance; painting and sculpture in Italy from Nicola Pisano through Lorenzo Ghiberti, with emphasis on Giotto, Duccio, and other leading artists of the early fourteenth century.

178B. Italian Renaissance Art (4) I. Ruda

Lecture—3 hours; term paper or gallery studies and review. The High Renaissance: Leonardo, Michelangelo, Raphael, and Titian in their artistic and cultural settings.

178C. Italian Renaissance Art (4) II. Ruda

Lecture—3 hours; term paper or gallery studies and review. Western European architecture, sculpture and the art of the Italianate style from late sixteenth through the early eighteenth centuries.

179A. Baroque Art (4) I. Ruda

Lecture—3 hours; term paper or gallery studies and review. Seventeenth-century painting, including such artists as Caravaggio, Rembrandt, and Velázquez. Offered in alternate years.

182. British Art (1750-1914) (4) III. Macleod

Lecture—3 hours; discussion—1 hour. Prerequisite: course 1C. Analysis of the place of art in British culture—1750 to 1914. Topics include influence of class and gender on art education, patronage, and exhibition societies. Artists: Hogarth, Turner, Pre-Raphaelites, and lesser-known advocates of military, social realism, 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 1830. Artists studied include Goya, David, Delacroix, Constable, Turner, the Pre-Raphaelites, and Courbet.

183B. Impressionism and Post-Impressionism (4) II. Macleod

Lecture—3 hours; discussion—1 hour. Prerequisite: at least one course in art or consent of instructor. Examination of modern movement in European art from impressionism and blim to Post-Impressionism. Artists studied include Picasso, Matiss, Kandinsky, Malevich, and Pollock.

183D. Modern Sculpture (4) II. Howard

Lecture—3 hours; term paper or gallery studies and review. Sculpture from Neo-Classicism to the present.

183E. Contemporary Art: 1945 to the Present (4) III. Macleod

Lecture—3 hours; discussion—1 hour. Prerequisite: at least one course in art or consent of instructor. Painting and sculpture in Europe and America from 1945 to the present, with emphasis on the New York school, Pop art, Op art, Earthworks, and Feminist art.

183F. The Tradition of Modernism (4) I. The Staff

Lecture—3 hours; discussion—1 hour. Prerequisite: course 183A, 183B, 183C, or 184. Introduction to the artistic movements which traditionally constitute twentieth-century Modernism. Study will be divided into seminal avant-garde movements as Cubism and Surrealism, and sessions critically examining the emergence of individual artists as representatives of such movements.

184. Twentieth Century Architecture (4) II. Weinler

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.

186. After Modernism: 1968 (4) II. The Staff

Lecture—3 hours; discussion—1 hour. Prerequisite: background course in modern European history and philosophy recommended. Covers critical theory dealing with links between visual and textual production within the alternative tradition of European modernism. Images and key texts of Expositionism, Blue Rider, Dada, Bauhaus, N.S. Fasolam, Welmar Film, and Post War Restoration examined.

188. Architecture of the United States (4) I. Weinler

Lecture—3 hours; term paper. Prerequisite: course 25 recommended. American architecture from the first European settlers to Postmodernism. Technological and formal developments will be examined within the social, political, and economic context in which they emerged. Issues include ideals of domesticity and the development of the architectural profession.
The Major Program

The studio art major provides the knowledge and experience necessary for a broad understanding of the visual arts.

The Program. For the beginning student, the major offers an introduction to drawing, composition, sculpture, and art history. Students may then advance to more specialization courses (sculpture, printmaking, ceramics, photography, film making, as well as theory and criticism) in upper-division work.

Portfolios. Students at Davis should keep a continuing portfolio of their art work which is subject to faculty review at such times as when the student is declaring the major, trying to add the first day of class (the department gives preference to students who have preenrolled), and requesting independent study courses.

Career Alternatives. The studio art graduate is prepared for graduate work or continuing development as a professional artist or art teacher. Students who have career aspirations in the commercial aspects of the visual arts can acquire a broad general education and a creative foundation in the art studio major, establishing a basis for further specialization in commercial art.

A.B. Major Requirements:

Preparatory Subject Matter ........................................ 30
Three courses from Art 2, 3, 4, 5, 6; see prerequisites required for upper division courses ........................................ 12
Two courses from Art 1A, 1B, 1C, 1D ................................... 8
Depth Subject Matter .................................................. 36
Six courses, under three different instructors, chosen from Group A, Practice of Art ........................................ 24
One course from Group B, Theory and Criticism ............... 4
Two upper division courses in art history ...................... 8
Total Units for the Major ............................................ 56

Recommended
(a) Students interested in drawing and painting should take Art 2, 3, 4 (course 5 is recommended);
(b) Students interested in sculpture should take Art 2, 3, 5 (course 4 is recommended); and
(c) Students preparing for graduate work in any of the environmental design professions should take Art 2, 5, 6, 16.
Major Advisers. See the Class Schedule and Room Directory.

Minor Program Requirements:

Art Studio ................................................................. 20
Upper division art studio courses chosen in consultation with a faculty adviser (one lower division substitute course permissible) ........................................ 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 Announcements or Graduate Admissions Office.

Courses in Art (Studio)

Lower Division Courses

2. Drawing I (12-hour, II, III, Henderson, Shultz, Zhang and staff). Laboratory—6 hours; to be arranged—4 hours. Form and composition in black and white (CAN Art 8)
3. Drawing (4) I, II, III, Hollowell, Henderson & staff. Laboratory—8 hours; to be arranged—4 hours. Prerequisite: course 2. Form and composition in color.

4. Life Drawing (4) I, II, III, Hollowell, Thibaud & staff. Laboratory—8 hours; to be arranged—4 hours. Prerequisite: course 2. Form in composition using the human figure as subject.

5. Sculpture (4) I, II, III, Pule, Zhang & staff. Laboratory—8 hours; to be arranged—4 hours. Form in space using plaster and other media. (C.N.A Art 12)

106. Introduction to Art Appreciation (4) I, Hollowell. Lecture—3 hours; term paper or gallery study and review. Introduction to the appreciation of painting, sculpture, architecture, and industrial art. Illustrated lectures intended for students not specializing in art. (P.N.P grading only)

16. Descriptive Drawing (4) I, II, III, Hollowell & staff. Laboratory—8 hours; to be arranged—4 hours. Objective drawing and rendering; representations of space.

19. Directed Study Group (1-5) I, II, III. The Staff (Chairperson in charge). Prerequisite: consent of instructor. Restricted to lower division students. (P.N.P grading only)

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

Upper Division Courses

Note: Upper division courses are listed under three groups: (A) Practice of Art; (B) Theory and Criticism; (C) Special Study Courses. Preenrollment in upper division courses is restricted to art majors. Art minors may obtain permission to preenroll by filling out a "Waiver of Restriction" form in the Art office.

Group A: Practice of Art

101. Painting: Materials and Carriers (4) I, II. DeForest and Hollowell. Laboratory—8 hours; to be arranged—4 hours. Prerequisite: course 2, 3, 4, 5, or consent of instructor. Experimentation in media and their supports.

102. Painting (4) I, II, III. Hollowell, Hawthorn & staff. Laboratory—8 hours; to be arranged—4 hours. Prerequisite: course 2, 3, 4, 5, or consent of instructor. Advanced painting in various media including oil and polymers. May be repeated once for credit with consent of instructor.

103. Advanced Drawing (4) I, II, III, C. Nagle & staff. Laboratory—8 hours; to be arranged—4 hours. Prerequisite: 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) I, II, I. L. Schulz & staff. Laboratory—12 hours. Prerequisite: courses 4 and 101, or consent of instructor. Advanced figure drawing and painting using the human figure as subject. May be repeated once for credit with consent of instructor.

105. Photography (4) I, II, III, Halfman & staff. Laboratory—8 hours; to be arranged—1 hour. Prerequisite: courses 2, 3, 4, 5, or consent of instructor. Photography as an art form. Experiments with camera and light sensitve materials.

111. Photography (4) II, III, Halfman. Laboratory—8 hours; to be arranged—1 hour. Prerequisite: courses 2, 3, 4, 5, or consent of instructor. Art of camera and light sensitive materials: tonal control, multiple exposure, synthetic negatives, etc. May be repeated once for credit with consent of instructor.

115. Film-making (4) I, II, Henderson. Laboratory—8 hours; to be arranged—1 hour. Prerequisite: courses 2, 3, 4, 5, or consent of instructor. Film-making as an art form: 8 and 16 mm. cameras and sound track. May be repeated once for credit with consent of instructor.

121A. Architectural Design (4) II, III. Cremer Laboratory—8 hours; to be arranged—1 hour. Prerequisite: courses 2, 5, 16, or compensating background in design or engineering. Small buildings as art forms, visualized in cardboard, belts, or platen models.

122. Printmaking: Relief (4) I, II. The Staff Laboratory—8 hours; to be arranged—1 hour. Prerequisite: courses 2, 3, 4, 5, or consent of instructor. Woodcut, linocut, metal-plate relief and experimental uses of other materials.

123. Printmaking: Intaglio (4) I, II. The Staff Laboratory—8 hours; to be arranged—1 hour. Prerequisite: course 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) I. DeForest Laboratory—8 hours; to be arranged—1 hour. Prerequisite: courses 2, 3, 4, 5, or consent of instructor. Stone and metal-plate lithography and other planographic methods. May be repeated once for credit with consent of instructor.

128. Printmaking: Serigraphy (4) II. The Staff Laboratory—8 hours; to be arranged—1 hour. Prerequisite: courses 2, 3, 4, 5, or consent of instructor. Serigraphy and related stencil methods. May be repeated once for credit with consent of instructor.

141. Sculpture: Non-Metal Materials (4) I. Pule Laboratory—8 hours; to be arranged—1 hour. Prerequisite: courses 2, 3, 4, 5, or consent of instructor. Sculpture in compliant media, e.g., wood, plaster, plasticine, etc. May be repeated once for credit with consent of instructor.

142. Sculpture: Ceramics I (4) I, II. The Staff Laboratory—8 hours; to be arranged—1 hour. Prerequisite: course 2, 3, 4, 5, or consent of instructor. Introduction to ceramic forms and processes.

143. Sculpture: Ceramics II (4) I, 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 Modeling (4) II, I. Neri Laboratory—8 hours; to be arranged—1 hour. Prerequisite: courses 2, 3, 4, 5, or consent of instructor. Sculpture in various media using the human figure as subject. May be repeated once for credit with consent of instructor.

145. Sculpture: Concept and Materials (4) I, II. Pule Laboratory—8 hours; to be arranged—1 hour. Prerequisite: courses 2, 3, 4, 5, or consent of instructor. Sculpture in various media using the human figure as subject. May be repeated once for credit with consent of instructor.

146. Sculpture: Ceramics III (4) I, II. The Staff Laboratory—8 hours; to be arranged—1 hour. Prerequisite: course 141, 143, 144, or 145. Advanced form and color. Clay sculpture in relief and round. May be repeated once for credit with consent of instructor.

187. Theory and Criticism: Painting and Sculpture (4) I, II. The Staff Lecture—3 hours; term paper. Prerequisite: course 2 or 5 and one art lecture course. Development of camera vision, ideas, and aesthetics and their relationship to the fine arts from 1890 to the present.

188. Theory and Criticism: Painting and Sculpture (4) I, II. The Staff Lecture—3 hours; term paper. Prerequisite: course 2 or 5 and one art lecture course. Study of forms and symbols in historic and contemporary masterpieces.

192. Internship (2-12) I, II, III, The Staff (Chairperson in charge). Internship—term paper or catalog. Supervised program of internships at professional art institutions such as museums, galleries, and art archives including collections of slides and photographs. May be repeated once for credit. (P.N.P grading only)

193. Seminar in Art Practice (4) I, II. The Staff (Chairperson in charge). Discussion—laboratory—8 hours; variable—4 hours. Prerequisite: courses 2 and 3; upper division status; taking courses in upper division drawing, painting, and sculpture. Work (painting, sculpture, drawing, etc.) devoted for group discussion and criticism, as well as group discussion of contemporary topics in the visual arts. Offered in alternate years.

198. Directed Group Study (1-5) I, II, III, The Staff (Chairperson in charge). (P.N.P grading only)

999. Special Study for Advanced Undergraduates (1-5) I, II, III. The Staff (Chairperson in charge). (P.N.P grading only)

Graduate Courses

201. Experiments in Art and Visual Communication (4) I, II, III. The Staff Lecture—12 hours. Original work produced for class discussion and criticism. May be repeated for credit.

209. Seminar (4) I, II, III, Carnsmith, Halfman, Rogoff and staff. Seminar—3 hours. Original works produced for group discussion and criticism. Associated topics of a contemporary and historical nature. May be repeated for credit.

219. Seminar: Critical Evaluation (4) I, II, III. The Staff (Graduate Adviser in charge). Seminar—1 hour. May be repeated for credit. (S.U. grading only)

229. Seminar: Comprehensive Qualifying (4) I, II, III. The Staff (Graduate Adviser in charge). Seminar—1 hour. Further critical evaluation of the students works to determine his eligibility to begin the Comprehensive Project. May be repeated for credit. (S.U. grading only)

299. Individual Study (1-6) I, II, III. The Staff (Chairperson in charge). (S.U. grading only)

2995. Comprehensive Project (9) I, II, III. The Staff (Graduate Adviser in charge). An original body of work accompanied by a catalogue summarizing the student's aesthetic position. May be repeated for credit. (S.U. grading only)

Professional Courses


Note: Various of the above courses are not offered each year; please check quarterly schedules.

Asian American Studies

(College of Letters and Science)

George Kaywgra, Ph.D., Program Director
Program Office, 156 AOB 4 (516-752-9265)
Committee in Charge
Vincent A. Crookenberg, Ph.D. (Education)
Roy H. Doli, Ph.D. (Biochemistry and Biophysics)
Isao Fujimoto, M.A. (Applied Behavioral Sciences)
George Kagiwada, Ph.D. (Asian American Studies)
Peter C.Y. Leung, N.S. (Asian American Studies)
Vicki Ruiz, Ph. D. (History)
Diane Wolf, Ph. D. (Sociology)

Faculty
George Kagiwada, Ph.D., Director
Peter C.Y. Leung, M.S., Lecturer S.O.E.

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. This University requirement can be satisfied by one of the following courses in Asian American Studies: 1, 2, 3. (See also under University requirements.)

Related Courses. For courses in Asian languages, see Cantonese (below) and Chinese and Japanese. For other Asian courses, see Chinese and Japanese, and East Asian Studies.

Minor Program Requirements:

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<th>UNITS</th>
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<tr>
<td>100</td>
<td>1, 111, 112, 130, 192 (No less than 4 units of 192 may be counted toward this total)</td>
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Minor Adviser: P.C.Y. Leung

Courses in Asian American Studies

Direct questions pertaining to the following courses to the instructor or to Asian American Studies Program, 585A BO (916-752-3625).

Lower Division Courses

1. Historical Experience of Asian Americans (4) I, II, III, The Staff
   Lecture—3 hours; discussion—1 hour. Introduction to Asian American Studies through an overview of the history of Asian Americans in the U.S. from the 1840s to the present within the context of the development of the United States. (Offered fall and spring quarters in even-numbered years. Offered winter quarter in odd-numbered years.)

2. Contemporary Experience of Asian Americans (4) I, II, III, Kagiwada
   Lecture—3 hours; discussion—1 hour. Introduction to Asian American Studies through analysis of relationships between ethnicity, race, and culture. Identity development of Asian Americans and their communities in the context of contemporary American institutional practices. (Offered winter quarter in even-numbered years. Offered fall and spring quarters in odd-numbered years.)

20. Calligraphic Expression in Asian American Culture (3) I, Leung
   Lecture—2 hours; studio—3 hours. Survey the legacy of calligraphy in Asian American families, festivals, temples, and schools. Understanding and appreciation of calligraphy through basic writing. Trace origins, principles and styles of Chinese and Japanese calligraphy. Offered in alternate years.

92. Internship (1-3) I, II, III, The Staff (Director in charge)
   Internship—3-9 hours. Prerequisite: enrollment dependent on availability of intern positions and consent of instructor. Supervised internship in community and institutional settings related to American American communities. (P/NP grading only.)

99. Directed Group Study (1-5) I, II, III, The Staff (Director in charge)
   Primarily intended for lower division students. (P/NP grading only.)

Special Study for Undergraduates (1-5) I, II, III, The Staff (Director in charge) (P/NP grading only.)

Upper Division Courses

100. Asian American Communities (4) II, Kagiwada
   Lecture/discussion—4 hours. Prerequisite: course 110.

110. Study of historical and contemporary experiences of various Asian American groups, with the community as the unit of analysis.

101. Language and Educational Issues of Asian Immigrants (4) III, The Staff
   Lecture—3 hours; discussion—1 hour. Prerequisite: course 1 or 2; upper division standing. Analysis of language diversity issues in American society, especially in public schools. Overview of public policies on language and programs, particularly for Asian American minority students. Offered in even-numbered years.

110. Theoretical Perspectives in Asian American Studies (4) I, Kagiwada
   Lecture/discussion—4 hours. Prerequisite: course 1 or 2; upper division standing. Theoretical bases and research on the social and political influence of Asian American experience with the society as the unit of analysis.

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Lower Division Courses

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2. Contemporary Experience of Asian Americans (4) I, II, III, Kagiwada
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110. Study of historical and contemporary experiences of various Asian American groups, with the community as the unit of analysis.

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   Lecture—3 hours; discussion—1 hour. Introduction to Asian American Studies through an overview of the history of Asian Americas from the 1840s to the present within the context of the development of the United States. (Offered fall and spring quarters in even-numbered years. Offered winter quarter in odd-numbered years.)

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   Lecture—3 hours; discussion—1 hour. Introduction to Asian American Studies through analysis of relationships between ethnicity, race, and culture. Identity development of Asian Americans and their communities in the context of contemporary American institutional practices. (Offered winter quarter in even-numbered years. Offered fall and spring quarters in odd-numbered years.)

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   Lecture—2 hours; studio—3 hours. Survey the legacy of calligraphy in Asian American families, festivals, temples, and schools. Understanding and appreciation of calligraphy through basic writing. Trace origins, principles and styles of Chinese and Japanese calligraphy. Offered in alternate years.

92. Internship (1-3) I, II, III, The Staff (Director in charge)
   Internship—3-9 hours. Prerequisite: enrollment dependent on availability of intern positions and consent of instructor. Supervised internship in community and institutional settings related to American American communities. (P/NP grading only.)

99. Directed Group Study (1-5) I, II, III, The Staff (Director in charge)
   Primarily intended for lower division students. (P/NP grading only.)

Special Study for Undergraduates (1-5) I, II, III, The Staff (Director in charge)

*Course not offered this academic year.

Courses in Cantonese

1-3. Elementary Cantonese (5-5-6) I-III, Laung
   Lecture—3 hours; recitation—3 hours. Introduction to Cantonese grammar and development of conversational skills in a cultural context. Approximately 250 Chinese characters will be introduced during Cantonese 2 and 3. (Not open to native speakers.)

4-5-6. Intermediate Cantonese (3-3-3) I-III, Laung
   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

Atmospheric Science is the study of the physics of meteorological processes, including general circulation of the atmosphere and weather systems; mass and energy transfers at the planetary surface and within the atmosphere; solar and terrestrial radiation; turbulence and diffusion; atmospheric interaction with the biosphere; climate variability; air pollution, meteorology, and development in modern meteorological instrumentation.

The Program. Atmospheric science is based on applied mathematical physics, and is strongly relevant to environmental biology and human ecology. The course of study provides a mathematical and physical science background. In addition to a broad background in meteorology, the major includes a minor area to be chosen from mathematics, computer science, environmental studies, resource management or a physical or biological science.

Internships and Career Alternatives. Atmospheric science students have participated in internships with the California Air Resources Board, various county Air Pollution Control Districts, and the National Weather Service. Numerous career opportunities exist in the federal and state governments, research and development in the private sector, and education. Examples of career areas are agricultural meteorology, air-pollution forecasting and control, weather modification, hurricanes and severe weather forecasting and research, weather satellite meteorology, and numerical weather forecasting. About half of our graduates continue their education by seeking the M.S. or Ph.D. degrees in atmospheric science.
B.S. Major Requirements:

(For convenience in program planning the usual courses taken to satisfy the requirements are shown in parentheses. Equal or more comprehensive courses are acceptable.)

UNITs

English Composition Requirement 9-18
See College requirement
Preparation Subject Matter 63
Biological sciences (Biological Sciences 1A, 1B) 10
Chemistry (Chemistry 1A, 1B) 10
Computer science (Computer Science 111B, 150A or equivalent) 3
Mathematics (Mathematics 21A, 21B, 21C, 22A, 22B, 22C) 21
Meteorology (Atmospheric Sciences 60D) 4
Physics (Physics 9A, 9B, 9C) 12
Statistics (Statistics 32) 3

Breadth/General Education 28
Satisfaction of General Education requirements is dependent on availability of courses.

Additional units in social sciences and humanities to total 28 units

Depth Subject Matter 30
Atmospheric Science 110A, 110B, 120, 121A, 121B 7
Upper division Atmospheric Science courses selected with advisor's approval 12
If both courses 120 and 133 are taken, only one may be counted. No more than 3 units of courses 182 and 199 may be counted.

Restricted Electives 21
Earth and planetary sciences (choose from Environm. Sci. 116, 150A, 150B, Geography 116, 117, Geology 105, 113, 115, Resource Sciences 103, Soil Science 100, Water Science 100, 141, or courses approved by adviser) 6
Coordinated Courses (minor area) 2 to be chosen with advisor's approval from mathematics, computer science, environmental studies, resource management, or a physical or biological science 15

Unrestricted Electives 30-38
Total Units for the Degree 180

Major Advisor, R.H. Shaw (Land, Air and Water Resources)

Advancing Center for the major, as well as for graduate studies, is located in 122 Hoagland Hall, Land, Air and Water Resources Teaching Center (816-752-1669).

Graduate Study. You can specialize in particular areas of atmospheric science through graduate study and research leading to the M.S. and Ph.D. degrees. For details see under the Graduate Group in Atmospheric Science. See also the Graduate Division section in this catalog.

Related Courses. See Environmental Studies 150A; Geography 115, 116; Physics 144A, 144B; Resource Sciences 103, 131.

Courses in Atmospheric Science

Questions pertaining to the following courses should be directed to the instructor or to the Land, Air and Water Resources Teaching Center, 122 Hoagland Hall (816-752-1669).

Lower Division Courses

10. Severe and Unusual Weather (3) I, II, III. Carroll, Ware
Lecture—2 hours; discussion—1 hour. Prerequisite: Physics 10. High school physics or equivalent. Extreme or unusual weather events, e.g., floods, blizzards, hurricanes, tornadoes, and desertification. Emphasis placed on scientific perspective and human context. Not intended for students majoring in the physical sciences. General Education credit.

124. Meteorological Instruments and Observations (3) I. Shaw
Lecture—2 hours; laboratory—3 hours. Prerequisites: course 60; Physics 9C. Modern meteorological instruments and their use in making observations and measurements. Both standard and micrometeorological instruments are included. Offered in alternate years.

128. Radiation and Satellite Meteorology (4) I, II. Weimer
Lecture/discussion—3 hours; laboratory—1 hour. Prerequisites: course 60; Physics 9B. Concepts of atmospheric radiation and the use of satellites in meteorology. Emphasis on the modification of solar and infrared radiation by the atmosphere. Estimation from satellite data of atmospheric variables such as temperatures and cloudiness.

133. Biometeorology (4) I, II. Shaw
Lecture—3 hours; discussion—1 hour. Prerequisite: two courses in a biological discipline; Mathematics 168. Atmospheric and biological interactions. Physical basis for plant, animal and human response and adaptation to short-term meteorological events. Students who have completed course 105A may receive only one unit of credit.

149. Introduction to Air Pollution (3) I. Carroll, Chang, Raabe (Civil Engineering)
Lecture—4 hours. Prerequisite: Mathematics 22B, Chemistry 18B; course 121A or Engineering 103A. Examination of physical and technical aspects of air pollution. Emphasis on geophysical processes and population meteorology as well as physical and chemical properties of pollutants. (Same course as Civil Engineering 149.)

150. Numerical Weather Prediction (4) I, II. Goerlitz
Lecture—3 hours; discussion—1 hour. Prerequisite: course 121B and Engineering 5. Numerical techniques and their applications to meteorological problems. Finite differencing and spectral methods, design of forecast models, parameterization of physical processes and predictability. Written computer programs to illustrate these topics.

158. Boundary-Layer Meteorology (4) I. Shaw
Lecture—3 hours; discussion—1 hour. Prerequisite: course 121A. Growth, development and structure of the atmospheric layer directly influenced by the underlying surface and extending to a maximum of about two kilometers under convective conditions. Turbulent diffusion in the boundary layer. The microclimate and near the ground surface. Laboratory observations and measurements on campus in atmospheric science. Internship supervised by a member of the faculty. (PINF grading only.)

159. Directed Group Study (1-5) I, II, III. The Staff (Chairperson in charge) Prerequisites: upper division units in Atmospheric Science. (PINF grading only.)

159. Special Study for Advanced Undergraduates (1-5) I, II, III. The Staff (Chairperson in charge) Prerequisites: upper division units in Atmospheric Science and at least an overall B average. (PINF grading only.)

Graduate Courses

200. Atmospheric Processes (3) I. The Staff
Lecture—3 hours. Prerequisite: Mathematics 22B or 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-110B, 120, and 126. Credit not allowed to students having completed any of these courses.

221A. Advanced Atmospheric Dynamics (3) I, II. Nathan
Lecture—3 hours. Prerequisite: course 121B. Shallow water theory and potential vorticity conservation. Mathematical and physical properties of geophysical
waves. Wave-wave interactions, Barotropic instability of geophysical flows. Offered in alternate years.

221B. Advanced Atmospheric Dynamics II (3) III.
Nathan
Lecture—3 hours. Prerequisite: course 221A. Quasi-geostrophic potential vorticity equation for a rotating stratified atmosphere on a sphere. Conditions for instability in stratified atmospheres; baroclinic instability; barotropic instability; linear and non-linear flow interaction theory. Forced waves in the atmosphere. Nonlinear theory of baroclinic instability. Offered in alternate years.

223. Advanced Boundary-Layer Meteorology (3) III.
Shaw
Lecture—3 hours. Prerequisite: course 230. Characteristics of the atmospheric boundary layer under convective and nocturnal conditions. Heat budget at the surface and boundary layer forcing. Similarity theory and scaling of the boundary layer. Measurement and simulation techniques. Offered in alternate years.

230. Atmospheric Turbulence (3) II.
Shaw
Lecture—3 hours. Prerequisite: course 121B or 158. Dynamics and energetics of turbulence in the atmosphere, including vorticity dynamics, statistical description of turbulence, Eulerian and Lagrangian scales, spectral analysis, conditional sampling techniques, turbulent diffusion; the closure problem, gradient-diffusion and second-order methods. Offered in alternate years.

231. Advanced Air Pollution Meteorology (3) II.
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.

240. General Circulation of the Atmosphere (3) I.
Grotjahn
Lecture—3 hours. Prerequisite: course 121B. Large-scale, observed atmospheric circulations. Energy and momentum balances derived and compared with observations. Theoretical framework developed to synthesize observed features. Offered in alternate years.

241. Climate Dynamics (3) III.
Weare
Lecture—3 hours. Prerequisite: courses 210, 212A, 121B. Thermodynamics, stability, and climate modeling. Advanced numerical methods (тик-ток, finite difference, finite element) and computer programming. Emphasis on climate modeling. Offered in alternate years.

250. Mesoscale Meteorology (3) II.
Soong
Lecture—3 hours. Prerequisite: graduate standing, course 150, a course in partial differential equations; or consent of instructor. The study of weather phenomena with horizontal spatial dimensions between 250 and 2500 kilometers. Methods of observational study and numerical modeling of the structure and temporal behavior of these weather systems. Offered in alternate years.

265. Numerical Modeling of the Atmosphere (4) II.
Soong
Lecture—2 hours; laboratory—6 hours. Principles of numerical modeling of the dynamic, thermodynamic and physical processes of the atmosphere. Hands-on experiments on model development using the shallow water equations and the primitive equations. Operational forecast models. Offered in alternate years.

270A-G. Topics in Atmospheric Science (1-3) 1, 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 Infra-red Radiation in the Atmosphere; (E) Aerosol and Cloud Physics; (F) Atmospheric Chemistry; (G) General Meteorology.

290. Seminar (1) I, II, III.
The Staff (Chairperson in charge)
Seminar—1 hour. Prerequisite: graduate standing in Atmospheric Science or related field. Current developments in selected areas of atmospheric research. Topics will vary according to student and faculty interests. (S/U grading only.)

292A-D. Research Conference in Atmospheric Science (1), I, II, III.
The Staff
Discussion—1 hour. Review and discussion of current literature in: (A) Air Quality Meteorology; (B) Biometeorology; (C) Boundary Layer Meteorology; (D) Climate Dynamics. May be repeated up to a total of 5 units per segment. (S/U grading only.)

298. Group Study (I-5) I, II, III.
The Staff (Chairperson in charge)
Prerequisite: graduate standing and consent of instructor. (S/U grading only.)

299. Research (I-12) I, II, III.
The Staff (Chairperson in charge)
Prerequisite: graduate standing and consent of instructor. (S/U grading only.)

The Major Program

Avian Science (A Graduate Group)

Richard D. Grotjahn, Ph.D., Chairperson of the Group (916-752-2246)

Group Office, 151 Hoagland Hall (916-752-1406)

Faculty. Includes nineteen faculty members from the Departments of Land, Air and Water Resources, Mechanical Engineering, Civil Engineering, Geophysics, the Laboratory for Energy-Related Health Research, the Division of Environmental Studies, and the National Institute for Global Environmental Change.

Graduate Study. The Graduate Group in Avian Science offers both the M.S. and Ph.D. degree programs. The student can choose to focus on graduate work in one or more of the following fields: air quality meteorology, biometeorology, micrometeorology, numerical weather prediction, 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 Avian Science graduate program include mathematics at 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. S.T. Soong (Land, Air and Water Resources, 752-6115)

Graduate Admissions Officer. T.R. Nathan (Land, Air and Water Resources, 752-6160).

Avian Science

See Epidemiology and Preventive Medicine

Avian Sciences

(916-752-1230)

Factory

Ursula K. Abbott, Ph.D., Professor
Hans Abplanalp, Ph.D., Professor Emeritus
Francine A. Bradley, Ph.D., Lecturer
Ralph A. Ernst, Ph.D., Lecturer
C. Richard Grau, Ph.D., Professor Emeritus
Annie J. King, Ph.D., Associate Professor
Kirk C. Klausing, Ph.D., Associate Professor
F. Howard Kratzer, Ph.D., Professor Emeritus
James R. Millen, Ph.D., Associate Professor
Frank X. Ogasawara, Ph.D., Professor Emeritus
Kathryn Ralke, Ph.D., Assistant Professor
Pran N. Vohra, Ph.D., Professor Emeritus
Wesley W. Weathers, Ph.D., Professor
Barry W. Wilson, Ph.D., Professor
Wilbur C. Wilson, Ph.D., Professor Emeritus
Allen E. Woodward, M.S., Lecturer Emeritus

The Major Program

Avian science is the study of birds and the ways in which they relate to and are useful to humans. The major combines the study of avian wildlife and their environment, production and market potential of domestic birds and eggs, captive 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 laboratory staff gives students a large role in selecting and designing their own course work. Students may specialize in a bachelor's program that qualifies them for a particular career or they may choose a program to meet other broader intellectual and cultural interests.

Internships and Career Alternatives. Independent study, undergraduate research, and internships are features emphasized in the avian sciences program. There are birds available for laboratory or special study housed within the main building as well as at the research farm and the experimental aviary. A student in the avian sciences major has a variety of career options, including wildlife management, environmental research, teaching biology, gamebird production, domestic and foreign agricultural extension and advisory services, governmental agencies, or the domestic or exotic bird industry. A recent survey has shown that the majority of avian sciences graduates enter graduate school or are employed by the domestic bird industry. The remainder of the graduates were evenly distributed in the categories of professional schools, avian biology agencies, educational fields, and individual jobs indirectly associated with birds.

B.S. Major Requirements:

(For convenience in program planning, the usual courses taken to satisfy the requirements are shown in parentheses where possible. Equal or more comprehensive courses are acceptable.)

UNITS

English Composition Requirement..........0-8

See College requirement

Preparatory Subject Matter.............5-54

Avian sciences (Avian Sciences 11 or 13).................34

Biological sciences (Biology 1, 1A, 1B, 1C).................15

Chemistry (Chemistry 1A, 1B, 8A, 8B).............16

Computer science (Agricultural Science).............15

Mathematics (Mathematics 18A, 18B).............6

Physics (Physics 1A and 1B).............6

Statistics (Statistics 13).............4

Avian Medicine

See Epidemiology and Preventive Medicine

*Course not offered this academic year.
Breadth Subject Matter .................................................. 24
Satisfaction of General Education requirement .................. 24

Depth Subject Matter .................................................. 49
Physiological Biochemistry Laboratory (Physiological Sciences 101A-101B or Biochemistry 101A-101B) .................. 6
Genetics (Genetics 100) .................................................. 4
Nutrition (Avian Sciences 150-150L or Nutrition 110) .......... 2
Physiology (Physiology 110) .............................................. 5
Laboratory units in above listed subjects ............................ 4
(Recommended courses include Animal Sciences 105L, Avian Sciences 150L, Biochemistry 101L, or Physiology 110L)

Specialized courses related to avian species ....................... 25

Restricted Electives .................................................. 27
To supplement or expand depth subject matter courses ........ 27

Unrestricted Electives .................................................. 13-20
Total Units for the Degree ........................................... 180

Major Adviser. A.J. King.

Advising Center for the major is located in 3202 Meyer Hall (918-752-1300).

Graduate Study. Further training is available through graduate study 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 Division section in this catalog.

Related Departments. See Agricultural Economics 130; Food Science and Technology 120, 120L, 121; International Agricultural Development 102; Nutrition 123; Physiology 117; Zoology 100, 100L.

Courses in Avian Sciences

Division I: Lower Division Courses

11. Introduction to Poultry Science (3) II. Bradley Lecture—4 hours; laboratory—2 hours. The mosaic of events that have led poultry science to other scientific disciplines and poultry to humans. Poultry science techniques and production methods from the time of domestication to the present. One field trip required. General Education credit: Nature and Environment/Introductory

11L. Laboratory in Avian Sciences (1) I, II. Morzenti Laboratory—3 hours. Prerequisite: course 11 may be taken concurrently. Demonstrations, laboratory exercises, and field trips on avian field trips; management, anatomy, reproduction, egg incubation, nutrition, health and welfare of domestic birds; data collection techniques.


92. Internship in the Avian Sciences (1-12) I, II, III. The Staff (Chairperson in charge) Internship—3 to 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. Open only with Internship Approval Request form essential. (P/NP grading only)

98. 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 birds and their products. (P/NP grading only)

Upper Division Courses

100. Principles of Avian Sciences (5) II. The Staff Lecture—4 hours; laboratory—3 hours. Prerequisite: Biological Sciences 1A. Aspects of biology (anatomy, physiology, behavior, nutrition, reproduction and genetics) that provide basis of birds. Emphasis on those features of birds, domestic, wild and experimental, which are distinctive.

101. Patterns in Avian Biology (3) I. Weathers Lecture—3 hours. Prerequisite: Biological Sciences 1B or the equivalent. Patterns of reproduction, locomotion; foraging, growth, development, energetics, and temperature regulation exhibited by birds. Ecological and evolutionary adaptations and allozyme analysis of life history traits.

102. Fertility and Hatchability (4) II. Abbott. Lecture—3 hours; discussion—1 hour. Prerequisite: course 100; Genetics 100; Zoology 100. Normal avian embryonic development. Reproductive failures resulting from disease, nutritional or genetic causes. Use of avian embryos in research.

115. Reptil Biology (3) I. Morzenti Lecture—3 hours. Prerequisite: Biological Sciences 1A or the equivalent. Study of birds of prey: classification, distribution, habits and habitats, migration, unique anatomical and physiological adaptations, natural and captive breeding, health and diseases, environmental concerns, conservation, legal considerations, rehabilitation, and falconry. Includes two Saturday field trips.

123. Management of Birds (4) III. Millam Lecture—3 hours; discussion—1 hour. Prerequisite: course 100. Captive management of birds will be studied by focusing on four major avian groups: ducks, parrots, pheasants, and pigeons. Management practice will be related to research on differences in avian physiology and human culture.

130. Poultry Breeding and Genetics (3) I. Applanat Lecture—3 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 of interest.

149. Advanced Poultry Management (4) III. Ernst. Lecture—3 hours; discussion—1 hour. Prerequisite: course 11 or Animal Science 2, or the equivalent. Environmental management of poultry: brooding; disease prevention, recycling; lighting programs; housing design; egg, broiler, and turkey production; brooding flock care; and hatchery management. Offered in alternate years.

150. Nutrition of Birds (3) II. Klausing Lecture—4 hours. Prerequisite: Nutrition 110 (may be taken concurrently). General principles of nutrition specific to avian species, including feedstuffs, feed additives, nutrient metabolism, energy systems, and nutritional support of egg production and growth. Use of computers for feed formulation to support production. Offered in alternate years.

150L. Nutrition of Birds Laboratory (2) III. King Laboratory—6 hours. Prerequisite: course 150. Feeding trials to study nutrient requirements. Metabolizable energy study and proximate analysis of feed. Determination of vitamins, minerals, fatty acids and other nutrients or substances in feed with emphasis on use of laboratory equipment.

160. Seminar in Avian Sciences (1) I, II, III. The Staff Seminar—1 hour. Prerequisite: upper division standing in Avian Sciences and consent of instructor. May be repeated three times for credit. (P/NP grading only)

192. Internship in Avian Sciences (1-12) I, II, III. The Staff (Chairperson in charge) Internship—3 to 36 hours. Prerequisite: completion of a minimum of 84 units; consent of Instructor. Internship on and off campus in poultry, gamebirds or exotic bird production, management and research; or in a business, industry, or agency concerned with these entities. Compliance with Internship Approval Request form essential. (P/NP grading only.)

195. Topics in Current Research (1-3) I, II, III. The Staff (Chairperson in charge) Lecture—discussions—variable. Hours will depend on instructor with the number of units being commensurate with the number of hours in class. Prerequisite: consent of instructor. Discussion of topics of current interest in avian sciences. May be repeated three times for credit.

277. Tutoring in Avian Sciences (1-3) I, II, III. The Staff (Chairperson in charge) Tutoring—variable. Hours and duties vary depending upon course being tutored. Prerequisite: Avian Sciences or related major; advanced standing; consent of instructor. Tutoring of students in lower division avian sciences courses on weekly basis. Discussion—tutoring fee charged in course of tutoring. Written critiques of teaching procedures. (P/NP grading only)

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

199. Special Study for Advanced Undergraduates (1-5) I, II, III. The Staff (Chairperson in charge) Prerequisite: consent of instructor. (P/NP grading only)

Graduate Courses

220. Cellular Proliferation and Oncogenes (4) III. Radke Lecture—3 hours; seminar—3 hours. Prerequisite: Biochemistry 101B, Zoology 121A-121B, Genetics 102B. Regulation of growth and division of animal cells. Oncogenes, retroviruses and growth factors will be discussed in the context of normal and cancerous growth. Critical reading and writing are stressed.

230. Avian Endocrinology (2) II. Millam Lecture—2 hours. Prerequisites: course work in endocrinology, avian biology or reproductive physiology. Examination of current issues in avian endocrinology with emphasis on endocrine aspects of reproductive physiology. Offered in alternate years.

250. Advanced Poultry Nutrition (3) III. Klausing Lecture—2 hours; discussion—1 hour. Prerequisite: Nutrition 110. Metabolic basis for nutrient requirement in avian species including energy, amino acids, vitamins, and minerals. Discussions on design 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. Avian energetics and water requirements of captive and free-living birds. Metabolic requirements for growth, maintenance, reproduction, and thermoregulation. Emphasis given to diversity of patterns found in birds and their ecological correlates. Offered in alternate years.

290. Seminar (1) I, II, III. The Staff (Chairperson in charge) 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. Prerequisites: 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. (SU grading only)

297T. Supervised Teaching in Avian Sciences (1-4) I, II, III. The Staff (Chairperson in charge) Tutoring—1 to 4 hours. Prerequisite: graduate standing and consent of instructor. Tutoring of students in lower division courses in the 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 (1-5) I, II, III. The Staff (Chairperson in charge) Prerequisite: consent of instructor.

Course not offered this academic year.
Avian Sciences (A Graduate Group)
Hans Apelana, Ph.D., Chairperson of the Group
Group Office, 3202 Mayer Hall (916-752-1300)

Faculty. Consists of members from several departments in the College of Agricultural and Environmental Sciences and the School of Veterinary Medicine.

Graduate Study. The Graduate Group in Avian Sciences offers the M.S. degree program to students who wish to pursue specialized advanced work on avian species. The areas of specialization that may be chosen by the student at present include: nutrition, physiology, reproduction, pathology, toxicology, food chemistry, management, ecology, genetics, comparative incubation, environmental physiology, and cellular and developmental studies using wild and domestic birds as experimental animals. Both master's degree plans, thesis or comprehensive examination, are available.

Preparation. It is expected that the student will have had undergraduate preparation in a field appropriate to the course of study selected. The student will be expected to have had courses in most of the following subjects: general biology, general and organic chemistry, biochemistry, avian biology, genetics, nutrition, physiology, and statistics.

Graduate Adviser. K.C. Klassing (Avian Sciences).

Bacteriology
See Microbiology

Biochemistry (College of Agricultural and Environmental Sciences)

The Major Program
The biochemistry major introduces students to the chemistry of living organisms and the experimental techniques that are used to probe the structures and functions of biologically-important molecules. Students who enjoy both chemistry and biology and who are comfortable with quantitative approaches to problem solving will find biochemistry a rewarding field of study.

The Program. The biochemistry program begins with a two-quarter general biochemistry course that provides an introduction to the principles of biochemistry. Biochemistry majors then take a comprehensive and rigorous laboratory course designed to familiarize them with the most important aspects of biochemical research. There are additional upper-division courses in biochemistry which examine detailed aspects of modern biochemistry. Students also are required to take courses in other biological sciences and a full year of physical chemistry.

Choice of College. The Bachelor of Science degree is offered by both the College of Agricultural and Environmental Sciences and the College of Letters and Science. 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.

Students majoring in Biochemistry in the College of Letters and Science may petition the Dean of the College to receive credit toward the B.A. in Science requirements for those courses in chemistry that have been taken at other institutions prior to first enrollment at UC Davis and that are judged by the Chemistry department to cover substantially the same material as upper division courses in the subject at UC Davis. Students in the College of Agricultural and Environmental Sciences must accumulate 45 units of upper division courses to graduate. Further information can be obtained from the Division of Biological Sciences Office, 376 Mrak Hall.

Career Alternatives. The biochemistry program provides a solid scientific background for students seeking a research, teaching, or service career in the life sciences. There are positions open to biochemists in the food processing, pharmaceutical, agricultural research, and chemical industries. Also, university teaching, research laboratories, and government-sponsored research facilities provide employment opportunities.

B.S. Major Requirements:

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<tr>
<th>Units</th>
<th>Course Description</th>
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<tbody>
<tr>
<td>ENGR 0-8</td>
<td>College of Agricultural and Environmental Sciences students only; See College requirement</td>
</tr>
<tr>
<td>BIOL 55-62</td>
<td>Biological sciences (Biological Sciences 1A, 1B, 1C)</td>
</tr>
<tr>
<td>CHEM 15</td>
<td>Chemistry (Chemistry 1A-1B-1C, 5, or 4A-4B-4C (students may start with Chemistry 4A and continue with 15-19 but not vice versa))</td>
</tr>
<tr>
<td>PHYS 9-12</td>
<td>Physics, 12 units minimum (Physics 5A-5B-5C or 9A-9B-9C)</td>
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<tr>
<td>STAT 38-39</td>
<td>Statistics (Statistics 130, 130A)</td>
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<tr>
<td>GENET 12-13</td>
<td>Genetics 100</td>
</tr>
<tr>
<td>24</td>
<td>Breadth/General Education</td>
</tr>
<tr>
<td>100</td>
<td>College of Letters and Science students: Refer to the College section for a description of the options available in meeting this requirement</td>
</tr>
<tr>
<td>12</td>
<td>Restricted Electives</td>
</tr>
<tr>
<td>120</td>
<td>To include Biochemistry 133, 143, and 153; and at least one additional upper division course in biochemistry, another biological science, or physical chemistry</td>
</tr>
<tr>
<td>190</td>
<td>Unrestricted Electives to bring total to 190 units</td>
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</table>

Courses. See under Biochemistry and Biophysics.

Courses not offered this academic year.
cesses such as photosynthesis and respiration; carbohydrate, fat, and nitrogen metabolism.

123. An Introduction to Enzymology (3) III. Whitaker (Food Science and Technology)

Lecture—3 hours. Prerequisite: course 101B. Properties of physical, chemical and catalytic properties of enzymes and their utilization. Experimental determination and quantitative evaluation of influence of reaction conditions on activity are stressed. Specificity and mechanism of action illustrated by consideration of selected enzymes.

123L. Enzymology Laboratory (2) III. Whitaker (Food Science and Technology)

Lecture—1 hour. Laboratory—3 hours. Prerequisite: course 101B; course 123 (concurrently). Laboratory procedures involved in separation and study of enzymes.

133. Behavior and Analysis of Enzyme Systems (3) III. Segel

Lecture—3 hours. Prerequisite: course 101B. Introduction to enzyme kinetics and receptor-ligand interactions with emphasis on metabolic regulation and data analysis. Topics include steady-state kinetics, patterns of feedback inhibition, control by enzyme activity, allosteric enzymes, multiregulatory systems, enzyme assays, and membrane transport.

143. Structure-Function Relations of Proteins (3) I. Cridde, Hedrick

Lecture—3 hours. Prerequisite: courses 101A, 101B, and 101L (may be taken concurrently). Correlation of structure and 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.

153. Molecular Biology of Eukaryotic Cells (3) II. Dahmus

Lecture—3 hours. Prerequisite: course 101B and 101L; Genetics 100. Structure, expression and regulation of eukaryotic genes. Chromosome structure and replication; gene transcription, RNA processing; protein synthesis and translational control; development, immune system and oncogenes.

190. Undergraduate Seminar in Biochemistry (1) I, II, III. The Staff

Seminar—1 hour. Prerequisite: courses 101A, 101B (may be taken concurrently). Discussion of the historical developments of modern biochemistry.

192. Internship (1-12) I, II, III. The Staff (Chairperson in charge)

Internship—3-36 hours. Prerequisite: consent of instructor. Technical and/or practical experience on and off campus, supervised by a member of the Biochemistry Faculty (P/NP grading only).

194L. Biochemistry Honors (1-5) I, II, III. The Staff

Prerequisite: 4 units of course 198 with faculty director; senior standing; grade point average of at least 3.25; consent of department. Honors project in Biochemistry. Laboratory research on a biochemical problem followed by presentation of the work in a written thesis and in a seminar (P/NP grading only).

197T. Tutoring in Biochemistry (1-5) I, II, III. The Staff (Chairperson in charge)

Discussion—1-15 hours. Prerequisite: upper division standing and consent of instructor. To assist the instructor by tutoring students in one of the department's regular courses. (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

201A. Physical and Chemical Biochemistry (4) I. Benisek (Biological Chemistry); Cridde, Lagarias, Matthews (Biological Chemistry), Segel, Troy (Biological Chemistry)

Lecture—4 hours. Prerequisite: course 101B; Chemistry 107B-108 or 110C; 128C, 129C. Biochemical thermodynamics and chemical and physical properties of biomacromolecules, including enzyme kinetics and mechanisms for determining size and shape of macromolecules.

201B. Integration of Metabolism and Regulatory Phenomena (3) I. Learned

Lecture—3 hours. Prerequisite: course 201A or consent of instructor. Regulatory phenomena that occur in control of metabolism; e.g., in regulation at enzyme level; integration of metabolic pathways including homonesticity, hormonal influences, turnover of enzymes, some complex aspects of metabolism, regulation of amino acids and lipid metabolism in living systems. Offered in alternate years.

201C. Molecular Biology (3) III. Bradbury (Biological Chemistry), Dahmus, Doi, Hershey (Biological Chemistry)

Lecture—3 hours. Prerequisite: course 201A. Structure and organization of DNA and chromatin; DNA replication, repair and modification; transcription and RNA processing; protein biosynthesis and turnover; transcriptional and post-transcriptional control mechanisms; examples of the above from eukaryotic and prokaryotic cells, and viruses.

201R. Cellular Biochemistry (3) II. Etzioni, McNamee, Traut (Biological Chemistry), Troy (Biological Chemistry)

Lecture—3 hours. Prerequisite: course 201A. Structure and function of cell membranes and cell surface components with emphasis on biochemical principles involved in cell growth, cell development and cell-cell interactions. Biochemical aspects of some differentiated systems, such as the immune system.

202A-202D. Advanced Biochemical Methods (1-1) II. Carson, Hedrick

Lecture—1 hour. Prerequisite: course 201A (may be taken concurrently), and 101L or the equivalent. Laboratory methods and procedures used in biochemical research.

202L. Advanced Biochemistry Laboratory (5) I, II, III. The Staff

Laboratory—15 hours. Prerequisite: course 201A (may be taken concurrently), and 101L or the equivalent. Two five-week assignments in biochemistry research laboratories. Individual research problems with emphasis on methodology/procedural experience and experimental design. May be repeated twice for credit.

204. Gene Expression (3) III. The Staff

Lecture—3 hours. Prerequisite: course 153 or 201C. Examination of current working hypotheses on the mechanism of gene expression on transcription. Translation factors, ciselementing elements and regulatory domains will be examined in detail with special emphasis on eukaryotic systems.

208. Membrane Biochemistry (2) II. McNamee, Villarejo

Lecture—2 hours. Prerequisite: course 201D. Advanced topics in membrane biochemistry with emphasis on the structure and function of membrane proteins and lipids. Offered in alternate years.

212. Chemical Modifications of Proteins (3) II. Benisek (Biological Chemistry)

Lecture—3 hours. Prerequisite: course 101B; Chemistry 128C. Chemical approaches for studying proteins, emphasizing the use of chemical modifications as a tool in the study of active sites, particularly of enzymes, and relating the structure of proteins to their functions. Offered in alternate years.

215. Genetics of Biological Systems (2) III. The Staff

Lecture—2 hours. Prerequisite: courses 201A, 201B; FORTIV IV (may be taken concurrently). Kinetic behavior of multivariable biological systems: mathematical methods and analysis of typical data with accent on computer use; in particular, the kinetics of multivariable catalysts, pre-steady state systems, perturbed systems, and reactions in a metabolic sequence. Offered in alternate years.

250. Biochemical Literature (1) I, II, III. The Staff

Seminar—1 hour. Prerequisite: course 201C or consent of instructor. Critical reading and evaluation of current biochemical literature. Selected papers will be presented and discussed in detail. (S/J grading only)

270. Advanced Research Conference (1) I, II, III. The Staff (Chairperson in charge)

Seminar—1 hour. Prerequisite: course 201C or consent of instructor. Presentation and critical discussion of research activities of various members of the local biochemical community; primarily designed for graduate students. (S/J grading only)

291. Current Progress in Biochemistry (1) I, II, III. The Staff (Chairperson in charge)

Seminar—1 hour. Prerequisite: course 201C or consent of instructor. Seminars presented by guest lecturers on subjects of their own research activities. (S/J grading only)

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

Prerequisite: consent of instructor. (S/J grading only)

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

Prerequisite: consent of instructor. (S/J grading only)

Professional Course

380. The Teaching of Biochemistry (1, 2) I, II, III. The Staff (Chairperson in charge)

Discussion—1 hour. Prerequisite: graduate student in Biochemistry; consent of instructor. Practical experience in methods and problems of teaching biochemistry. Includes analyses of texts and supporting material, discussion of teaching techniques, preparing for and conducting discussion sessions, observing and guiding student laboratory work, formulation of topics and questions for examinations under supervision of instructor. Participation in the teaching program required for Ph.D. degree. May be repeated for credit. (S/J grading only)

Biochemistry and Molecular Biology (A Graduate Group)

Henry R. Matthews, Ph.D., Chairperson of the Group
Group Office, 149 Briggs Hall (916-752-9301)
Faculty. Consists of members from the Colleges of Letters and Science, and Agricultural and Environmental Sciences, and the Schools of Medicine and Veterinary Medicine

Graduate Study. The Graduate Group in Biochemistry and Molecular Biology offers programs of study and research leading to the M.S. and Ph.D. degrees. Graduate work in biochemistry involves a broad overview plus specialization in one or more of the following: protein chemistry, control of gene expression, plasmids, gene rearrangements, chromosome structure and function, Immunoochemistry, molecular virology, reproductive biochemistry, structure and function of surfaces, protein synthesis, biochemistry of neoplasia, biochemistry of chloroplasts, lipid biosynthesis, hormonal control of metabolism, photochemical enzymology, and membrane transport. For detailed information regarding graduate study, address the chairperson of the group.

Graduate Advisers. E. Bandman (Food Science and Technology), L. F. Bison (Viticulture and Enology), J.C. Lagarias (Biochemistry and Biophysics), M.R. Villarejo (Biochemistry and Biophysics).

Courses in Biochemistry and Molecular Biology

Graduate Courses

200. Seminar (1) I, II, III. The Staff

Seminar—1 hour. Prerequisite: consent of instructor. (S/J grading only)

259. Research (1-12) I, II, III. The Staff

Prerequisite: consent of instructor. (S/J grading only)
Biological Chemistry
See Medicine, School of

Biological Sciences
(Intercollege Division)
Robert D. Green, Ph.D., Dean of Biological Sciences
Merna R. Villarazo, Ph.D., Associate Dean
Division Office, 376 Mtak Hall (916-752-0410)

Faculty
Faculty includes all members of the departments of Animal Physiology, Biochemistry and Biophysics, Botany, Genetics, Microbiology and Zoology; and academic advisors for divisional majors and instructors of upper division courses in curricula of divisional majors.

Programs of Study
The Division of Biological Sciences is an intercollege unit with responsibilities for the teaching and research of the departments of Animal Physiology, Biochemistry and Biophysics, Botany, Genetics, Microbiology, and Zoology. Four majors leading to an A.B. degree are offered in Biological Sciences, Botany, Microbiology, and Zoology. Seven majors are offered within the Division leading to a B.S. degree in disciplines of the six above-named departments, and in Biological Sciences. The majors are described under the respective departmental listings, except for the majors in Biological Sciences (outlined below).

The Major Programs
Biological sciences is the study of life from the molecular level up to the level of populations. New discoveries continually add to and change this dynamic field.

The Program. The biological sciences major programs (Bachelor of Arts and Bachelor of Science) are good choices for students who want to obtain a broad knowledge of biology. The core program for both degrees includes mathematics, both general and organic chemistry, and courses in biology which stress the unity of life as well as its diversity. The Bachelor of Science program focuses on the natural sciences and is intended for students who are interested in laboratory or research careers. The Bachelor of Arts program requires fewer units in the natural sciences allowing students to take more courses in the humanities and social sciences. It is a good choice for students who wish to pursue a "people-oriented" career.

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 Agriculture 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.

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 also an excellent background for students wishing to enter a graduate program in biology, a teacher-training program, a health professional school, or other professional schools.

A.B. Major Requirements:

Preparatory Subject Matter .................................. 37-43

B.S. Major Requirements:

Biological Sciences 1A-1B-1C ................................ 15
Chemistry 1A-1B .............................................. 10
Chemistry BA-BB or 118A-118BB-118BC ............... 8-12
Mathematics 6 ............................................... 6
Recommended: Chemistry 1C; Physics 5A-5B, 5C; a course in computer programming.

Note: A course in computer programming may be acceptable toward satisfaction of the mathematics/statistics requirement with prior approval from the Dean.

Depth Subject Matter ........................................ 36
Genetics 120 ................................................... 4
Restricted Electives .......................................... 32

Upper division biological sciences courses include:
1. a minimum of 2 units or 6 (quarter) hours of laboratory classes,
2. at least 3 units from each of the three Area Requirements: animal biology, microbiology, and plant biology (see "Course List for Area Requirement" section below following the total units. The lists apply to both the A.B. and B.S. majors.), and
3. at least one course from each of the five Group Requirement lists, (a) through (e) following.

Note: A course that appears on both the Area and Group Requirement lists may be used toward satisfying both requirements. Both halves of sequential courses connected by a hyphen must be taken.

Course List for Group Requirement
(a) Organismal biology: Botany 102, 105, 108, 114, 118, 119; Entomology 101, 102, 103; Microbiology 105, 106; Veterinary Microbiology 127, 128; Wildlife and Fisheries Biology 111, 120; Zoology 100, 105, 106, 112, 133, 134, 139, 137.

(b) Population biology and ecology: Anthropology 154A; Botany 117, 114; Entomology 104; Environmental Studies 100, 121; Genetics 105; Geology 150C; Microbiology 120; Wildlife and Fisheries Biology 110, 151; Zoology 125.

(c) Evolutionary biology: Anthropology 151, 152; Botany 100, 116, 140; Genetics 103; Geology 107; Plant Science 103; Zoology 148.

(d) Physiology: Biological Sciences 121, 111; Microbiology 130A, 130B; Plant Pathology 110, 117; Plant Pathology 130; Zoology 142, 143.

(e) Biochemistry and cell biology: Biochemistry 122, 123, 133, 143, 153; Botany 125; Botany/Zoology 130; Genetics 102A; Medical Microbiology 107; Physiology 100A-100B, 100A-100B; Virology Microbiology 126; Zoology 121A, 121B, 121C.

Note: Biological Sciences 121 may be used to satisfy either Group D or Group E.

Total Units for the Major .................................. 106-112

Breadth Subject Matter
Written/Oral Expression See appropriate College section for requirement

Breadth/General Education Satisfaction of General Education requirement
See also the appropriate College section for additional requirements

Course List for Area Requirement
(a) Animal biology: Anatomy 100; Anthropology 151, 152, 153, 154A, 155, 156; Avian Sciences 100; Biological Sciences 120; Entomology 101, 102, 103, 108, 109, 118, 119, 120, 121, 133, 134, 139; Environmental Studies 129; Geology 111A; Cell Biology and Human Anatomy 101; Nematology 110; Wildlife and Fisheries Biology 110, 111, 120, 140, 151; Zoology 100, 105, 106, 112, 125, 133, 134, 136, 137, 139, 147, 148, 149, 155.

(b) Microbiology: Botany 114, 118, 119; Entomology 156; Geology 111B; Medical Microbiology 107; Microbiology—all upper division courses (excluding 190-199 courses); Plant Pathology 120, 130; Veterinary Microbiology 126, 127, 128, 132.

(c) Plant Biology: Botany 100, 101, 102, 105, 108, 111, 112, 114, 116, 117, 118, 119, 121, 122, 140, 144; Environmental Horticulture 105, 107; Plant Science 101, 103; Range Science 100; Vegetable Crops 105.

Note: Botany 114, 118, or 119 may be used for either microbiology or plant biology (not both).

Other Upper Division Courses
A list of courses which will be accepted in satisfaction of the upper division major requirement, without petitioning, is available in the Division of Biological Sciences Office.

There is a limitation of variable-unit courses which may be counted toward the major. Of these courses, up to 6 units or 199 courses may be counted, and no units of 197 courses may be counted.

Major Advisers. Contact Division Office for adviser assignments.

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 enrollment. In course 134H, The Division of Biological Sciences also confers Citations of Outstanding Performance on undergraduates majoring in Biological Sciences who have demonstrated superior academic performance and individual achievement in research. Students who wish to be considered for a Citation must first meet or exceed a specified grade-point average and participate in an appropriate research project.

The Division additionally recommends students in the Biological Sciences who graduate 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 Division Office.

Minor Program Requirements:

The minor in Biological Sciences is designed to acquaint students with the range and variety of modern biology, including courses in two of three areas: animal biology, plant biology, and/or microbiology, and in four of the following five subdisciplines: organismal biology, ecology, evolution, physiology, and biotechnology. Students may select a list of required courses and electives, which are acceptable for the major program in Biological Sciences but which do not require extensive upper division preparation. The basic course work and additional courses of more advanced biology can be made, as appropriate, with the approval of an advisor for the minor.

Information on certification of completion of the minor program can be obtained from the Division Office.

UNITS

Biological Sciences..........................22
Genetics 100...............................4
Additional upper division units (see Area and Group Requirements below)............18

Area Requirements:

One course in two of three areas: Animal Biology, Microbiology, and/or Plant Biology. An extensive list of courses which will satisfy area requirements can be found under the Biological Sciences major program description above. (Courses can be used to simultaneously satisfy both the area and group requirements.)

Group Requirements:

At least one course or course sequence must be selected from four of the following five groups:

(a) Organismal Biology: Botany 102, 105, 114; Microbiology 105; Zoology 100, 106, 112, 137
(b) Ecology: Anthropology 154A; Botany 101; Environmental Studies 100; Wildlife and Fisheries Biology 151; Zoology 125
(c) Evolution: Anthropology 151; Botany 116, 140; Genetics 103; Geology 107; Zoology 148, 149
(d) Physiology: Botany 111, 112; Physiology 110
(e) Biochemistry and cell biology: Biochemistry 101A-101B; Botany/Zoology 130; Physiology 101A-100B; Zoology 121A, 121B

Minor Adviser. Same as for major.

Teaching Credential Subject Representative. Associate Dean (Biological Sciences). See also the Teacher Education Program.

Bodega Marine Laboratory Program

A full quarter of undergraduate course work in marine biology is available each Spring Quarter at the Bodega Marine Laboratory (BML), located in Bodega Bay. The offerings include lecture and laboratory instruction in the developmental biology and physiological adaptation of marine organisms, a weekly colloquium and an intensive individual research experience under the direction of Laboratory faculty. (Biological Sciences courses 120, 120P, 121, 121P, 123.) The program is residential, with students housed on the Laboratory grounds. Participation on an optional basis and board fee in addition to standard campus registration fees. Application required. Forms can be obtained from the Division of Biological Sciences. Applications due on or before pre-registration deadline. Additional information on 10, the Bodega Marine Laboratory Program is available from the Division Office or BML, directly (707) 875-2211, P.O. Box 247, Bodega Bay, CA 94923.

Courses in Biological Sciences

Lower Division Courses

1A. Introductory Biology (5) I, II, III. The Staff (Microbiology)

Lecture–4 hours; discussion—1 hour. Prerequisite: Chemistry 1B (may be taken concurrently). Introduction to biological molecules, bioenergetics, cell structure and function, elements of molecular biology, and virology. Interdisciplinary course designed for majors in the biological sciences. This course satisfies course 1.

1B. Introductory Biology (5) I, II, III. The Staff (Zoology)

Lecture–3 hours; discussion—1 hour. Prerequisite: course 1A. Continuation of course 1A. Topics include animal anatomy and classification, genetics, systematics, evolution, survey of the animal kingdom, comparative anatomy, physiology, and adaptation in animals. This course replaces Zoology 2 and 3.

1C. Introductory Biology (5) I. Kyhos (Botany), II. Wlashestoner/Bonner, III. Beers (Zoology); IV. O'Neill/Stanford, Turner (Botany)

Lecture–4 hours; laboratory—3 hours. Prerequisite: course 1B. Continuation of course 1B. Topics covered include animal ecology, evolution, population ecology, ecosystem analysis and human evolution. This course replaces Botany 2.

10. General Biology (4) Leslie (Zoology); II. Marr (Microbiology); III. Flik (Botany)

Lecture–3 hours; discussion—1 hour. Consideration of the main features and principles of biology, with emphasis on biological processes and special reference to evolution, heredity, and the theory of biology on human life. Designed for students not specializing in biology. Not open for credit to those who have had course 1A. General Education Credit: Nature and Environment/Introductory.

11A-11B. Issues in the Life Sciences (2-3) I, II. Villarazo

Lecture—1 hour; discussion—1 hour. Prerequisite: enrollment limited to BUSP students; consent of instructor required. Designed to broaden the students' understanding of biology by demonstrating the range of subjects and approaches included in the field of biology. Both basic biological research topics and applied biology will be studied.

19. Biology of Cancer (3) III. Pfeiffer (Biological Sciences, Microbiology)

Lecture—3 hours. Prerequisite: course 1A or 10, or Genetics 103. Interdisciplinary course offers an introduction to the biological, clinical and psychosocial aspects of cancer, and emphasizes basic understanding of biological principles and facts about the disease process. Designed for students with little scientific background. Offered in alternate years.

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.)

Upper Division Courses

120. Developmental Biology of Marine Invertebrates (4) I, III. Clark, Chang and Jaffey (Biological Sciences)

Lecture—30 hours total; laboratory—30 hours total.

Prerequisite: Zoology 100-101L, Biochemistry 101A-101B or Physiological Sciences 101A-101B; course 123 concurrently. Phylogenetic patterns of reproduction and development among the marine invertebrates. Students majoring in physical science and approaches to understanding gametogenesis, gamete interaction and fertilization, cleavage, cell differentiation, morphogenesis, and larval development and metamorphosis. Offered at Bodega Marine Laboratory. (See above description for Bodega Marine Laboratory Program.)

120P. Developmental Biology of Marine Invertebrates/Advanced Laboratory Topics (3) III. Clark, Chang and Jaffey (Biological Sciences)

Laboratory—120 hours total. Prerequisite: course 120 concurrently. Students pick a research topic for an Honors research study. Research will be related to a topic covered in course 120. Conducted at the Bodega Marine Laboratory with close supervision of resident faculty. (See above description for Bodega Marine Laboratory Program.)

121. Physiological Adaptation of Marine Organisms (4) III. Clegg and Crowe (Zoology)

Laboratory—30 hours total; laboratory—30 hours total. Prerequisite: Biochemistry 101A-101B or Physiological Sciences 101A-101B; Physics 5A-5B-5C; course 123 concurrently. Physiological adaptation to the environment among organisms in marine and estuarine habitats. Course offered at Bodega Marine Laboratory. (See above description for Bodega Marine Laboratory Program.)

121P. Physiological Adaptation of Marine Organisms/Advanced Laboratory Topics (4) III. Clegg and Crowe (Zoology)

Laboratory—120 hours total. Prerequisite: course 121 concurrently. Students pick a research topic for an Honors research study. Research will be related to a topic covered in course 121 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) I, II. Clark (Biological Sciences)

Seminar—1 hour. Prerequisite: 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 speakers. Course will be held at the Bodega Marine Laboratory. (P/NP grading only.) See above description for Bodega Marine Laboratory Program.

194H, Research Honors (2) I, II, III.

Independent study—6 hours. Prerequisite: senior standing. Students majoring in Biological Sciences who have completed two quarters (3-5 units per quarter) of 199 and who qualify for the honors program, as defined by the current catalog. Opportunity for Biological Sciences majors to pursue intensive research culminating in the writing of a senior thesis with the guidance of faculty 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.)

Graduate Courses

298. Group Study (1-5) I, II, III. The Staff (Associate Dean In charge)

Prerequisite: consent of Instructor. Division of Biological Sciences staff members may offer group study courses under this number.

Professional Course

310. Effective Teaching of College Biology (2) III.

Thorton (Botany)

Informal lecture-discussion—2 hours. Teaching function of an academic career; objectives, nature, and
Biomedical Engineering (A Graduate Group)

David F. Katz, Ph.D., Chairperson of the Group (916-752-2195)

Faculty includes faculty members from the three colleges, and the Schools of Medicine and Veterinary Medicine.

Graduate Study. The Graduate Group in Biomedical Engineering offers programs of study and research leading to the M.S. and Ph.D. degrees. The programs of study are intended to prepare students for professional work in the effective integration of engineering and medical sciences, including modeling of biological systems and the design of devices and procedures useful for human and veterinary medicine. It is a broad interdepartmental program which is best suited for students who are capable and comfortable with considerable independence. Each student together with an advisor defines a specific course of study suited to individual goals.

Preparation. The Group requires strong competence in mathematics and engineering as necessary for successful completion of study. Prior course work in these areas is emphasized in the evaluation of applications. Some such training can in principle be acquired after admission to the Group, but generally it necessitates one or more additional years of study.

Faculty. Advisers. Itz-Roy E. Curry, Ph.D., Professor (Human Physiology); Mont Hubbard, Ph.D., Professor (Mechanical Engineering); Maury L. Hull, Ph.D., Associate, Professor (Biological Engineering); David Katz, Ph.D., Professor (Biological and Biomedical Sciences); ElizabethA. C. Widy, Ph.D., Professor (Computer Science Engineering); Bruce Mark, Ph.D., Professor (Orthopaedic Surgery); James F. Shackelford, Ph.D., Professor (Materials Science and Engineering); Keith Williams, Ph.D., Assistant Professor (Biological Education).

Graduate Courses

200. Introduction to Biomedical Engineering (4) I. Katz

Lecture-4 hours. Introduction to application of and interaction between engineering technology and the biological and medical sciences, and demonstration of some clinical applications.

210. Introduction to Biomedical Engineering (4) II. Shackelford

Lecture-4 hours. Prerequisite: Engineering 45 or consent of instructor. Mechanical and atomic properties of metallic, ceramic, and polymeric implant materials; corrosion, degradation, and failure of implant materials; inflammation, wound healing, and tissue response; blood coagulation; properties of bone, joint, and blood vessels; biocompatibility of orthopedic and cardiovascular materials.

223. Multidisciplinary Dynamics (4) II. Hubbard and Eke

Lecture-3 hours; discussion-1 hour. Prerequisite: Mechanical Engineering 222. Dynamics of coupled rigid bodies; multibody kinematics; Euler and Tait-Bryan angles; Euler and Rodrigues parameters; constrained systems; nonholonomic systems; inertia dynamics; generalized active and passive forces; Kane's, Newton-Euler, and Lagrange formulations for multibody systems; computer-aided equation derivation.

227. Research Techniques in Biomechanics (3) I. Williams

Lecture-2 hours; laboratory-3 hours. Prerequisite: consent of instructor; physical Education 115 recommended. Experimental techniques for biomechanical analysis of human movements are examined. Techniques include data acquisition and analysis by computer, force platform analysis, measurement, planar and three-dimensional cinematography, data reduction and smoothing, body segment parameter determination; electromyography; biomechanical modeling. (Same as Physical Education 227.)

231. Musculoskeletal System Biomechanics (3) III. Hull

Lecture-3 hours. Prerequisite: Engineering 102, Mechanical Engineering 176. Mechanics of skeletal muscle and mechanical models of muscle, solution of the inverse dynamics problem, theoretical and experimental results of kinematic and kinetic analysis, computation of segmental load and muscle forces, applications to gait analysis and sports biomechanics. Offered in alternate years.

232. Orthopaedic Biomechanics (3) III. Martin

Lecture-3 hours. Prerequisite: graduate standing. Introduction to the biomechanics of the skeleton. Analysis of musculoskeletal forces, observations of the mechanical properties of bone, bone growth, modeling, remodeling, and repair; bone structure composition, quantitation, histomorphometry, and techniques of surgical repair.

252. Advanced Information Systems (3) I. Wetzel

Lecture-2 hours; laboratory-2 hours. Prerequisite: experience in initial phases of data preparation, editing, and sorting; Computer Science Engineering 168 or equivalent. Students 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.

290. Seminar (1) I, III, Katz

Seminar-1 hour. Seminar in biomedical engineering. (SUG grading only.)

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

(SUG grading only.)

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

(SUG grading only.)

Biophysics (A Graduate Group)

Richard Nuccitelli, Ph.D., Chairperson of the Group Group Office, 2320 Storer Hall (916-752-4768)

Faculty includes faculty members from the Department of Biochemistry and Biophysics, Chemistry, Physics, Zoology, and others, and the School of Medicine.

Graduate Study. The Graduate Group in Biophysics offers programs of study leading to the M.S. and Ph.D. degrees. Biophysics is a broad interdepartmental program that is ideal for students who are comfortable with considerable independence. The emphasis is on molecular biophysics. The curriculum consists of certain core courses in biology, chemistry, and physics, followed by specialty courses related to research interests. Specific program requirements are decided upon by a committee consisting of a research advisor, the graduate advisor, and a group member. The Committee meets to consider individual educational needs with the student.

Graduate Advisor. A.H. Maki (Chemistry)

Graduate Courses

200. Current Techniques in Biophysics (2) I. A.H. Maki

Lecture-2 hours. Prerequisite: graduate standing; Biophysics 101A, Zoology 101A. Lectures on the current techniques in biophysics research including diffraction, magnetic resonance spectroscopy, calorimetry, optical spectroscopy, and electrophysiology. (SUG grading only.)

200A. Biophysical Laboratory (3) I, II, III. The Staff (Chairperson in charge)

Laboratory-16 hours (5 weeks). Prerequisite: course 200 may be taken concurrently. Laboratory assignment is in the research laboratory of a Biophysical Graduate Group. Individual research projects with emphasis on methodological experimental experience and experimental design.

200B. Biophysical Laboratory (5) I, II, III. The Staff (Chairperson in charge)

Laboratory-two 16-hour rotations (5 weeks each). Prerequisite: course 200 may be taken concurrently. Two five-week laboratory assignments in the research laboratories of Biophysical Graduate Group faculty members, individual research problems with emphasis on methodological experimental 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 for consent of instructor; course 299 concurrently. Presentation and discussion of faculty and graduate-student research in biophysics. May be repeated for credit. (SUG grading only.)

298. Group Study (1-5) I, II, III. The Staff (Chairperson in charge) (SUG grading only.)

299. Research (1-12) I, II, III. The Staff (Chairperson in charge) (SUG grading only.)

Botany (College of Letters and Science)

Robert W. Pearcy, Ph.D., Chairperson of the Department

Department Office, 143 Robbins Hall (916-752-0617)

Faculty

Fredrick T. Addicott, Ph.D., Professor Emeritus

Lars Anderson, Ph.D., Lecturer

Floyd A. Ashton, Ph.D., Professor Emeritus

Daniel J. Axelson, Ph.D., Professor Emeritus

Michael G. Barbour, Ph.D., Professor Emeritus

David E. Bayer, Ph.D., Professor Emeritus

Bruce A. Bonner, Ph.D., Associate Professor Emeritus

Paul A. Canestra, Ph.D., Professor Emeritus

Herbert B. Currier, Ph.D., Professor Emeritus

James A. Doyle, Ph.D., Professor (Botany, Ecology)

Emanuel Epstein, Ph.D., Professor Emeritus

(Botany, Land, Air and Water Resources)

Richard H. Fell, Ph.D., Professor Emeritus

Emmett F. Gillard, Jr., Ph.D., Professor Emeritus

John J. Harada, Ph.D., Associate Professor Emeritus

Hendrik J. Kettler, Ph.D., Professor Emeritus

Donald W. Khyos, Ph.D., Professor Emeritus

Norman J. Lang, Ph.D., Professor Emeritus

William J. Lucas, Ph.D., Professor Emeritus

Jack Major, Ph.D., Professor Emeritus

Terence M. Murphy, Ph.D., Professor Emeritus

Robert F. Norris, Ph.D., Associate Professor Emeritus

Sharmar O'Neil, Ph.D., Assistant Professor Emeritus

Robert W. Pearcy, Ph.D., Professor Emeritus

Marcel Rejmanek, Ph.D., Associate Professor Emeritus

Thomas L. Root, Ph.D., Professor Emeritus

Maureen L. Stanton, Ph.D., Associate Professor Emeritus

Alan J. Starnler, Ph.D., Professor Emeritus

C. Ralph Stocking, Ph.D., Professor Emeritus

Steven M. Tely, Ph.D., Assistant Professor Emeritus

Robert M. Thornton, Ph.D., Senior Lecturer

John M. Tucker, Ph.D., Professor Emeritus

Larry Vanderhoef, Ph.D., Professor Emeritus

Grady L. Webert, Ph.D., Professor Emeritus

T. Elliott Weir, Ph.D., Professor Emeritus

Kenneth Wells, Ph.D., Professor Emeritus

*Course not offered this academic year.
**Botany**

**The Major Programs**

Botany is the study of plants. This study includes many specialized areas: anatomy, cell and molecular biology, biosystematics, and plant evolution, physiology, ecology, phylogeny, mycology, and weed science.

The Program. The Bachelor of Science degree in botany provides two options. Option I is for students who plan to emphasize a body of knowledge and who wish to obtain a general secondary teaching credential or training for a position requiring detailed knowledge of plants. Option II is for students who plan to pursue an advanced study in the physiology and biochemistry of plants. Students who wish to enter graduate programs in botany but not pursue the degree should elect the Bachelor of Arts major program.

Choice of College. The Bachelor of Arts degree is offered only in the College of Letters and Science. The Bachelor of Science degree is offered in 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.

Students majoring in Botany in the College of Letters and Science may petition the Dean of the College to receive credit toward the major for courses in the subject at UC Davis and that are judged by the Chemistry department to cover substantially the same material as upper division courses in the subject at UC Davis. Students in the College of Agricultural and Environmental Sciences must accumulate 54 units of upper division courses to graduate. Further information can be obtained from the Division of Biological Sciences Office, 370 Morr Hall.

**Career Alternatives.** Botanists may teach, conduct research, or hold administrative positions. They are employed by educational institutions, federal and state agencies such as the U.S. Department of Agriculture, the Forest Service, Environmental Protection Agency and private industry. Some botanists will have careers in the pharmaceutical, petroleum or chemical industries, seed companies, botanical gardens, plant nurseries, and food companies. The developing field of plant biotechnology will offer challenging careers to botanically trained graduates, and many elect to continue study toward advanced degrees.

### A.B. Major Requirements

<table>
<thead>
<tr>
<th>Preparatory Subject Matter</th>
<th>38-41</th>
</tr>
</thead>
<tbody>
<tr>
<td>Biological Sciences 1A, 1B, 1C</td>
<td>16</td>
</tr>
<tr>
<td>Chemistry 1A, 1B, 1C</td>
<td>18</td>
</tr>
<tr>
<td>Statistics 13 or 102</td>
<td>4</td>
</tr>
<tr>
<td>Zoology 2-L</td>
<td>12</td>
</tr>
<tr>
<td>Botany 102, 10L, 111, 11L, 112, 114, 116</td>
<td>8</td>
</tr>
<tr>
<td>Total Units for the Major</td>
<td>80-83</td>
</tr>
</tbody>
</table>

**Recommended**

For students with interests in specialized areas of botany (e.g., agricultural botany, ecology, systematics and evolution, morphology, plant physiology, etc.), certain substitutions, including courses in other departments, may be allowed on prior consultation with the botany major advisor.

### B.S. Major Requirements:

**Option I:** For those who plan an advanced study in some areas of botany or a related discipline, (b) to obtain a general secondary teaching credential, or (c) training for a position requiring a detailed knowledge of plants.

<table>
<thead>
<tr>
<th>Preparatory Subject Matter</th>
<th>56-63</th>
</tr>
</thead>
<tbody>
<tr>
<td>Biological Sciences 1A, 1B, 1C</td>
<td>16</td>
</tr>
<tr>
<td>Chemistry 1A, 1B, 1C</td>
<td>16</td>
</tr>
<tr>
<td>Physics 8A, 8B</td>
<td>12</td>
</tr>
<tr>
<td>Statistics 13 or 102</td>
<td>4</td>
</tr>
<tr>
<td>Biochemistry 47</td>
<td>8</td>
</tr>
<tr>
<td>Genetics 40</td>
<td>4</td>
</tr>
<tr>
<td>Total Units for the Major</td>
<td>105-110</td>
</tr>
</tbody>
</table>

**Recommended**

Botany 195 (3-5 units); German, French, or Russian. For students with interests in specialized areas of botany (e.g., agricultural botany, ecology, systematics and evolution, morphology, plant physiology, etc.), certain substitutions, including courses in other departments, may be allowed on prior consultation with the botany major advisor.

**Option II:** For those who plan advanced study in physiology and/or biochemistry of plants.

<table>
<thead>
<tr>
<th>Preparatory Subject Matter</th>
<th>56-68</th>
</tr>
</thead>
<tbody>
<tr>
<td>Biological Sciences 1A, 1B, 1C</td>
<td>16</td>
</tr>
<tr>
<td>Botany 2</td>
<td>8</td>
</tr>
<tr>
<td>Chemistry 1A-1B-C</td>
<td>4</td>
</tr>
<tr>
<td>Zoology 2-L</td>
<td>8</td>
</tr>
<tr>
<td>Botany 102, 10L, 111, 11L, 112, 114, 116</td>
<td>8</td>
</tr>
<tr>
<td>Genetics 40</td>
<td>4</td>
</tr>
<tr>
<td>Total Units for the Major</td>
<td>107-122</td>
</tr>
</tbody>
</table>

**Recommended**

Botany 199 (3-6 units); German, French, or Russian; Engineering 10 or Computer Science Engineering 30. Certain substitutions, including courses in other departments, may be allowed on prior consultation with the botany major advisor.

**Breadth Subject Matter**

- Chemistry 1A, 1B, 1C | 16 |
- Ecological sciences 24 |
- English and/or rhetoric | 8 |
- Social sciences and/or humanities | 16 |

**Minor Requirements**

- Botany | 23 |

To satisfy the requirements for a Botany minor, a student must complete Biological Sciences 1C (or equivalent introductory botany course). Upper division units including at least one course from each of the four groups must be obtained. Additional units may be selected from within the major.

### Courses in Botany

**Lower Division Courses**

10. Plants, People and the Biosphere (3) II, Falk
   Lecture—3 hours; one weekend field trip (half-day); term paper. 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/Introduction.

92. Internship (1-12) I, II, III. The Staff (Chairperson in charge)
   Internship—3-36 hours. Prerequisite: consent of instructor. Technical and/or professional experience on or off campus. Supervised by a member of the Botany Department faculty. (P/NP grading only).

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

99. Special Study for Undergraduates (1-5) II, III. The Staff (Chairperson in charge)
   Prerequisite: consent of instructor. (P/NP grading only).

**Upper Division Courses**

100. Evolutionary Biology of Plants (4) II. Stanmore, Kyhos
   Lecture—3 hours; discussion—1 hour. Prerequisite: Biological Sciences 1A, 1B, 1C. Introduction to evolutionary principles and processes, emphasizing plants. Topics include: mutation, selection, gene flow, chromosome evolution, speciation, adaptive radiation, reconstruction of evolutionary relationships, evolutionary rates and trends, and origin of new groups.

101. Survey of Plant Communities of California (4) II, III. Barbour

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*Course not offered this academic year.*
107. Plant Ecology (4) II. Percy, Barbour
Lecture—3 hours; discussion—1 hour. Prerequisite: Biological Sciences 1A, 1B, 1C; emphasis on use of vegetation to study plant distribution. (Fall.)

117. Plant Ecology (4) II. Percy, Barbour
Lecture—3 hours; three to five field trips (Friday or weekend). Prerequisite: Biological Sciences 1A, 1B, 1C; course 117 and course 102 or 108 strongly recommended. The study of ecological communities and their association with environments. Special emphasis on California. Students taking course 117 cannot receive credit for course 101.

118. Phycology (5) II. Lang
Lecture—3 hours; laboratory—6 hours; one weekend field trip. Prerequisite: Biological Sciences 1A, 1B, 1C; emphasis on morphology, physiology and development of major divisions (including cyanobacteria) with emphasis on phylogenetic relationships. Laboratory exercises stress identification and culturing of selected algae with consideration of the environmental and historical factors that determine their distribution. Offered in alternate years.

150. Biology and Management of Freshwater Macrophytes (3) Anderson
Lecture—3 hours; two field trips. Prerequisite: Biological Sciences 1A, 1B, 1C, Chemistry 88; course 111 or Water Science 122 recommended. Brief survey of common freshwater macrophytes, their reproduction, morphology, physiology, growth (photosynthesis, nutrient utilization), development (hydogenesis), and management. Offered in alternate years.

155. Chemical and Cytological Methods (4) II.
The Staff
Lecture—1 hour; discussion—1 hour; laboratory—6 hours. Prerequisite: Biological Sciences 1A, 1B, 1C. Practical laboratory methods in preparing biological materials for examination with the light microscope; special emphasis given to localization of cell constituents; introduction to photography and autoradiography.

1900. 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 papers.

1904. Special Study for Honors Students (1-5) I, II, III.
The Staff (Chairperson in charge)
Prerequisite: open only to seniors of major standing on honors list. Independent study of selected topics under the direction of a member of the staff. Completion will involve the writing of a senior thesis.

1907. Directed Group Study (1-5) I, II, III.
The Staff (Chairperson in charge)
Prerequisite: consent of instructor. (P/N grading only.)

1909. 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

202. Plant Ecophysiology (3) II. Percy
Lecture—3 hours. Prerequisite: courses 111, 112, 117, and consent of instructor. Study of the mechanism of physiological adaptation of plants to their environment. Offered in alternate years.

233. Ecophysiological Methods (3) II.
Percy
Lecture—1 hour; laboratory—4 hours; individual projects. Laboratory and lecture course covering basic concepts underlying the research methods and instrumentation useful in plant ecophysiology.
205A. Advanced Plant Physiology (3) II. Lucas
Lecture—3 hours. Prerequisite: course 112; Chemistry 107A or consent of instructor. Cellular physiology, plant water relations, translocation and membrane transport.

206B. Advanced Plant Physiology (3) II. Thep
Seminar
Lecture—3 hours. Prerequisite: course 112; Biochemistry 101B. Photosynthesis, respiration, and general plant metabolism.

206C. Advanced Plant Physiology Laboratory (3) II. Lucas
Laboratory—6 hours; term paper. Prerequisite: course 205A (may be taken concurrently). Laboratory procedures in plant physiology. Experiments demonstrate the theory and practice of modern instruments and techniques designed to illustrate subject matter of course 205A.

206B. Advanced Plant Physiology Laboratory (3) II. Castelfranco
Laboratory—9 hours. Prerequisite: course 205B (may be taken concurrently). Biochemistry 101B. Laboratory procedures in plant physiology. Experiments selected to follow subject-matter sequence of course 205B.

206C. Advanced Plant Physiology Laboratory (3) I. Thep
Laboratory—9 hours. Prerequisite: course 205C (may be taken concurrently). Laboratory procedures in plant physiology. Experiments selected to follow subject-matter sequence of course 205C.

212. Physiology of Herbicidal Action (3) II. Bayer
Lecture—3 hours. Prerequisite: course 211, 122. Study of the fundamental processes involved in the physiological action of herbicides. Detailed consideration of the in-plant processes. Physiology of herbicide action.

215. Light and Plant Growth (3) II. Bonner
Lecture—3 hours. Prerequisite: courses 205A, 205B, 205C; Physics 56. Mechanisms and phenomena involved in the control of plant growth by light. Photoperiodism, photoadaptation, photomorphogenesis, and certain aspects of photosynthesis. Course offered in alternate years.

221. Special Topics in Plant Physiology (2) II. Thep
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 once for credit. (SU grading only. Offered in alternate years.

227. Plant Molecular Biology (4) I. Harada
Lecture—4 hours. Prerequisite: Genetics 102A or Biochemistry 102B. Molecular aspects of higher plant biology with emphasis on gene expression. Plant nuclear and organelle genome organization, gene structure, mechanisms of gene regulation, and special topics related to development and response to biological and environmental stimuli.

228. Plant Molecular Biology Laboratory (4) I. Harada, Seminars
Laboratory—1 hour; laboratory—10 hours. Prerequisite: Biochemistry 101L or course in molecular genetics and consent of instructor; course 227 recommended. Research methods in plant molecular biology. Topics include analysis of gene expression, characterization of gene structure, and gene transfer technology. Emphasis will be placed on analysis of developmentally regulated gene expression. (Same course as Vegetable Crops 228.)

231. Biological Electron Microscopy (1) I. Falk
Lecture—1 hour. Prerequisite: consent of instructor. Introduction to biological microscopy. Areas covered are: electron optics, electron specimen interactions, and vacuum systems.

231L. Biological Electron Microscopy Laboratory (1) I. Falk
Laboratory—8 hours. Prerequisite: consent of instructor; course 231 may be taken concurrently. Introduction to biological electron microscopy. Areas covered are: specimen preparation and microscope operation. Limited enrollment.

240. Paleobotany and Angiosperm Evolution (4) I. Doyle
Lecture—3 hours; laboratory—3 hours. Prerequisite: course 108, 116, or 140. Critical analysis of the plant fossil record as a source of evidence on origin, evolution, and phylogeny of the angiosperms, Cretaceous and Tertiary climates, geographic history of modern taxa, and origin of modern vegetation types. Offered in alternate years.

243. Palynology (4) I. Doyle
Lecture—2 hours; laboratory—6 hours. Prerequisite: course 108, 116, or 140. Morphology of spores and pollen grains and their use in stratigraphy, plant systematics, and paleoecology. Techniques for study of modern spores and pollen and identification of fossil palynomorphs from sediments of Paleozoic to Quaternary age. Offered in alternate years.

255. Principles of Plant Taxonomy (4) I.
Lecture—2 hours; laboratory—6 hours. Prerequisite: course 108; Genetics 103 recommended. Principles of plant classification; phylogenetic vs. phenetic classification; examples of the way in which various disciplines—systematics, evolutionary biology, etc.—affect problems of taxonomic relationship, and the logic of higher categories.

256A. Experimental Plant Taxonomy I (2) I. Kyhos
Lecture—1 hour; laboratory—3 hours. Prerequisite: course 102; course 117 and Genetics 103 recommended. Application of experimental techniques to the elucidation of taxonomic problems and evolutionary relationships in higher plants. Offered in alternate years.

256B. Experimental Plant Taxonomy II (3) I. Kyhos
Lecture—1 hour; laboratory—3 hours. Prerequisite: course 256A. Further work in plant systematics with emphasis on higher taxa. Applications of experimental techniques, phylogenetic relationships, and higher taxa. Offered in alternate years.

290. Seminar (1) I. Norris; II. Thep; III. Kyhos
Seminar—1 hour. (SU grading only.)

290C. Research Conference in Botany (1) I, II, III. Thep
Seminar—1 hour. Review of current literature and research methods in botanical disciplines. Topics will be announced quarterly. (SU grading only.)

292. Seminars in Botany (1) I, II, III. Thep
Seminar—1 hour. Review and discussion of current literature. May be repeated once for credit. (SU grading only.)

295. Seminar in Mycology (1) I. Butler (Plant Pathology)
Seminar—1 hour. Review and evaluation of current literature and research in mycology. (SU grading only.) (Same course as Plant Pathology 295.)

Prerequisite: graduate standing and consent of instructor. Designed for graduate students who must teach plant pathology. Offered in alternate years. (SU grading only.)

298. Group Study (1-5) I, II, III. Thep (Chairperson in charge)
Prerequisite: consent of instructor. (SU grading only.)

Professional Course

390. The Teaching of Botany (2) I, II, III. Thep
Chairperson in charge
Discussion—2 hours. Prerequisite: graduate standing; concurrent enrollment as a teaching assistant in Botany. Consideration of the problems of teaching botany, especially preparing for and conducting discussions, guiding student laboratory work, and the formulation of questions and topics for examination. (SU grading only.)

Botany (A Graduate Group)

Students admitted into the Botany Graduate Group before June 1, 1989 will be allowed to complete their degree in this subject. New students, however, should see the Plant Biology Graduate Group section in this catalog.

Cantonese
See Asian American Studies

Cell and Developmental Biology

(A Graduate Group)

Carol A. Erickson, Ph.D., Chairperson of the Group
(816) 752-9318

Group Office, 2320 Storer Hall (918-752-7486)

Faculty. The group includes 37 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 interdisciplinary 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 coursework 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. C.A. Erickson (Zoology), S. Meisel (Cell Biology and Human Anatomy).

Courses in Cell and Developmental Biology

Graduate Courses

200. Current Techniques in Cell Biology (2) II. Nucitelli
Lecture—2 hours. Current techniques used in cell
Cell Biology and Human Anatomy
See Medicine, School of

Chemistry
(College of Letters and Science)
Kwain M. Smith, Ph.D., Chairperson of the Department

William H. Fink, Ph.D., Vice-Chairperson of the Department
Peter A. Rock, Ph.D., Vice-Chairperson of the Department

Department Office, 108 Chemistry Building
(916) 752-0500/0593; FAX (916) 752-6995

Faculty
Thomas L. Allen, Ph.D., Professor
Lawrence J. Andrews, Ph.D., Professor Emeritus
Alan L. Balch, Ph.D., Professor
Albert T. Botini, Ph.D., Professor
Robert K. Brittin, Ph.D., Professor Emeritus
R. David Britt, Ph.D., Assistant Professor
Joyce T. Del, Ph.D., Associate Adjunct Professor
Timothy C. Donnelly, Ph.D., Lecturer
W. Ronald Fawbush, Ph.D., Professor
William H. Fink, Ph.D., Professor
Edwin C. Friedrich, Ph.D., Professor
Siegfried Friedrich, Ph.D., Lecturer
H. Hallen Hope, Ph.D., Associate Professor
William M. Jackson, Ph.D., Professor
Susan M. Kauzelich, Ph.D., Assistant Professor
Raymond M. Kast, Ph.D., Professor Emeritus
Joel J. Keitel, Ph.D., Professor
Peter B. Kelly, Ph.D., Assistant Professor
Richard E. Kenner, Ph.D., Professor Emeritus
Mark J. Kuhn, Ph.D., Professor
Gerd N. LaMar, Ph.D., Professor
Donald F. Land, Ph.D., Assistant Professor
Carlito B. Lebrilla, Ph.D., Assistant Professor
August H. Mati, Ph.D., Professor
Kirill A. McEwen, Ph.D., Professor
Claude P. Moisson, Ph.D., Professor
R. Bryan Miller, Ph.D., Professor
Tadeusz F. Molinka, Ph.D., Assistant Professor
William M. Musker, Ph.D., Professor
Krishnan P. Narayanan, Ph.D., Assistant Professor
Michael H. Nantz, Ph.D., Assistant Professor
Charles F. Nash, Ph.D., Professor
Edger P. Painter, Ph.D., 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
Kevin M. Smith, Ph.D., Professor
James H. Swinhardt, Ph.D., Professor
Dino S. Tinti, Ph.D., Professor
Nancy S. Ture, Ph.D., Professor
Susan C. Tucker, Ph.D., Assistant Professor
David H. Volman, Ph.D., Professor Emeritus
Fred E. Wood, Ph.D., Lecturer
George S. Zwiller, Sc.D., Professor

The Major Programs

Chemistry studies the composition of matter, its structure, and the means by which it is converted from one form to another. The Program. Two programs in chemistry are available, one leading to the Bachelor of Arts and the other to the Bachelor of Science. Students who are interested in chemistry as a profession would normally elect the program leading to the B.S. degree, which is accredited by the American Chemical Society. The current undergraduate chemistry major has less intensive training in chemistry and is appropriate for a student with a strong interest in chemistry, but who also has another goal such as professional school preparation or secondary school teaching. Career Alternatives. Chemistry graduates with bachelor's degrees are employed extensively throughout industry in production supervision, quality control, technical marketing, and other areas of applied chemistry. Some of the firms employing these graduates are in the food and beverage processing industries, the petroleum industry, paper and textile production and processing, the chemical industry, pharmaceuticals, and the photographic industry. The bachelor programs also provide chemistry graduates with the rigorous preparation needed for the advanced degrees required for careers in research and education.

A.B. Major Requirements:

Preparatory Subject Matter:...

Chemistry 1A-1B, 2A-B, or 4A-4B-C, 1C-19...
Mathematics 21A-21B-21C or 1A-1B-1C...

Depth Subfield Matter:


Total Units for the Major: 72-79

B.S. Major Requirements:

Preparatory Subject Matter:...

Chemistry 1A-1B, 2A-B, or 4A-4B-C, 1C-19...
Mathematics 21A, 21B, 21C, 22B, 22C...

Depth Subfield Matter:


At least 9 additional upper division units in chemistry (except Chemistry 107A, 107B), including a course in laboratory work...

Total Units for the Major:...

Major Advisers.

Chemistry offers programs of study leading to the B.S. and Ph.D. degrees in chemistry. Detailed information regarding graduate study may be obtained by writing to the Graduate Adviser, Department of Chemistry. See also the Graduate Division section in this catalog.

Courses in Chemistry

Lower Division Courses

1A. General Chemistry (5). I. Donnelly, McQuarrie, Wood; II. Allen, Lerner, McQuarrie, Lecture: hours, discussion: 1 hour, laboratory: 3 hours. Prerequisite: course 1A or 4A. Continuation of course 1A. Liquids, colloidal properties of solutions, chemical equilibria, acids and bases, oxidation-reduction reactions, thermodynamics, electrochemistry.

1B. General Chemistry (5). I. Donnelly, Rock, 
II. III. Rock, 
Lecture: hours, discussion: 1 hour, laboratory: 3 hours. Prerequisite: course 1A or 4A. Continuation of course 1B. Chemical kinetics, bonding, chemistry of the main group elements, coordination chemistry, nuclear chemistry, application of principles of chemistry to qualitative analysis.

4A. General Chemistry (5). I. Tinti, 
Lecture: hours, discussion: 1 hour, laboratory: 3 hours. Prerequisite: Mathematics 21A (may be taken concurrently), high school chemistry and physics,
satisfactory score on Diagnostic Examination or course 9. A grade of C or better. Stoichiometry, the periodic table, chemical reactions and equations, physical properties and kinetic theory of gases, atomic and molecular structure and chemical bonding, focusing in on the physical sciences or engineering. Course sequence 4A-4B-4C is equivalent to sequence 1A-1B-1C-5.

48. General Chemistry (5) II. Wood
Lecture—3 hours, laboratory—6 hours. Prerequisite: course 4A. Continuation of course 4A. Chemical thermodynamics; the properties of liquids and solutions; quantitative treatment of chemical equilibria with applications to precipitation reactions; acid-base reactions, and some non-thermal reactions. Elementary electrochemistry. Laboratory will emphasize qualitative wet-chemical techniques.

4C. General Chemistry (5) III. Svinhufvud
Lecture—3 hours; laboratory—6 hours. Prerequisite: course 4B. Continuation of course 4B. Chemical kinetics, topics in systematic inorganic chemistry; the solid state, nuclear chemistry, introduction to organic chemistry and biochemistry. Laboratory will emphasize qualitative analysis and preparative techniques.

5. Quantitative Analysis (4) Lebarbier; III. Donnelly
Lecture—2 hours; laboratory—6 hours. Prerequisite: course 1C with a grade of C or higher. An introduction to the principles and methods of quantitative analysis with emphasis on the application of equilibrium theory to analytical problems. Students who have received credit for the 4A-4B-1C sequence may enroll in course 5 for 2 units of credit only; not open to students who have received credit for 4A-4B-4C. (CAN Chem 12)

8A. Organic Chemistry: Brief Course (3) I. S. Friedrich; III. I. J. Judd; III. II. J. L. Judd
Lecture—3 hours. Prerequisite: course 1B with a grade of C or higher. A survey of basic concepts in organic chemistry and reactions for students majoring in the natural sciences. Intended for students majoring in areas other than chemistry.

8B. Organic Chemistry: Brief Course (3) II. D. D. III. S. Friedrich
Lecture—2 hours; laboratory—3 hours. Prerequisite: course 8A. Continuation of course 8A. The laboratory is concerned primarily with the study of the properties and chemistry of the common classes of organic compounds.

9. Introduction to General Chemistry (2). Wood
Lecture/discussion—3 hours. Prerequisite: chemistry diagnostic exam; not open for credit to students who have passed the exam or completed course 1A or 4A. Introduction to general chemistry concepts. Students who complete course 9 will receive only 3 units for course 1A or 4A. Course 9 must be taken for a letter grade and may not be repeated.

10. Concepts of Chemistry (4). Swinhart
Lecture—4 hours. A survey of basic concepts and contemporary applications of chemistry. Designed for non-science majors and not as preparation for Chemistry 1A. Course not open to students who have had Chemistry 1A; but students with credit for course 10 may take Chemistry 1A for full credit. General Education credit: Nature and Environment/Introduction.

88. Directed Group Study (1-5) I, II, III. The Staff
Chairperson in charge
Prerequisite: consent of Instructor. Primarily for lower division students. (P/NP grading only)

99. Special Study for Undergraduates (1-5) I, II, III. The Staff
Chairperson in charge
Prerequisite: consent of Instructor. (P/NP grading only)

Upper Division Courses

107A. Physical Chemistry for the Life Sciences (3) L. Fink
Lecture—3 hours. Prerequisite: course 4C or 5 or consent of Instructor. Mathematics 18C or 21C, one year college level physics. A basic course in physical chemistry intended for majors in the life science areas. Introductory development of classical and statistical thermodynamics including equilibrium properties and solutions of nonelectrolytes. Kinetic theory of gases and liquids. Transport processes in liquids and solutions.

107B. Physical Chemistry for the Life Sciences (3) II. Schmid
Lecture—3 hours. Prerequisite: course 107A or 110C. 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, and surface chemistry and colloid systems. Considerations on bioreversible processes.

108. Physical Chemistry of Macromolecules (3) III. Means
Lecture—3 hours. Prerequisite: course 107B or 110C. Physical properties and characterization of macromolecules with emphasis upon those of biological interest. Structural thermodynamic, optical and transport properties of polymers in bulk and in solution. Physical characterization methods. Special topics on the properties of polyelectrolyte systems.

110A. Physical Chemistry: Thermodynamics (3) I. Kelly; II. Lebarbier
Lecture—3 hours. Prerequisite: course 5 or 4C; Mathematics 21C or 16C; one year of college physics. Development and application of the principles of chemical thermodynamics.

110B. Physical Chemistry: Quantum Mechanics (3) III. M. M. Maki
Lecture—3 hours. Prerequisite: course 110A. Atomic and molecular structure and spectra.

110C. Physical Chemistry: Kinetics (3) II. J. Keizer; III. Fink
Lecture—3 hours. Prerequisite: course 110B. Statistical thermodynamics, kinetic theory of gases, and chemical kinetics.

111. Physical Chemistry: Methods and Applications (4) I. Hope; III. T. J. Tink
Lecture—2 hours; laboratory—6 hours. Prerequisite: courses 110C (may be taken concurrently) and 115. Introduction to the chemical literature, methods of data analysis, techniques of physical measurements, vacuum systems, laboratory experiments from the areas of thermodynamics, spectroscopy, and kinetics.

115. Instrumental Analysis (4) II. Fawcett
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 and related methods. Can trace analy- ses of samples having practical significance.

118A. Organic Chemistry for Health and Life Sciences (4) I, II, III. The Staff
Lecture—3 hours; laboratory—3 hours. Prerequisite: course 118A. Continuation of course 118A, with emphasis on spectroscopy and the preparation and reactions of anionic hydrocarbons, aliphatic alcohols, and aldehydes.

118B. Organic Chemistry for Health and Life Sciences (4) II, III. The Staff
Lecture—3 hours; laboratory—3 hours. Prerequisite: course 118B. Continuation of course 118B, with emphasis on the preparation, reactions and identification of carboxylic acids and their derivatives, alky and acyl amines, 8-dicarbonyl compounds, and various classes of naturally occurring, biologically important compounds.

120. Physical Chemistry Laboratory: Advanced Methods (3) II. Hope
Lecture—1 hour; laboratory—6 hours. Prerequisite: courses 110C and 111. Design of experiments; experimental control and data acquisition using microcomputers. Laboratory emphasizes the use of microcomputers in advanced physical-chemical experiments.

121. Introduction to Molecular Structure and Spectra (4) III. True
Lecture—4 hours. Prerequisite: course 110B. Modern theoretical and experimental methods used to study problems of molecular structure and bonding; emphasis on spectroscopic techniques.

12A. Inorganic Chemistry: Fundamentals (3) I. Land Lecture—3 hours. Prerequisite: course 1C or 4C. Symmetry, molecular geometry and structure, molecular orbital theory of bonding (polar covalent bonds, and transition metals); solid state chemistry, energetics and spectroscopy of polyatomic compounds.

12B. Inorganic Chemistry: Main Group Elements (3) III. Svinhufvud
Lecture—3 hours. Prerequisite: course 12A. Synthesis, structure and reactivity of inorganic and heteroatomic molecules containing the main group elements.

12C. Inorganic Chemistry: d and f Block Elements (3) III. Baich
Lecture—3 hours. Prerequisite: course 12A. Synthesis, structure and reactivity of transition metal complexes, organometallic and bioinorganic chemistry, the lanthanides and actinides.

128A. Organic Chemistry (3) I. Kerth; 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. Only two units credit allowed for students who have taken course BB.

128B. Organic Chemistry (3) I. Nantz; III. Musker; III. Molnari
Lecture—3 hours. Prerequisite: course 128A or consent of instructor, course 129A strongly recommended; chemistry majors should enroll in course 128B concurrently. Continuation of course 128A with emphasis on aromatic and aliphatic substitution reactions, elimination reactions, and the chemistry of carbonyl compounds. Introduction to the application of spectroscopic methods to organic chemistry.

129C. Organic Chemistry (3) I. Miller; II. Miller; III. Schore
Lecture—3 hours. Prerequisite: course 128B, chemistry majors should enroll in course 129C concurrently. Continuation of course 128B with emphasis on andante condensations and the chemistry of amines, phenols, and sugars; selected biologically important compounds.

129A. Organic Chemistry Laboratory (2) I. Isli- dorof; II. S. Friedrich
Lecture—1 hour; laboratory—3 hours. Prerequisite: course 1C or 4C with a grade of C or higher; course 129A (may be taken concurrently). Introduction to laboratory techniques of organic chemistry. Emphasis is on methods used for purification of organic compounds. Only one unit of credit will be allowed for students who have taken course BB.

129B. Organic Chemistry Laboratory (2) I. Musker; II. Isli-do; III. II. Isli-do
Lecture—4 hours. Prerequisite: courses 128B (may be taken concurrently) and 129A. Continuation of course 129A. Emphasis is on methods used for synthesis and isolation of organic compounds.

129C. Organic Chemistry Laboratory (2) I. Bottin; II. III. Bottin
Lecture—2 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—6 hours. Prerequisite: courses 5, 129C, 129C. Application of physical and
chemical techniques to the qualitative identification of organic compounds.

140. Synthetic Methods (4) III. Musker
Lecture—1 hour; laboratory—9 hours. Prerequisite: course 128C. Introduction to the synthetic methodology of organic chemistry; emphasis on stereoselective reactions and application to multistep syntheses of organic molecules containing multifunctionality.

140. Synthetic Methods (4) III. Musker
Lecture—1 hour; laboratory—9 hours. Prerequisite: course 128C. Integrated Inorganic-organic 6-hour course in the preparation, purification and characterization of multifunctional organic, organometallic, and transition metal compounds using various advanced methods.

150. Chemistry of Natural Products (3) I. Molfek-McKee
Lecture—3 hours; Prerequisite: course 128C. Chemistry of terpenes, steroids, acetaldehydes, and alkaloids; isolation, structure determination, biosynthesis, chemical transformations, and total synthesis.

192. Internship in Chemistry (1-4) I, II, III. The Staff (Chairperson in charge)
Internship—3 to 18 hours. Prerequisite: upper division standing; student's approval by faculty sponsor prior to enrollment. Credit for internship in chemistry requires a final written report. May be repeated for credit for a total of 6 units. (P/NP grading only)

194H. Undergraduate Research (2-5) I, II, III. The Staff (Chairperson in charge)
Prerequisite: course 128B (may be taken concurrently) and honor's status. Original research and a written report of the investigation. Unit value to be determined by instructor supervising the research. (P/NP grading only)

195. Industrial Chemistry (1) I. Wood
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. Professionals in the chemical industry will give seminars discussing both research and career insights. The research seminar will be technical while the career-oriented seminar will be more general. (P/NP grading only)

197. Projects in Chemical Education (1-4) I, II, III. The Staff (Chairperson in charge)
Discussion and/or laboratory. Prerequisite: consent of instructor. Participation may include development of laboratory in the chemistry laboratory, lecture demonstrations, autotutorial modules or assistance with laboratory sessions. May be repeated for credit for a total of 12 units. (P/NP grading only)

199. Directed Group Study (1-5) I, II, III. The Staff (Chairperson in charge). Prerequisite: consent of instructor based upon adequate preparation in chemistry, mathematics and physics. (P/NP grading only)

Special Study for Advanced Undergraduates (1-16) I, II, III. The Staff (Chairperson in charge)
Prerequisite: consent of instructor based upon adequate preparation in chemistry, mathematics, and physics. (P/NP grading only)

Graduate Courses

201. Basic Chemical Uses of Symmetry and Group Theory (2) S. Satpathy
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, rotational, and electronic spectra; photoelectron spectroscopy; magnetism; electronic spin and nuclear quadrupole resonance spectroscopy; nuclear magnetic resonance spectroscopy; other spectroscopic methods.

210A. Quantum Chemistry: Introduction and Stationary-State Properties (3) II. Tittel
Lecture—3 hours. Prerequisite: course 1108 and 110C or consent of instructor. Stationary-state quantum chemistry; postulates of quantum mechanics, Schrödinger equation; quantum problem and angular momenta, hydrogen atom, perturbation theory, variational theory, atoms and molecules.

210B. Quantum Chemistry: Time-Dependent Systems (3) II. Tittel
Lecture—3 hours. Prerequisite: course 210A. Matrix mechanics and time-dependent quantum chemistry: Matrix formulation of quantum mechanics, Heisenberg description, time-dependent perturbation theory, scattering theory, variational wave functions, and miscellaneous molecular properties.

210C. Quantum Chemistry: Molecular Spectroscopy (3) II. Tittel
Lecture—3 hours. Prerequisite: course 210B. Molecular spectroscopy: Born-Oppenheimer approximation, rotational, vibrational and electronic spectroscopy, spin systems, and molecular photochemistry.

211A. Advanced Physical Chemistry: Statistical Thermodynamics (3) III. Britt
Lecture—3 hours. Prerequisite: consent of instructor. Principles and applications of statistical mechanics; ensemble theory; statistical thermodynamics of gases, solids, solutions, and polymer and colloidal systems.

211B. Statistical Mechanics (3) III. Keizer, McQuarrie
Lecture—3 hours. Prerequisite: course 211A. Statistical mechanics of nonequilibrium systems, including the rigorous integration of equations of motion, 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 describing chemical reactivity at a microscopic level. Offered in alternate years.

213. Theoretical and Computational Chemistry (3) III. Keizer, McQuarrie, Fink
Lecture—3 hours. Prerequisite: courses 211A and 210B or consent of instructor. Mathematics of wide utility in chemistry, computational methods for guidance or alternative to experiment, and modern formulations of chemical theory. Emphasis will vary in successive years. May be repeated for credit when topic differs. Offered in alternate years.

216. Magnetic Resonance Spectroscopy (3) II. Makri, LaMar
Lecture—3 hours. Prerequisites: 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-nuclear resonance, theory of g-tensor in organic and transition ions, spin Hamiltonians, nuclear quadrupole resonance, spin relaxation processes. Offered in alternate years.

217. X-Ray Structure Determination (3) III. Hope
Lecture—3 hours. Prerequisite: introduction to X-ray structure determination; crystallography, symmetry, diffraction geometry, sample preparation and handling, diffraction apparatus and data collection, powder diffraction and refinement, presentation of results, text, tables and graphics, crystallographic literature.

218. Physical Principles of Macromolecular Structure (3) III. Beers
Lecture—3 hours. Prerequisite: course 211A or the equivalent. Relationship of higher order macromolecular structure to subunit composition; equilibrium properties and macromolecular dynamics; physical-chemical aspects of macromolecular structure. Offered in alternate years.

219. Spectroscopy of Organic Compounds (3) I. B. Friedrich
Lecture—3 hours. Prerequisite: course 210B or the equivalent. Introduction to vibrionic and electronic spectroscopy and applications to organic compounds and inorganic spectra. Use of experimental data; thermodynamics of electrolyte and non-
electrolyte solutions; complex equilibria in aqueous and non-aqueous solutions; potentiometry and specific ion electrodes; mass transfer in liquid solutions; fundamentals of separation science, including column, gas and liquid chromatography.

241 A-D. Special Topics in Analytical Chemistry (3) III. The Staff

Lecture—1 hour. Prerequisite: consent of instructor. Series of advanced, research-oriented, special-topics courses in analytical chemistry. Topics will vary each semester course is offered.

*Seminar (1) I, II, III. The Staff

Seminar—1 hour. Prerequisite: consent of instructor. (SU grading only.)

293. Introduction to Chemistry Research (1) I. The Staff (Smith in charge)

Discussion—2 hours. Designed for incoming graduate students preparing for higher degrees in chemistry. Group and individual discussion of research activities in the Department and research topic selection. (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.)

296. Group Study (1-5) I, II, III. The Staff (Chairperson in charge)

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

The laboratory is open to qualified graduate students who wish to pursue original investigation. Students wishing to enroll should communicate with the department well in advance of the quarter in which the work is to be undertaken. (SU grading only.)

Professional Course

350. Methods of Teaching Chemistry (3) I, II, III. The Staff (Chairperson in charge)

Lecture—1 hour; discussion—1 hour; laboratory—3 hours. Prerequisite: graduate student standing in Chemistry; consent of instructor. Practical experience in methods and problems of teaching chemistry. Includes analyses of texts and supporting material, discussion of teaching techniques, preparation and conducting of discussion sessions and observing and guiding student laboratory work. 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 (3) III. Wood

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. (PINP grading only.)

Chicano Studies

(College of Letters and Science)

Refugio I. Rochin, Ph.D., Program Director
Program Office, TB 101 (916-752-2421)

Committee in Charge

Angie C. Chabram, Ph.D. (Chicano Studies, Spanish)
Richard A. Figueroa, Ph.D. (Education)
Yvette Flores-Ortiz, Ph.D. (Chicano Studies)
Barbara J. Menno, Ph.D. (Education)
Maluquilas Montoya, Ph.D. (Chicano Studies)
Beatriz Pescueira, Ph.D. (Chicano Studies, Sociology)
Vicki L. Ruiz, Ph.D. (History)

Adaliza Sosa-Riddell, Ph.D. (Chicano Studies)

Faculty

Angie C. Chabram, Ph.D., Assistant Professor
(Chicano Studies)
Yvette Flores-Ortiz, Ph.D., Assistant Professor
(Chicano Studies)
Maludalas Montoya, Ph.D., Professor (Chicano Studies)
Beatriz Pescueira, Ph.D., Assistant Professor
(Chicano Studies)
Refugio I. Rochin, Professor (Chicano Studies, Agricultural Economics)
Adaliza Sosa-Riddell, Ph.D., Lecturer S.O.E. (Chicano Studies)

The Major Program

The major in Chicano studies provides all students with an academic background in the American, Mexican, and Latin cultures. The experience of Chicanos in the United States is analyzed through an interdisciplinary approach focusing upon Chicano history, politics, Spanish language and linguistics, literature, the social sciences, and the arts.

The Program. The major allows for two emphases, one in humanities and the other in sociology. The humanities track introduces the student to Chicano history and social sciences, but stresses in-depth knowledge of the Spanish language, literature, and Chicano culture. The humanities track also develops skills in cross-cultural education and teaching, and provides professional preparation in communications, fine arts, and cultural studies. The sociology track combines traditional courses in the social sciences with courses that deal intensively with the contemporary Chicano experience. The sociology emphasis promotes a greater understanding of the social, political, and cultural life of Chicano people, and it provides a solid basis of knowledge for those who wish to work in a cross-cultural setting.

Career Alternatives. A degree in Chicano studies prepares students for careers in bilingual education, community service, and public administration. It is also excellent preparation for graduate or professional school.

A.B. Major Requirements:

Humanities Emphasis:

<table>
<thead>
<tr>
<th>Course</th>
<th>UNITS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Preparatory Subject Matter</td>
<td>12-42</td>
</tr>
<tr>
<td>Chicano Studies</td>
<td>10</td>
</tr>
<tr>
<td>Chicano Studies 20</td>
<td>4</td>
</tr>
<tr>
<td>Linguistics 1</td>
<td>4</td>
</tr>
<tr>
<td>Spanish 1, 2, 3 (or the equivalent)</td>
<td>8</td>
</tr>
<tr>
<td>Spanish 4 or 7A, 5 or 7B</td>
<td>8-12</td>
</tr>
<tr>
<td>Depth Subject Matter</td>
<td>38-40</td>
</tr>
<tr>
<td>History 169A, 169B, 169C or 168B</td>
<td>12</td>
</tr>
<tr>
<td>Political Science 168</td>
<td>4</td>
</tr>
<tr>
<td>Sociology 10 or Spanish 124</td>
<td>4</td>
</tr>
<tr>
<td>Spanish 125, 126, 135</td>
<td>12</td>
</tr>
<tr>
<td>One course from Linguistics 115, 150 or Education 151</td>
<td>3-4</td>
</tr>
<tr>
<td>One course from Spanish 131, 132, 133-34</td>
<td>3-4</td>
</tr>
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</table>

Total Units for the Major: 50-82

Sociology Emphasis:

<table>
<thead>
<tr>
<th>Course</th>
<th>UNITS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Preparatory Subject Matter</td>
<td>29-37</td>
</tr>
<tr>
<td>Chicano Studies 10</td>
<td>4</td>
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<td>Chicano Studies 20</td>
<td>4</td>
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<tr>
<td>Linguistics 1</td>
<td>4</td>
</tr>
<tr>
<td>Sociology 1, 46A, 46B</td>
<td>13</td>
</tr>
<tr>
<td>Spanish 4 or 7A, 5 or 7B</td>
<td>8-12</td>
</tr>
<tr>
<td>Depth Subject Matter</td>
<td>43</td>
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<td>Chicano Studies 102</td>
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<tr>
<td>History 169B</td>
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<td>Linguistics 115</td>
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<tr>
<td>Political Science 168</td>
<td>4</td>
</tr>
<tr>
<td>Sociology 110, 140, 165A, 169</td>
<td>16</td>
</tr>
<tr>
<td>Electives, a maximum of 12 units chosen from any of the following courses with no more than 2 courses from any one group</td>
<td>12</td>
</tr>
</tbody>
</table>

*Course not offered this academic year.

Minor Program Requirements:

This interdepartmental minor provides students with a general overview of Chicano/Mexican American life in terms of the history, culture, political involvement, and role in the society of the United States.

UNITs

Chicano (Mexican-American) Studies | 23-24 |
Chicano Studies 10 or 20 | 4 |
History 169A or 169B | 4 |
Political Science 168 | 4 |
Sociology 110 or Spanish 124 | 4 |
Two elective courses to be chosen from Chicano Studies 102, 132, Education 151, History 169A or 169B (not to duplicate one of the above), Spanish 126A, 126B, or 126C | 7-8 |

Courses in Chicano Studies

Lower Division Courses

10. Introduction to Chicano Studies (4) J. Sosa-Riddell

Lecture—4 hours; discussion—1 hour. Analysis of the situation of the Chicano (Mexican-American) people, emphasizing their history, literature, political movements, education and related areas. (PINP grading only)

20. Development of Chicano Culture and Literature (4) I. Chabram

Lecture—3 hours; discussion—1 hour. Knowledge of Spanish not required. Panoramic view of the development of Chicano culture and literary forms from the 1940's to the present. Course explores how Chicano literary texts and other artistic forms reflect social, political, and cultural transformations.

70. Survey of Chicano Art (4) Montoya

Lecture—4 hours. Survey of contemporary Chicano art in context of the social turmoil from which it springs. Includes political use of the poster and the mural, the influence of the Mexican mural and graphic movement, and social responsibility of the artist. (PINP grading only)

73. Chicano Art Expression Through Silk-Screen (4) I. Montoya

Studio—8 hours; laboratory—4 hours. Introductory level studio course using silk screen and basic printing techniques to explore and develop images of Chicano cultural themes and expressions. Students will experiment with images and symbols from their immediate environment/culture. Integrated approach to Chicano philosophy of art.

98. Directed Group Study (3-5) I, II, III. The Staff (Chairperson in charge)

Upper Division Courses

102. Chicanas in Contemporary Society (4) I. Pescueira

Lecture—3 hours; term paper. Prerequisite: course
Chinese

See Chinese and Japanese (below); Asian American Studies; and East Asian Studies

Chinese and Japanese

(College of Letters and Science)

Robert Borgen, Ph.D., Program Director
Program Office, TB 134 (916-752-4995)

Committee in Charge
Robert Borgen, Ph.D. (Chinese and Japanese)
Donald Gibbs, Ph.D. (Chinese and Japanese)
Mau-sang Ng, Ph.D. (Chinese and Japanese)
Benjamin E. Waclawik, Ph.D. (Chinese and Japanese)
Michelle Yeh, Ph.D. (Chinese and Japanese)

Faculty
Robert Borgen, Ph.D., Associate Professor
Donna Gies, Ph.D., Assistant Professor
Donald Gibbs, Ph.D., Associate Professor
Susan Grewald, Ph.D., Assistant Professor
Kay H. Kim, Ph.D., Professor Emeritus
Mau-sang Ng, Ph.D., Associate Professor
Benjamin E. Waclawik, Ph.D., Professor
Michelle Yeh, Ph.D., Associate Professor

Related Courses. See East Asian Studies course listing.

The Minor Program

Minors are offered in Chinese and Japanese for students wishing to follow a formally recognized program of study in those languages and their literatures.

Minor Program Requirements:

<table>
<thead>
<tr>
<th>Language</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chinese</td>
<td>20</td>
</tr>
<tr>
<td>Japanese</td>
<td>20</td>
</tr>
</tbody>
</table>

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; Japanese 10, 15, 25) may also be used. In addition, students must demonstrate their language proficiency, normally through completion of Chinese 111 or Japanese 111. For details, consult the undergraduate advisors.

Placement. Chinese 1 and Japanese 1 are intended for beginning students with no prior knowledge of those languages. Students who do have some knowledge may wish to improve their skills should meet with one of the advisers to discuss appropriate placement.

Student Advisers. C.-N. Chang (Japanese), D. Gibbs (Chinese)

Prerequisite Credit. No student may repeat a course if that course is a prerequisite for a course which has already been completed with a grade of C- or better.

Courses in Chinese

Lower Division Courses

1. Elementary Chinese (3) I, II, III, IV
   Lecture/discussion—5 hours. Introduction to Chinese grammar and development of all language skills in a cultural context with specific emphasis on communication. (Students who have successfully completed

Chinese 2 or 3 in the 10th or higher grade in high school may receive unit credit for this course on a P/N grading basis only. Although a passing grade will be charged to the student's P/NP option, no petition is required. All other students will receive a letter grade unless a P/NP petition is filed.)

1A. Intensive Elementary Modern Chinese (10) I, II
   The Staff
   Lecture—5 hours; discussion—5 hours. Combines the work of courses 1 and 2 into a single quarter. Those who complete this course may go on to course 3.

2. Elementary Chinese (3) I, II
   The Staff
   Lecture-discussion—5 hours. Prerequisite: course 1. Continuation of course I in the areas of grammar and basic language skills.

3. Elementary Chinese (3) III, IV
   The Staff
   Lecture-discussion—5 hours. Prerequisite: course 2. Completion of grammar sequence and continuing practice of all language skills, continuation of course 2.

3A. Situational Chinese (3) I, II, III, IV
   The Staff
   Discussion—2 hours. Prerequisite: course 3 may be taken concurrently. Instruct and students create a specific situational sequence and established roles for student-participants. Using techniques of drama and substitution drills, students have greater opportunity to develop spoken skills than is possible in course 3.

4. Intermediate Chinese (3)
   The Staff
   Lecture-discussion—5 hours. Prerequisite: course 3 or the equivalent. Intermediate-level training in spoken and written Chinese in a cultural context, based on language skills developed in course 3.

5. Intermediate Chinese (3)
   The Staff
   Lecture-discussion—5 hours. Prerequisite: course 4 or the equivalent. Intermediate-level training in spoken and written Chinese in a cultural context, based on language skills developed in course 4.

6. Intermediate Chinese (3)
   The Staff
   Lecture-discussion—5 hours. Prerequisite: course 5 or the equivalent. Intermediate-level training in spoken and written Chinese in a cultural context, based on language skills developed in course 5.

6A. Situational Chinese (3) I, II, III
   The Staff
   Discussion—2 hours. Prerequisite: course 6 may be taken concurrently. Instructor and students create a specific situation sequences and established roles for student-participants. Using techniques of drama and oral repetition, students develop spoken fluency and appropriateness of expression as skills requisite to internships and study in China.

10. Modern Chinese Literature (In English) (4)
    Robert Borgen
    Lecture—3 hours; discussion—1 hour. Introductory course requiring no knowledge of Chinese language or history. Reading anthologies of short stories and novels and viewing of two films. Designed to convey a feeling for what China has experienced in the twentieth century.

11. Great Books of China (3) I, II
    Waclawik
    Lecture—1 hour; discussion—1 hour. Selected readings in English translations. (P/N grading only.)

98. Directed Group Study (1-5)
    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

104. Twentieth-Century Chinese Fiction (In English) (4) I, II
    Ng
    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 social and political changes of the twentieth century. Through study of the most influential writers and genres.

105. Western Influences on Twentieth-Century Chinese Literature (In English) (4) I, II
    Ng
    Lecture—3 hours; discussion—1 hour. Prerequisite: course 10 or History 8A recommended. Introduction

*Course not offered this academic year.
108. Chinese Poetry and Traditional Chinese Fiction (4) I. Ng

Lecture: 3 hours; discussion: 1 hour. Prerequisite: course 101 or consent of instructor. Traditional Chinese poetry and its development down to modern times. Takes a close look at poetry and prose from both the Tang and Song Dynasties, as well as modern Chinese poetry. Offered in alternate years.

109. Poetics of China and Japan (4) II. Yeh

Lecture: 3 hours; discussion: 1 hour. A comparative study of Chinese and Japanese poems, examining specific poets and their works. Offered in alternate years.

110. Modern Chinese Poetry and Traditional Chinese Fiction (4) I. Ng

Lecture: 3 hours; discussion: 1 hour. Prerequisite: course 101 or consent of instructor. The development of modern Chinese poetry and its influence on contemporary Chinese literature. Offered in alternate years.

111. Advanced Chinese (4) I. II. The Staff

Lecture: 3 hours; discussion: 1 hour. Prerequisite: course 113 or permission of instructor. Selected readings from modern Chinese literature, focusing on contemporary themes and issues.

112. Traditional Chinese Fiction (4) II. Ng

Lecture: 1 hour; discussion: 3 hours. Prerequisite: course 112 or the equivalent. Close reading of traditional Chinese fiction, analyzing its themes and motifs.

113. Readings in Traditional Chinese Poetry (4) I. Yeh

Lecture: 3 hours; discussion: 1 hour. Prerequisite: course 6 or permission of instructor. Selected readings from traditional Chinese poetry, focusing on its language and style.

114. Readings in Modern Chinese Poetry (4) II. Yeh

Lecture: 3 hours; discussion: 1 hour. Prerequisite: course 6 or permission of instructor. Selected readings from modern Chinese poetry, focusing on its language and style.

115. Modern Chinese Language and Culture (4) I. II. The Staff

Lecture: 3 hours; discussion: 1 hour. Prerequisite: course 6 or the equivalent. An introduction to modern Chinese language and culture, focusing on its history and development.

116. Advanced Classical Chinese (4) I. II. The Staff

Lecture: 3 hours; discussion: 1 hour. Prerequisite: course 116 or permission of instructor. Selected readings from classical Chinese literature, focusing on its language and style.

117. Introduction to Classical Chinese: Confucius (4) I. Ng

Lecture: 3 hours; discussion: 1 hour. Prerequisite: course 116 or consent of instructor. An introduction to the works of Confucius, focusing on his life and teachings.

118. Introduction to Classical Chinese: Mencius (4) I. II. Ng

Lecture: 3 hours; discussion: 1 hour. Prerequisite: course 116 or consent of instructor. An introduction to the works of Mencius, focusing on his life and teachings.

119. Introduction to Classical Chinese: Narrative Styles (4) I. II. Ng

Lecture: 3 hours; discussion: 1 hour. Prerequisite: course 116 or consent of instructor. An introduction to the narrative styles of classical Chinese literature, focusing on their development and influence.

120. Advanced Chinese (4) I. II. The Staff

Lecture: 3 hours; discussion: 1 hour. Prerequisite: course 113 or permission of instructor. Selected readings from advanced Chinese literature, focusing on contemporary themes and issues.

121. Traditional Chinese Fiction (4) II. Ng

Lecture: 1 hour; discussion: 3 hours. Prerequisite: course 112 or the equivalent. Close reading of traditional Chinese fiction, analyzing its themes and motifs.

122. Readings in Traditional Chinese Poetry (4) I. Yeh

Lecture: 3 hours; discussion: 1 hour. Prerequisite: course 6 or permission of instructor. Selected readings from traditional Chinese poetry, focusing on its language and style.

123. Readings in Modern Chinese Poetry (4) II. Yeh

Lecture: 3 hours; discussion: 1 hour. Prerequisite: course 6 or permission of instructor. Selected readings from modern Chinese poetry, focusing on its language and style.

124. Linguistics (4) II. III. Wallack

Lecture-discussion: 3 hours; term paper. Prerequisite: course 6 or consent of instructor. An introduction to the principles of modern linguistics, focusing on the study of language and its structure.

125. The Chinese Language (4) III. Wallack

Lecture-discussion: 4 hours. Prerequisite: course 6 (may be taken concurrently). An introduction to the Chinese language, focusing on its history, grammar, and pronunciation.

126. Chinese Internship (1-12) I. II. III. The Staff

Internship: 3-36 hours to be arranged. Prerequisite: upper division standing and consent of instructor. A practical experience in Chinese language, focusing on real-world applications.

127. Tutoring in Chinese (1-5) I. II. III. The Staff

Tutoring: 1-5 hours. Prerequisite: consent of Program. A practical experience in teaching Chinese, focusing on real-world applications.

128. Directed Group Study (1-5) I. II. III. The Staff

Chairperson in charge. Prerequisite: permission of Program. A practical experience in teaching Chinese, focusing on real-world applications.

129. Research (1-12) I. II. III. The Staff

(SU grading only)

Graduate Course

299. Special Study for Undergraduates (1-6) I. II. III. The Staff

(SU grading only)

Courses in Japanese

Lower Division Courses

1. Elementary Japanese (5) I. The Staff

Lecture/discussion: 5 hours. Introduction to spoken and written Japanese, focusing on basic grammar and vocabulary. (SU grading only)

2. Intermediate Japanese (5) I. The Staff

Lecture/discussion: 5 hours. Continuation of course 1, focusing on advanced grammar and vocabulary. (SU grading only)

3. Advanced Japanese (5) II. The Staff

Lecture: 3 hours; discussion: 1 hour. Advanced study of spoken and written Japanese, focusing on advanced grammar and vocabulary. (SU grading only)
112. Modern Japanese: Reading and Discussion (4) I. The Staff
Lecture—3 hours; discussion—1 hour. Prerequisite: course 6 or the equivalent. Continuation of course 111. (P/NP grading only.)

113. Modern Japanese: Reading and Discussion (4) II. The Staff
Lecture—3 hours; discussion—1 hour. Prerequisite: course 111. Continuation of course 111. (P/NP grading only.)

114A. Spoken Japanese (2) I. The Staff
Discussion—2 hours. Prerequisite: course 114A or the equivalent. Continuation of course 114A. Training in spoken Japanese for students with a basic working knowledge of the language. (P/NP grading only.)

114B. Spoken Japanese (2) II. The Staff
Discussion—2 hours. Prerequisite: course 114B or the equivalent. Continuation of course 114B. Training in spoken Japanese for students with a basic working knowledge of the language. (P/NP grading only.)

115. Japanese Composition (2) I. The Staff
Lecture—2 hours. Prerequisite: course 6 or the equivalent. Development of skills in the techniques of writing Japanese. Practice in short essay writing with emphasis on correct grammar. (P/NP grading only.)

131. Readings in Modern Japanese Literature: 1920-1945 (4) III. Chang
Lecture—3 hours; discussion—1 hour. Prerequisite: course 131 or the equivalent. Continuation of course 131. May be taken independently. Covers selected texts from the immediate post-war years beginning in 1945 down to 1970 and the post-war recovery.

Lecture—3 hours; discussion—1 hour. Prerequisite: course 131 or the equivalent. Continuation of course 131, but may be taken independently. Covers selected texts from 1945 to 1970. Offered in alternate years.

134. Readings in the Humanities: Traditional Culture (4) II. Borgen
Lecture—3 hours; discussion—1 hour or term paper. Prerequisite: course 113. Fourth-year level reading of modern works by major specialists on traditional Japanese culture: literature, history, religion, thought, art, international relations, and literary history and criticism. Focus is equally on developing reading skills and learning about traditional Japanese culture.

136. Readings in the Humanities: The Post-1945 Period (4) I. Chang
Lecture—3 hours; term paper. Prerequisite: course 113. Fourth-year level reading of selected postwar writings on Japanese culture, history, philosophy, society, religion, politics, aesthetics, and comparative culture by prominent critics, scholars, and intellectuals.

138. Readings in Newspapers and Magazines (4) III. Griesvold
Lecture—3 hours; discussion—1 hour. Prerequisite: course 113 or the equivalent. Fourth-year level reading of newspaper and magazine reports, articles, and editorials on domestic and international affairs relating to contemporary Japan. Offered in alternate years.

192. Japanese Internship (1-12) I, II, III. The Staff
Internship—36 hours to be arranged. Prerequisite: upper division standing and consent of instructor. Work experience in Japanese language, with analytical term paper on a topic approved by instructor. (P/NP grading only.)

197T. Tutoring in Japanese (1-5) I, II, III. The Staff
Tutoring—5 hours. Prerequisite: consent of Program Chairman. Leading of small voluntary discussion groups affiliated with one of the Program's regular classes. May be repeated for credit, but only 2 units may be applied to the minor. (P/NP grading only.)

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

199. Special Study for Advanced Undergraduates (1-5) I, II, III. The Staff (Chairperson in charge). (P/NP grading only.)

Graduate Courses
201. Introduction to Classical Japanese (4) I. Borgen
Lecture—3 hours; discussion—1 hour. Prerequisite: course 113 or the equivalent. Introduction to classical Japanese using selections from classical Japanese prose and poetry.

202. Introduction to Classical Japanese (4) II. Borgen
Lecture—3 hours; discussion—1 hour. Prerequisite: course 201. Readings of relatively easy texts of classical Japanese prose and poetry by notable writers of modern Japanese.

203. Introduction to Classical Japanese (4) III. Griesvold
Lecture—3 hours; discussion—1 hour. Prerequisite: course 202. Readings of classical and pre-modern Japanese prose and poetry by notable writers of classical and pre-modern Japanese.

291. Seminar in Modern Japanese Literature: Major Writers (4) III. Chang
Seminar—4 hours. Prerequisites: any one of courses 131, 132, 133, 134, 135, or the equivalent. In-depth reading and critical analysis of major works by early modern and contemporary writers such as Natsume Soseki, Mori Ogai, Shimazaki Toson, Akutagawa Ryunosuke, Tanizaki Junichiro, Abe Kobo and Oe Kenzaburo. Offered in alternate years.

299. Research (1-12) I, II, III. The Staff
(SU grading only.)

Classics
(College of Letters and Science)
David A. Trallis, Ph.D., Program Director
Department Office (Spanish and Classics), 616 Sproul Hall (916-752-0835)
Faculty
Richard E. Grimm, Ph.D., Associate Professor Emeritus
Lynn E. Roller, Ph.D., Associate Professor
Westley E. Thompson, Ph.D., Professor
David A. Trallis, Ph.D., Professor

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, while 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 the students learn the rudiments of the language and read three or more 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, archeology, history, or theology. Students planning to go on to graduate work in classics should be aware that good graduate schools look for students who are well prepared 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, all majors in classics from Divinity who have sought admission to law or medical school have been accepted.

Classical Civilization
A. B. Major Requirements:

Preparatory Subject Matter .................................................24
Greek 1, 2, 3 or Latin 1, 2, 3 or the equivalent .................................................15
Three courses from the following .................................................9
(a) Classics 17A, 17B, 17C, 20
(b) Classics 4A, 10

Depth Subject Matter .........................................................40
Three upper division courses in Latin or Greek .............................................12
At least 28 units from the following, with or without emphasis in a single area, chosen in consultation with a major advisor: 28
(a) Language and Literature: All upper division courses in Latin and Greek
Classics 140, 141, 142, 143
(b) History: History 111A, 111B, 111C, 112A, 112B
(c) Art, Archaeology, and Drama: Classics 174, 175, Art 154A, 154B, 155
**A.B. Major Requirements:**

<table>
<thead>
<tr>
<th>Preparatory Subject Matter</th>
<th>UNITS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Greek 1, 2, 3 (or the equivalent)</td>
<td>16</td>
</tr>
</tbody>
</table>

**Depth Subject Matter:**

<table>
<thead>
<tr>
<th>Upper division units in Greek</th>
<th>36</th>
</tr>
</thead>
</table>

Total Units for the Major: 36-51

**Recommended Courses:**

- Latin 1, 2, 3.

**Latin Major Requirements:**

<table>
<thead>
<tr>
<th>Preparatory Subject Matter</th>
<th>UNITS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Latin 1, 2, 3 (or the equivalent)</td>
<td>16</td>
</tr>
</tbody>
</table>

**Depth Subject Matter:**

<table>
<thead>
<tr>
<th>Latin 121.</th>
<th>5</th>
</tr>
</thead>
<tbody>
<tr>
<td>At least 3 additional upper division units in Latin</td>
<td>31</td>
</tr>
</tbody>
</table>

Total Units for the Major: 36-51

**Major Advisers:** D. A. Trail, L. R. Roller (Classical Civilization); W. E. Thompson (Greek); and R. E. Grimm (Latin).

---

**The Minor Program**

The Department offers minors in Greek and Latin for those wishing to follow a shorter but still formally recognized program of study in classics.

**Minor Program Requirements:**

<table>
<thead>
<tr>
<th>Greek</th>
<th>21</th>
</tr>
</thead>
<tbody>
<tr>
<td>Four upper division courses in Greek</td>
<td>16</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Latin</th>
<th>21</th>
</tr>
</thead>
<tbody>
<tr>
<td>Four upper division courses in Latin</td>
<td>16</td>
</tr>
</tbody>
</table>

---

**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.

**Teaching Credential Subject Representative:** R. E. Grimm. See also the Teacher Education Program.

**Graduate Study:** A program of study and research leading to the M.A. degree in Classics is offered. Detailed information regarding graduate study may be obtained from the Graduate Advisor.

**Graduate Advisor:** D. A. Trail.

---

**Courses in Classics**

**Lower Division Courses**

4A. Classical Civilization (3) I, III. The Staff Lecture—3 hours. An introduction to the literature, art, and institutions of classical Greece. General Education credit: Civilization and Culture/Introductory.

10. Greek and Roman Mythology (3) I, II, III. The Staff Lecture—3 hours. Origin and development of myths and legends, their place in the religion, literature, and art of Greece and Rome.


17A. Mediterranean 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/Introductory.

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 art styles. General Education credit: Civilization and Culture/Introductory.

1**C. Later Greek and Roman Archaeology (4) III. Roller Lecture—3 hours; term paper. Archeological monuments of the Greek world after the conquest of Alexander the Great, and the monuments of Rome and the Roman Empire. Offered in alternate years. General Education credit: Civilization and Culture/Introductory.

20. Pompell AD 79 (4) IV. III. Trail Lecture—3 hours; term paper. Roman life in an urban community at the time of the eruption of Vesuvius. Slide presentations of the archaeological evidence will be supplemented by selected readings from Petronius' Satyricon and other ancient authors.

30. Greek and Latin Elements in English Vocabulary (5) I, III. The Staff Lecture—4 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 language not neglected.

31. Greek and Latin Elements in Technical Vocabulary (5) 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 improved ability to understand and retain unfamiliar terms.

**Upper Division Courses**

140. Homer and Ancient Epic (4) I. II. The Staff Lecture—3 hours; term paper. Prerequisite: course 4A or 10 or Comparative Literature 1. Reading of Iliad, Odyssey, and Aeneid in English. Discussion of Homeric 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/Introductory. Recommended GE preparation: Classics 4A.


142. Greek and Roman Novel (4) I. II. The Staff Lecture—3 hours; term paper. Examination of the ancient Greek roman 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/Introductory. Recommended GE preparation: Classics 4A or 10.

174. Ancient Greek Sanctorals (4) III. Roller Lecture/discussion—4 hours. Prerequisite: course 175C or consent of Instructor. A history of the gods, heroes, and heroes of Olympia, Delphi, and other sanctuaries. Student reports on major monuments. Offered in alternate years.

175C. Topography and Monuments of Ancient Athens (4) III. Roller Lecture/discussion—4 hours. Prerequisite: course 174A-17B or consent of instructor. A history of Athens as an urban center from the Bronze Age through the late Roman period. Student reports on major monuments with emphasis on restoration, chronology, and on the relation of documentary to excavational evidence. Offered in alternate years.

197TC. Community Tutoring in Classical Languages (1-3) I, II, III. Grimm 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 with special attention devoted to current problems in literary and critical 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) II. Trail Seminar—3 hours; term paper. Reading of selected books of the Aeneid, Georgics, and Georgics. 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. Historical and critical problems in Aristophanes or New Comedy. May be repeated for credit.

205. Latin Lyric and Elegy (4) I. Trail Seminar—3 hours; term paper. Critical examination of the works of Catullus, Horace, or Propertius. May be repeated for credit.

206. Greek Historiography (4) III. Thompson Seminar—3 hours; term paper. Development of historical writing in Greece. May be repeated for credit.

207. Greek Drama (4) II. The Staff Seminar—3 hours; term paper. Literary and philological analysis of the plays of Euripides, Sophocles, or Aeschylus. May be repeated for credit.

299. Research (1-12) I, II, III. The Staff Prerequisite: consent of instructor. (S/U grading only)

**Greek 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 if they pass the P/NP grading basis only. Although a passing grade will be charged to the student's P/NP option, no petition is required. All other students will receive a letter grade unless a P/NP petition is filed.)

2. Elementary Greek (5) II. 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 (concurrent). Supplementary study of New Testament Greek.
Clinical Pathology

(School of Veterinary Medicine)

Joseph G. Zink, D.V.M., Ph.D., Acting Chairperson of the Department
Department Office, 1319 Haring Hall (916-752-0153)

Faculty

Bernard F. Feldman, D.V.M., Ph.D., Professor

Nanci S. Linn, M.V.Sc., Ph.D., Professor

Donald E. Jasper, D.V.M., Ph.D., Professor Emeritus

Jill A. Kaneko, D.V.M., Ph.D., Professor

Joseph G. Zink, D.V.M., Ph.D., Professor

Part-Time Clinical Faculty

Robert M. Dufort, D.V.M., Assistant Clinical Professor

Sondra B. Healy, D.V.M., Assistant Clinical Professor

John W. Switzer, D.V.M., Associate Clinical Professor

Courses in Clinical Pathology

Upper Division Courses

101. Comparative Hematology (2) III. Kaneko, Jain, Zink

Lecture—2 hours. Prerequisite: Biological Sciences 14, 110. Biochemistry 101A or 101B or Physiological Sciences 101A-101B or consent of instructor. Principles, interpretation, and applications of clinical hematology; comparative blood cellular morphology and function.

101L, Comparative Hematology Laboratory (2) III. Kaneko, Zink, Jain Laboratory—2 hours. Prerequisite: course 101 should be taken concurrently and consent of instructor. Introduction to laboratory methods and procedures of clinical hematology. Limited enrollment.

102. Clinical Biochemistry (4) I. Kaneko

Lecture—4 hours; laboratory—2 hours. Prerequisite: Physiology 112, 113. Physiological Sciences 101A-101B or Biochemistry 101A-101B, or consent of instructor. Principles and methods of clinical biochemistry; determination and interpretation of the biochemical constituents of the blood, urine, and other body fluids.

199. Special Study for Undergraduates (1-5) I, II, III. The Staff (Chairperson in charge) (P.N.P. grading only)

Graduate Courses

204. Normal and Abnormal Bone Marrow Cytology (1) I. Zink

Lecture—2 hours. Prerequisite: Veterinary Medicine 425 or course 101. Normal maturation of hematopoietic cells followed by a study of the cytology of blood and bone marrow in selected diseases of domestic animals including infections, anemias, myeloproliferative disorders and leukemias.

205. Physiology and Pathology of Leukocytes (2) III. Jain

Lecture—2 hours. Prerequisite: course 101, Biochemistry 101A-101B, or consent of instructor. Metabolism, ultrastructure, kinetics, homoeostasis, cytotoxicity, and functions of different leukocytes; physiological, functional, histochemical, and morphological changes in leukocytes in disease; role in inflammatory and immunologic processes. Offered in alternate years.

206. Immunohematology (2) III. Jain, Mackenzie (Medicine), Cullor

Lecture—2 hours. Prerequisite: course 101, Veterinary Microbiology 126, or consent of instructor. Immunologic aspects of hematology; blood cell antigens and antibodies; autoimmune hemolytic diseases; reactions in blood transfusions; transplantation mechanisms. Offered in alternate years.

254. Pathogenesis of Infectious Disease (3) II. Cullor (Pathology)

Lecture—2 hours. Prerequisite: upper division or graduate standing in biology or the medical sci-

Clinical Nutrition and Metabolism

See Internal Medicine in Medicine, School of
Community Development

ences. 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 are emphasized as well as the important species-related differences. Perinatal immune responses of dam and offspring are also covered. Offered in alternate years.

236. Directed Group Study (1-5) I, II, III. The Staff (Chairperson in charge)

239. Research In Clinical Pathology (1-12) I, II, III. The Staff (S/U grading only)

Clinical Psychology
See Medicine, School of

Communication
See Rhetoric and Communication

Community Development

(Graduate Group)

Mark Francis, Chairperson of the Group

Group Office, 103 AOB (Applied Behavioral Sciences), (916-752-1969)

Faculty. The Interdisciplinary faculty include those in Anthropology, Asian American Studies, African American Studies, Landscape Architecture, Environmental Design, Geography, Psychology, Sociology, and Women’s Studies.

Graduate Study. The Graduate Program in Community Development offers a multidisciplinary program of study which leads to the M.S. degree. The program is designed to prepare students for professional roles as planners, developers, designers, planners, researchers, or technicians in some emphasis upon rural, non-metropolitan communities and human service organizations. Training in community development is also aimed at preparing individuals to work within government or non-profit organizations in the realm of social and economic change. There is opportunity available for specialization in: (1) community design and planning, (2) minority community issues, (3) women’s issues in the community, (4) community health and human services, (5) environmental issues, and (6) rural and agricultural issues.

Preparation. Applicants to this program can prepare themselves by enrolling for upper division courses in the social or behavioral sciences, e.g., anthropology, economics, sociology, psychology, cultural geography, or political science, and courses in community studies.


Community Health
See Medicine, School of

Community Nutrition

(Graduate Group of Agricultural and Environmental Sciences)

The Major Program

Community nutrition teaches the identification of nutrition-related health problems and the biological, behavioral, economic, and sociocultural factors that influence the nutrition of individuals and groups. The aim of community nutrition is to apply this knowledge to the development of programs that improve the nutritional status in the community.

The Program. The community nutrition major is 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 advisor.

Career Alternatives. The community nutrition major prepares students for jobs in administrative, teaching, research, or public health/public service positions or for graduate or professional training in nutrition and other health sciences. Students who complete the academic requirements for an internship in dietetics are also qualified for careers in dietetics, following completion of an internship.

B.S. Major Requirements:

(For convenience in program planning, the usual courses taken to satisfy the requirements are shown in parentheses. Equal or more comprehensive courses are acceptable. Courses shown without parentheses are required.)

Units

English Composition Requirement .................................. 0-8

See College requirement

Preparatory Subject Matter ........................................ 49-50

Biological sciences (Biology Sciences 1A, 1B, 10A) .................. 16

Chemistry (Chemistry 1A, 1B, 2A, 2B) .................................. 16

Computer science (Agricultural Science and Management 21 or Sociology 40) ........................................ 2-3

Cultural food habits (Nutrition 20) ................................... 4

Cultural social science (Anthropology 2, Geography 2, or Sociology 3) ........................................ 4

Social research methods (Sociology 40 or Psychology 41) ............ 4

Statistics (Sociology 40 or Statistics 13) ................................ 4

Breadth/General Education ......................................... 6-24

Satisfaction of General Education requirement ...................... 6-24

(Note that some of the Option Subject Matter may meet General Education requirements)

Depth Subject Matter ............................................... 52-53

Biochemistry 101A-101B or Physical Sciences 101A-101B .................. 6-7

Food Science and Technology 100A, 100B, 101A, 101B .................. 10


Nutrition 192 .............................................................. 2

Physiology 100, 101 ...................................................... 7

Option Subject Matter .............................................. 28-32

Course work chosen from one of the following three options in consultation with advisor .................. 18-20

Additional units in a related social or health science chosen in consultation with advisor .................. 10-12

(May include a minor program in fields such as physical education, environmental toxicology, community development, statistics, or the social sciences.)

Behavioral-Psychological Option

Psychology 1, Education 110 or Psychology 110 .................. 130

Psychology 12 or Human Development 100A or 100B .................. 130

Psychology 115 or Human Development 100C .................. 130


Applied Behavioral Sciences 173, 176 .................................. 130

Consumer Science 100 .................................................. 100

Food Science and Technology 107, 117 .............................. 154

Anthropology 129, 130 .................................................. 130

Rhetoric and Communication 115 .................................... 115

Economics and International Development Option

International Agricultural Development 10 .......................... 100

Economics 1A, 1B ....................................................... 16A

Agricultural Economics 100A, 100B, 120, 130, 141 .................. 141

International Agricultural Development 110, 110A, 110B, 110C, 130, 162 .................................................. 110A, 110B, 110C

Consumer Science 100 .................................................. 100

Anthropology 122, 126 .................................................. 170

Economics 151A .......................................................... 151A

Environmental Studies 1, 165 .......................................... 115A

Rhetoric and Communication 115 .................................... 115

Sociocultural Option

Foreign language (10 units or the equivalent strongly recommended) ........................................ 130

Anthropology 101, 128, 133, 135 .................................... 175

Geography 170, 175 ....................................................... 175

Alto-American Studies 100 .............................................. 175

Applied Behavioral Sciences 2 ........................................ 175

Rhetoric and Communication 115 .................................... 115

Regional courses, choose 8 units from any of the following four areas (alternative courses may be selected in consultation with the advisor)

North America: Anthropology 141A, 141C, 176, Geography 121, History 189A, 189B, Sociology 143A, 143B

Central and South America: Geography 122A, 122B, History 161A, 161B, 162, 163A, 163B, 163S, 165, 166A, 166B, 166

Africa: Anthropology 140A, 140B, Geography 125A, 125B, History 115A, 115B, 115C


Additional Recommended Courses


Unrestricted Electives ............................................. 13-38

Total Units for Degree ............................................... 180

Major Adviser. K. G. Dewey (Nutrition).

Advising Center for the major is located in 1151 Meyer Hall (916-752-2512).

Internship. To fulfill the academic requirements for an internship in Dietetics, the following courses must be included: Economics 1B, Agricultural Economics 112, Food Service Management 120, 120L, 121, 122, 123, Applied Behavioral Sciences 153 or Education 110, Psychology 1, Nutrition 116A-116B, and Rhetoric and Communication 1. Consult the Advising Center prior to the first quarter of the junior year for information on procedures.

Graduate Study. For information on graduate study, see the Graduate Division section in this catalog.

*Course not offered this academic year.*
## Comparative Literature

**Course Code:** Comparative Literature (College of Letters and Science)

Robert M. Torrance, Program Director

Program Office, 922 Sprout Hall (915-752-9534)

### Committee in Charge

Samuel G. Armstead, Ph.D. (Comparative Literature, Spanish)

Ruby Cohn, Ph.D. (Comparative Literature, Dramatic Art)

Gail Finney, Ph.D. (Comparative Literature, German)

Michela Hannoush, Ph.D. (Comparative Literature, French)

Roland W. Hoermann, Ph.D. (Comparative Literature, German)

Manfred Kusch, Ph.D. (Comparative Literature, French)

Karl Lokke, Ph.D. (Comparative Literature, English)

Robert M. Torrance, Ph.D. (Comparative Literature)

Marlan B. Ury, Ph.D. (Comparative Literature)

### Faculty

Samuel G. Armstead, Ph.D., Professor (Comparative Literature, Spanish)

Marc Eli Blanchard, Agrégé de Lettres, Professor (French, Critical Theory)

Ruby Cohn, Ph.D., Professor (Comparative Literature, Dramatic Art)

Gail Finney, Ph.D., Professor (Comparative Literature, German)

Michela Hannoush, Ph.D., Assistant Professor (Comparative Literature, French)

Roland W. Hoermann, Ph.D., Professor (Comparative Literature, German)

Manfred Kusch, Ph.D., Associate Professor (Comparative Literature, French)

Karl Lokke, Ph.D., Assistant Professor (Comparative Literature, English)

Peter M. Schaefer, Ph.D., Professor (German)

Robert M. Torrance, Ph.D., Professor

Marlan B. Ury, Ph.D., Professor

### The Major Program

Comparative literature encourages students to read, think about, and compare exciting books from different national languages and from different parts of the world. Comparative literature enlarges students’ horizons by bridging the divisions between national cultures in order to allow cross-cultural perspectives.

The Program: Both the major and minor comparative literature programs allow students to combine courses in one or more national literature departments together with courses in comparative literature. The Introductory course sequence "Great Books of Western Civilization" provides both an overview of European literary culture from ancient times to the present and an intercultural practice in analytical thought and English composition. All readings in undergraduate comparative literature courses are in English, but majors may take upper-division courses in at least one foreign literature in the original language.

### A.B. Major Requirements:

#### UNITS

<table>
<thead>
<tr>
<th>Preparatory Subject Matter</th>
<th>12-42</th>
</tr>
</thead>
<tbody>
<tr>
<td>Comparative Literature 1, 2, 3,</td>
<td>12</td>
</tr>
<tr>
<td>Foreign language: sufficient preparation to insure satisfactory performance at the intermediate level</td>
<td>0-30</td>
</tr>
<tr>
<td>Depth Subject Matter</td>
<td>40</td>
</tr>
</tbody>
</table>

#### Courses in Comparative Literature

- **Lower Division Courses**
  - 1. Great Books of Western Civilization: From Myth to Faith (4)
  - 1, II. III. Director in charge
  - Lecture/discussion—4 hours. Prerequisite: completion of Subject A requirement. An introduction, through class discussion and frequent written assignments, to some of the great books of western civilization from Epic of Gilgamesh to St. Augustine’s Confessions. General Education credit: Civilization and Culture/Introductory.
  - 2. Great Books of Western Civilization: From Faith to Reason (4)
  - I. III. Director in charge
  - Lecture/discussion—4 hours. Prerequisite: completion of Subject A requirement. An introduction, through class discussion and frequent written assignments, to some of the great books of western civilization from Dante’s Inferno to Swift’s Gulliver’s Travels. General Education credit: Civilization and Culture/Introductory.
  - 3. Great Books of Western Civilization: The Modern Crisis (4)
  - I. III. Director in charge
  - Lecture/discussion—4 hours. Prerequisite: completion of Subject A requirement. An introduction, through class discussion and frequent written assignments, to some of the great books of western civilization from Goethe’s Faust to Beckett’s Waiting for Godot. General Education credit: Civilization and Culture/Introductory.
  - 4. The Short Story and Novella (4)
  - I. III. Director in charge
  - Lecture/discussion—4 hours. A study of great prose fiction by major authors of different countries, with especial emphasis on the modern period.
  - 5. Fairy Tales, Fables, and Parables (3)
  - I. III. Director in charge
  - Lecture/discussion—3 hours. An introduction to fairy tales, fables, and parables as recurring forms and motifs in literature, with readings from such diverse writers as Aesop and Grimm, Chaucer and Shakspere, Kafka and Borge. General Education credit: Civilization and Culture/Introductory.
  - 6. Myths and Legends (3)
  - I. III. Director in charge
  - Lecture/discussion—4 hours. An introduction to the comparative study of myths and legends, excluding those of Greece and Rome, with readings from Near Eastern, Greek, Celtic, Indian, and Japanese literary sources. General Education credit: Civilization and Culture/Introductory.
  - 7. Literature of Fantasy and the Supernatural (3)
  - I. III. Director in charge
  - Lecture/discussion—4 hours. An introduction to the literature of fantasy and the supernatural, including horror, mystery, and science fiction. General Education credit: Civilization and Culture/Introductory.
  - 8. Utopias and their Transformations (4)
  - I. III. Director in charge
  - Lecture/discussion—4 hours. A study of utopian literature, with readings from such diverse authors as More, Dystopian, and Science Fiction. General Education credit: Civilization and Culture/Introductory.

#### Recommended Reading

- Art: 10th, 11th, 12th, Classics 10; History 4A, 4B, 4C; Philosophy 21, 22, 23.

**Major Adviser:**

- The Staff

All Comparative Literature majors and minors must consult with their adviser, individually, at least once at the beginning and once at the end of each academic year. Honors Program: Candidates for high or highest honors in Comparative Literature must write a senior thesis under the direction of a faculty member approved by the Program Director. For this purpose. In addition to fulfilling all other major requirements, honors candidates must enroll in 6 units of Comparative Literature 146I during the first two quarters of the senior year. Only students who have attained a cumulative GPA of 3.5 in all courses satisfying the major requirement (except elementary foreign language courses) at the end of the junior year will be eligible for the honors program.

### Minor Program Requirements:

The minor in Comparative Literature allows students to combine courses in Comparative Literature with courses in one or two national literatures, including English and foreign literatures in translation. There is no foreign language requirement for the minor.

#### UNITS

<table>
<thead>
<tr>
<th>Comparative Literature</th>
<th>12-24</th>
</tr>
</thead>
<tbody>
<tr>
<td>Comparative Literature 1, 2, or 3</td>
<td>3</td>
</tr>
<tr>
<td>At least two upper division Comparative Literature courses (Comparative Literature 141 strongly recommended)</td>
<td>8</td>
</tr>
<tr>
<td>Three additional upper division courses in one or two national literatures (including English) or in Comparative Literature</td>
<td>12</td>
</tr>
</tbody>
</table>

Courses chosen to fulfill any of the above requirements are chosen with the approval of the adviser.

**Minor Adviser:**

- Same as Major Adviser

### Courses in Comparative Literature

**Lower Division Courses**

1. Great Books of Western Civilization: From Myth to Faith (4)
2. Great Books of Western Civilization: From Faith to Reason (4)
3. Great Books of Western Civilization: The Modern Crisis (4)
4. The Short Story and Novella (4)
5. Fairy Tales, Fables, and Parables (3)
6. Myths and Legends (3)
7. Literature of Fantasy and the Supernatural (3)
8. Utopias and their Transformations (4)
9. Master Authors in World Literature (2)
10. A.N. Master Authors in World Literature (2)
11. The Staff (Director in charge)

*Course not offered this academic year.*

**Lecture/discussion—1 two-hour session. Designed primarily to acquaint the student with major authors.**

1. Great Books of Western Civilization: From Myth to Faith (4)
2. Great Books of Western Civilization: From Faith to Reason (4)
3. Great Books of Western Civilization: The Modern Crisis (4)
4. The Short Story and Novella (4)
5. Fairy Tales, Fables, and Parables (3)
6. Myths and Legends (3)
7. Literature of Fantasy and the Supernatural (3)
8. Utopias and their Transformations (4)
9. Master Authors in World Literature (2)
10. A.N. Master Authors in World Literature (2)
11. The Staff (Director in charge)

*Course not offered this academic year.*
Beckett/Pinter, Genet/Dörrn-matt. May be repeated for credit in different subject area. Limited enrollment. (P/NP grading only)

12. Introduction to Women Writers (4) II, III. The Staff Lecture/discussion—3 hours; term paper. Prerequisite: completion of Subject A requirement. Survey of fiction, drama, and poetry by women writers from all Continents. Concerns of women compared in light of their varied social and cultural traditions. Students will practice literary analysis of work, imagery, narrative strategy, and General Education credit: Civilization and Culture/Introductory.

*13. Dramatic Literature (3) III. Cohn Lecture—3 hours. Prerequisite: Subject A or the equivalent. Introduction, through careful reading of selected plays, to some of the major forms of drama, from the earliest tragedies of ancient Greece to the contemporary American theater. Offered in alternate years. General Education credit: Civilization and Culture/Introductory.

*15. The Spiritual Quest (3) I. Torrance Lecture/discussion—3 hours. An exploration of the enduring search to discover—or to create—a transcendent meaning and purpose in human life, as reflected in Shakespeare’s works. Works to include: The Tempest, The Taming of the Shrew, The Merchant of Venice.

20. Man and the Natural World (4) I, II. McLean Lecture/discussion—3 hours; term paper. Examination of the human/nature relationship and the individual human being and his “natural” environment, whether cultivated or wild, as reflected in literary works from ancient times to the present by such authors as Hesiod, Virgil, Rousseau, Wordsworth, Thoreau, General Education credit: Civilization and Culture/Non-Introductory. Recommended GE preparation: any course from the GE Literature Preparation List.

25. Ethnic Minority Writers in World Literature (3) I. Bedrosian Lecture—3 hours; term paper. Consideration of a broad range of writers who speak from an ethnic perspective different from the nominally or politically dominant culture of their respective countries and who explore the challenges faced by characters significantly affected by their ethnic minority status. General Education credit: Civilization and Culture/Introductory.

*53A. Literature of China and Japan (3) II. Ury Lecture—2 hours; discussion—1 hour. Introduction to representative masterpieces of East Asia with readings from such works as The Story of The Stone, The Peasant, The Mute, The Plum Fan, Tang and Sung poetry, classical Japanese poetry, drama, and travel diaries, and The Tale of Genji.

53B. Literature of India and Southeast Asia (3) II. The Staff Lecture—2 hours; discussion—1 hour. Introduction to representative masterpieces of South Asia with readings from such works as the Mahabharata and Ramayana, The Cloud Messenger, The Little Clay Cart, and the stories and poems of both ancient and modern India and Southeast Asia.

98. Directed Group Study (1-5) I, II, III. The Staff (Director in charge) Restricted to lower division students. (P/NP grading only)

99. Special Study for Undergraduates (1-5) I, II, III. The Staff (Director in charge) (P/NP grading only)

Upper Division Courses

135. Women Writers (4) II, III, Reed, Lokke Lecture/discussion—3 hours; term paper. An exploration of women’s different views of self and society as revealed in major works by female authors of various times and cultures. Readings, principally of fiction, will include such writers as Lady Murasaki, Mme de Lafayette, and Charlotte Bronte. General Education credit: Civilization and Culture/Non-Introductory. Recommended GE preparation: any course from the GE Literature Preparation List.

140. Thematic and Structural Study of Literature (4) III. Hannoo Lecture/discussion—3 hours; term paper. Interpretation of selected works illustrating the historical evolution of themes, as well as of formal and structural elements.


*142. Critical Reading and Analysis (4) III. The Staff (Director in charge) Lecture/discussion—3 hours; term paper. Prerequisites: completion of courses in English 1-3 and a course in English literature or creative writing. Focuses on critical reading, analysis, and interpretation of literature. This course should be taken in the junior year. General Education credit: Civilization and Culture/Non-Introductory. Recommended GE preparation: any course from the GE Literature Preparation List.

145. Representations of the City (4) I. Hannoo Lecture/discussion—3 hours; term paper. Examination of the portrayal of the modern city in 19th and 20th century western literature. Readings include works by Balzac, Dickens, Poe, Balzac, Dostoevsky, Whitman, Zola, T.S. Eliot, and William Carlos Williams.

*146. Myth in Literature (4) III. Schaefer Lecture—3 hours; term paper. Prerequisite: course 6 recommended. Comparative study of different versions of one or more mythical myths, with attention to their cultural settings, fictional and literary forms of representation, as well as to their psychological dimensions.

153. The Forms of Asian Literature (3) III. Ury Lecture/discussion—3 hours; term paper. Prerequisites: 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/Non-Introductory. Recommended GE preparation: any course from the GE Literature Preparation List.

157. War and Peace in Literature (4) I. Blanchard Lecture/discussion—3 hours; term paper. Prerequisites: courses 1, 2, or 3, or consent of instructor. Study of a few major works from Western and non-Western literature which seeks to illuminate the way in which literature from antiquity to the present has been influenced by the awareness of war throughout the ages. General Education credit: Civilization and Culture/Non-Introductory. Recommended GE preparation: any course from the GE Literature Preparation List.

*158. The Detective Story as Literature (4) I. The Staff Lecture—3 hours; term paper. Study of the origins, literary and social background, development and implications of the literature of detection in a comparative context.

159A-G. Special Topics in Comparative Literature (1) I. The Staff (Director in charge) Lecture/discussion—3 hours; term paper. Intensive study of selected subjects: (A) The Play Within the Play; (B) The Lyrical Novel; (C) Women in Literature; (D) The Role of Philosophy in Literature; (E) The Role of Religious Experience in Literature; (F) The Literary Experience in Literature; (G) The Literary At_UARTs and Judgment. May be repeated for credit in different subject area. General Education credit: 159C: Civilization and Culture/Non-Introductory. Recommended GE preparation: any course from the GE Literature Preparation List.

160A. The Modern Novel (4) III. Finney Lecture/discussion—3 hours; term paper. The changing image of man and the individual as seen in novels by such writers as Hemingway, Proust, and Mann. General Education credit: Civilization and Culture/Non-Introductory. Recommended GE preparation: any course from the GE Literature Preparation List.

*160B. The Modern Novel (4) Cohn Lecture/discussion—3 hours; term paper. Readings in representative authors such as Ibsen, Strindberg, Chekhov, Pirandello and Brecht. General Education credit: Civilization and Culture/Non-Introductory. Recommended GE preparation: any course from the GE Literature Preparation List.

161A. Tragedy (4) I. Cohn Lecture/discussion—3 hours; term paper. Preservation and changing aspects of tragedy from ancient times to the present. General Education credit: Civilization and Culture/Non-Introductory. Recommended GE preparation: any course from the GE Literature Preparation List.

161B. Comedy (4) II. Cohn Lecture/discussion—3 hours; term paper. Comic attitudes toward life in literary works of different ages. General Education credit: Civilization and Culture/Non-Introductory. Recommended GE preparation: any course from the GE Literature Preparation List.


164A. The Middle Ages (4) II. Armstrong Lecture/discussion—3 hours; term paper. Readings in heroic epics, chivalric romances, and such major authors as Dante and Chaucer, with emphasis on shared assumptions common to all medieval writers. General Education credit: Civilization and Culture/Non-Introductory. Recommended GE preparation: any course from the GE Literature Preparation List.

*164B. The Renaissance (4) II. Torrance Lecture/discussion—3 hours; term paper. Readings in major authors such as Petrarch, Machiavelli, Erasmus, Montaigne, Rabelais, Cervantes, and Shakespeare, with particular attention to the implications of the possibilities and limitations of man. General Education credit: Civilization and Culture/Non-Introductory. Recommended GE preparation: any course from the GE Literature Preparation List.

164C. Baroque and Neoclassicism (4) III. Torrance Lecture/discussion—3 hours; term paper. Readings in major authors such as Cai'dermon, Corneille, Pascal, Racine, Milton, and Grimmelshausen, with consideration of the tension between the expansive energies of the "baroque" and the restraints of dogma and reason.

164D. The Enlightenment (4) III. Kusoh Lecture/discussion—3 hours; term paper. Study of various forms of epic poetry in both the oral and literary traditions. May be repeated for credit in different subject area. General Education credit: Civilization and Culture/Non-Introductory. Recommended GE preparation: any course from the GE Literature Preparation List.

*166B. The Novel (4) II. Dale Lecture/discussion—3 hours; term paper. Readings in various forms of the novel such as the picaresque, the developmental, and the confessional, with emphasis on the evolution of the genre. May be repeated for credit in different subject area. General Education credit: Civilization and Culture/Non-Introductory. Recommended GE preparation: any course from the GE Literature Preparation List.

167. Comparative Study of Major Authors (4) I. Schaefer Lecture/discussion—3 hours; term paper. Prerequisite: consent of instructor. Pivotal works of artists in the Western mainstream, such as Dante, Shakespeare, Cervantes, Goethe, Tolstoi, Proust, and Joyce.

*Course not offered this academic year.
168A. Romanticism (4) III. Lokee
Discussion—3 hours; term paper. Prerequisite: any introductory course in literature. Introduction to the Romantic movement with emphasis upon romantic concepts of the self, irony, love, the imagination and artistic creativity, and the relationship of the individual to nature and society. General Education credit: Civilization and Culture/Non-introductory. Recommended GE preparation: any course from the GE Literature Preparation List.

*168B. Realism and Naturalism (4) III. Finney
Discussion—3 hours; term paper. Prerequisite: consent of instructor. Novels and plays by Dickens, Zola, Flaubert, Dreiser, Ibsen, and Strindberg investigate marriage and adultery, the city and its perils, the hardships of industrialization, the war between the sexes, the New Woman, and other 19th-century themes. (30 semester credit hours). General Education credit: Civilization and Culture/Non-introductory. Recommended GE preparation: any course from the GE Literature Preparation List.

*169. The Avant-Garde (4) III. Cohn
Lecture/discussion—3 hours; term paper. Studies in movements such as surrealism, expressionism and the absurd. General Education credit: Civilization and Culture/Non-introductory. Recommended GE preparation: any course from the GE Literature Preparation List.

170. The Contemporary Novel (4) III. Torrance
Lecture—3 hours; term paper. Study of important novels from different parts of the world, including Asia, Latin America, Europe, and the United States, in the period from the Second World War to the present. General Education credit: Civilization and Culture/Non-introductory. Recommended GE preparation: any course from the GE Literature Preparation List.

194H. Special Study for Honors Students (1-5) I, II, III. The Staff (Director in charge)
Independent study—1-5 hours. Prerequisite: open only to those students 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.)

197T. Tutoring in Comparative Literature (1-5) I, II, III. Hoerman
Discussion—2-4 hours. Prerequisite: upper division standing with declared major in Comparative Literature. Tutoring in undergraduate courses including leadership in small voluntary discussion groups affiliated with current courses offered by Comparative Literature. May be repeated for credit for up to 6 units. (P/NP grading only.)

198. Directed Group Study for Advanced Undergraduates (1-5) I, II, III. The Staff (Director in charge)
(P/NP grading only.)

199. Special Study for Advanced Undergraduates (1-5) I, II, III. The Staff (Director in charge)
(P/NP grading only.)

Graduate Courses

200. Introduction to the Graduate Study of Comparative Literature (4) I. Finney
Seminar—3 hours; research paper. Prerequisite: reading knowledge of one foreign language. Introduction to research tools, library resources, and critical concerns of Comparative Literature, with focus on the comparative study of a single work, culminating in a related research project.

201. Theories of Comparative Literature (4) III. Torrance
Seminar—3 hours; research paper. Prerequisite: reading knowledge of one foreign language; course 141 or the equivalent recommended. An examination of international theories of literature with reference to language, genre, themes, social and historical context.

250A. Research in Comparative Literature (4) I, II, III. The Staff (Director in charge)
Individual instruction—1 hour. Prerequisite: course 200. Individually guided research, under the supervision of a faculty member, in a comparative topic culminating in a term paper. Required of M.A. and Ph.D. candidates.

250B. Research in Comparative Study of Author, Period, or Genre (4) I, II, III. The Staff (Director in charge)
Individual instruction—1 hour. Prerequisite: course 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: course 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.

298. Directed Group Study (1-5) I, II, III
Prerequisite: graduate standing. (SU grading only.)

299. Individual Study (1-12) I, II, III. The Staff (Director in charge)
(SU grading only.)

299D. Special Study for the Doctoral Dissertation (1-12) I, II, III
(SU grading only.)

Professional Courses

390. Teaching Comparative Literature in College (3) I. The Staff
Lecture—1 hour; discussion—2 hours. Methods of teaching Comparative Literature with specific applications to the introductory courses 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, III. The Staff
Discussion—1 hour. Regular consultations between the student instructor teaching Comparative Literature courses and a supervisor. In-class evaluation of teaching. May be repeated for credit after consultation with supervisor. (SU grading only.)

Comparative Literature
(A Graduate Group)

Joseph G. Zink, D.V.M., Ph.D., Chairperson of the Group
Group Office, 1126 Hersey Hall (916-752-1365)

Graduate Study. The Graduate Group in Comparative Pathology offers the M.S. and Ph.D. 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 disciplines so that students with diverse 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., M.D. 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 very flexible. The goal is to specialize in one field of principal interest and attain competence in one or more related areas.

Graduate Adviser: D. L. Dunworth (Pathology).

Comparative Pathology
See Computer Science; Computer Science (A Graduate Group); Engineering: Computer Science; and Engineering: Electrical and Computer Science

Computer Science

(Office of the College of Letters and Science)

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.

*Course not offered this academic year.
Computer Science (A Graduate Group)
Robert M. Keller, Ph.D., Chairperson of the Group

Preparatory Subject Matter

Computer Science Engineering 100 or 110
Electrical and Computer Science Engineering 171

Computer science electives

Minimum of 15 units from Computer Science Engineering 142, 152, 180, 195, 168, 170, 172, 175, 199 (maximum 3 units), Electrical and Computer Science Engineering 176, 177, 182B

Upper division mathematics

Minimum of 15 units of approved upper division courses in mathematics and/or statistics. Any upper division course in mathematics or statistics is approved for this requirement except the following:

Mathematics 100 and any mathematics course numbered above 188
Any statistics course numbered below 131 or above 188

Total Units for the Major

102

Major Advisers. M. Archer, R. Linz, R. Olson
(Computer Science)

Graduate Study. See the Graduate Division section in this catalog.

Consumer Economics

(College of Agricultural and Environmental Sciences)

Preparatory Subject Matter

Computer Science, core courses

Electrical and Computer Science Engineering 182A

Computer science electives

Minimum of 14 units from Computer Science Engineering 142, 152, 180, 195, 168, 170, 172, 175, 199 (maximum 3 units), Electrical and Computer Science Engineering 176, 177, 182B

Upper division mathematics

Minimum of 15 units of approved upper division courses in mathematics and/or statistics. Any upper division course in mathematics or statistics is approved for this requirement except the following:

Mathematics 108 and any mathematics course numbered above 188
Any statistics course numbered below 131 or above 188

Total Units for the Major

102

Major Advisers. M. Archer, R. Linz, R. Olson
(Computer Science)

Graduate Study. See the Graduate Division section in this catalog.

Consumer Food Science

(College of Agricultural and Environmental Sciences)

The Major Program

Consumer food science emphasizes the socio-economic, cultural, and nutritional aspects of foods as they relate to consumer acceptability and use.

The Program. Students take courses in consumer economics, nutrition, the scientific principles behind food preparation, sensory evaluation (smelling and tasting), food and culture, consumer behavior, and food product development. New courses make it into the marketplace. By working closely with an advisor, a student can develop a program which will satisfy its wide variety of goals, including jobs in industry, teaching, and graduate study in food sciences.

Career Alternatives. Graduates in this major are prepared for jobs in food product development, quality assurance, marketing and sensory analysis, extension work, creative writing, and community service. Some jobs include work in direct contact with consumers to determine the sensory characteristics of foods. They may be involved in examining foods, either in the laboratory or in the marketplace. Some students obtain the requirements for a teaching credential and teach elementary or high school home economics, while others go on to obtain a master's or Ph.D. in a related area.


Consumer Science
(College of Agricultural and Environmental Sciences)
Faculty. See under the Division of Textiles and Clothing, and the Departments of Agricultural Economics and Food Science and Technology.

Major Programs and Graduate Study. Consumer Food Science is a related major. For graduate study, see the Graduate Division section in this catalog.

See Consumer Economics, Food Science and Technology, Nutrition, and Textiles and Clothing.

Courses in Consumer Science
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) I, II, III. Schutz; Internship—3-36 hours. Prerequisite: consent of instructor. Internship on and off campus in a consumer science related area. (P/NP grading only.)

Upper Division Courses:
135. Principles of Food Product Development (3) I. Schutz; Lecture—3 hours. Prerequisite: course in introductory food science. Presents basic concepts of product research and development. Organization, activities, new product development, project management. Role of food regulations, consumerism, marketing, advertising, consumer research.

192. Internship in Consumer Science (1-12) I, II, III. Schutz; Internship—3-36 hours. Prerequisite: completion of a minimum of 84 units; consent of instructor. Internship on and off campus in a consumer science related area. (P/NP grading only.)

Graduate Courses
200. Consumer Research Methods (3) II. Schutz; Lecture—3 hours. Prerequisite: graduate standing or consent of instructor. Topics will include consumer laboratory and field attitude research, consumer sampling, measurement techniques, scales and methods of analysis.

239. Research (1-12) I, II, III. Schutz (SU grading only)

Consumer Technology
(College of Agricultural and Environmental Sciences)
Faculty. See under Department of Agricultural Engineering.

Courses in Consumer Technology
Questions pertaining to the following courses should be directed to the Instructor or the Department of Agricultural Engineering, 2030 Balzer Hall.

Lower Division Courses:
15. Experiments in Creative Woodworking (1) III. Grimer; Laboratory—2 hours. Experimental comparison of techniques for creating objects and structures of wood. Physical principles and properties of woods as related to structural stability, selection and use of tools, and aesthetics in design; finish to preserve, enhance, or create effects.

16. Experiments in Creative Metalworking (2) I. J. Rumsey; Lecture—1 hour; laboratory—2 hours. Prerequisite: Chemistry 1A and Physics 5A recommended. Experimental comparison of techniques for creating objects and structures of metal. Physical principles; design considerations; effects of techniques on quality and appearance; bases for self evaluation of skills. Layout, cutting, forming, welding and finishing. (P/NP grading only.)

17. Electrical Appliances and Systems (2) II. Miles; Lecture—1 hour; laboratory—3 hours. Characteristics and principles of electrical appliances and systems for lighting, heating, and power. Principles of electricity, loads, distribution, and control; safety; planning systems and selecting appliances.

98. Directed Group Study (1-5) I, II, III. The Staff (Student in charge); Prerequisite: consent of Instructor. (P/NP grading only.)

99. Special Study for Lower Division Students (1-5) I, II, III. The Staff (Student in charge); (P/NP grading only)

Upper Division Courses:
101. Engines for Automotive, Agricultural, Residential, and Recreational Use (3) III. U. Upadhyaya; Lecture—2 hours; laboratory—2 hours. Prerequisites: upper division standing or consent of instructor. Principles of engine construction and operation. Various Otto and Diesel cycles. Engine efficiencies and power measurements. Study of valves, fuels, combustion, and fuel injection, conventional and electronic ignition, starting and charging, cooling, lubricating and emission control systems.

111. Home Design (2) III. Garrett; Lecture—1 hour; discussion—1 hour; two term projects. Study of factors to be considered in planning, buying, or remodeling homes, including location, orientation, layout, traffic patterns, size, aesthetics, facilities, materials, building codes, regulations, safety, and financing.

196. Individual Projects (1-2) I, II, III. The Staff; Prerequisite: consent of Instructor. Directed exercises in planning and executing independent projects consistent with the student's abilities. (P/NP grading only.)

198. Directed Group Study (1-5) I, II, III. The Staff (Student in charge); (P/NP grading only)

199. Special Study for Advanced Undergraduates (1-5) I, II, III. The Staff (Student in charge); (P/NP grading only)

Dance
See Physical Education

Dermatology
See Medicine, School of
Courses in Design

Questions pertaining to the following courses should be directed to the instructor or to the Advising Center for the major, 152 Walker Hall (916-752-1159).

Lower Division Courses

1. Introduction to Design (4) I. Gotelli
   Lecture—4 hours. Evolution of 20th-century design emphasizing design elements, materials, principles, and vocabulary.

2. Design Methodology (4) III. The Staff (Olsen in charge)
   Lecture—4 hours. Prerequisite: course 1 recommended. Introduction to mental, visual, and sensory processes leading to creation of new forms, images, objects, and environments. Emphasis will be on imagining, producing, evaluating, and communicating ideas in the design process.

3. Fantasy Design (4) II. Gotelli
   Lecture—4 hours; discussion—1 hour. Prerequisite: course 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.

4. Drawing Studio (4) I. The Staff (Olsen in charge)
   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).

5. Media Studio (2) II. The Staff (Olsen in charge)
   Studio—8 hours; field trip. Prerequisite: course 2 must be taken concurrently; priority enrollment to Design majors. Tools, materials, and techniques used in the designer's studio.

6. Photography Media Studio (4) III. The Staff (Olsen in charge)
   Studio—8 hours. Prerequisite: course 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 development.

7. Drafting and Perspective (4) I. Olsen and staff
   Studio—8 hours. Prerequisite: course in drawing recommended. Creation of three-dimensional designs on two-dimensional surfaces.

8. Basic Imagery (4) I. Bulte
   Studio—8 hours. Prerequisite: courses 11, 12. Presentation of the fundamentals of designed images, combining a theoretical perspective with practice using the components of visual literacy. Specific focus upon (1) abstraction structure, (2) symbolism, and (3) representation.

9. Personal Adornment (4) I. Stabb
   Studio—8 hours; field trip. Exploration of the human image altered through ornament and its relation to the human form.

10. Hand Constructed Textiles (4) I. Laky
    Studio—8 hours; one or two field trips. Prerequisite: courses 11, 12. Contemporary approach to textile techniques of construction such as netting, piecing, knotting, and braiding.

11. Reproduction Graphics (4) II. The Staff (Olsen 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, mechanical and four-color screen separations.

12. Special Study for Undergraduates (1-5) I, II, III. The Staff (Thayer in charge)
    Prerequisite: consent of Instructor. (P/NP grading only)

Upper Division Courses

13. Design Delegation (4) II. Olsen and staff
    Studio—8 hours; field trip. Prerequisite: courses 11, 12, and 21. Exploration of the process of delegation, including principles of persuasive drawing, rapid visual communication, and collaborative critical thinking, rendering, and graphic presentation methods.

14. Textile Structures (4) III. Laky
    Studio—8 hours; field trip. Prerequisite: course 23 or 24. Art and science of hand building structures in flexible materials. Studying projects in experimental two- and three-dimensional forms with some emphasis on relationships to architecture, furniture and interiors.

15. Textiles in the Landscape (4) III. Shewcroft
    Lecture—2 hours; studio—5 hours. Prerequisite: courses 21, 22, 24. Structuring organic and mechanical forms in textiles, working with the symbiotic relationship of these textiles and their immediate placement in the outdoor landscape.

16A. Visual Presentation: Visual Merchandising (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 visual merchandising.

16B. Visual Presentation: Exhibition Design (4) I. Gotelli
    Studio—8 hours; one or two field trips. Prerequisite: background in drawing, personal adornment and non-loom textiles recommended. Exploration of multiple-media and multi-dimensional textiles: applique, patchwork, quilting, stomp work. The individualized influences of materials and techniques on contemporary textiles.

17A. Loom-Constructed Textile Design (4) I. Shewcroft
    Studio—8 hours. Prerequisite: course 23 or 24. Foundation course in handwoven textile structure and design, emphasizing yarn identification, basic draft and basic weaves and their derivatives explored in context of original color effects and yarn combinations.

17B. Loom-Constructed Textile Design (4) II. Shewcroft
    Studio—8 hours. Prerequisite: course 132A. Intermediate level study of complex fabric structure with emphasis on pattern in relation to surface, dimension, and material.

17C. Computer-Aided Textile Design (4) III. Shewcroft
    Studio—8 hours. Prerequisite: course 132B. Microcomputer applications to the structure, design, and weaving of fabrics, emphasizing advanced compositional, drafting, and plotting of multi-dimensional, original weave structures.

17D-133B. Optical Metaphor (4-5) I, II. Butler
    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.

17A. Fundamentals of Interior Architecture (4) I. Harrison and staff (Olsen in charge)
    Studio—8 hours. Prerequisite: courses 11, 12, 13, and 14. Study and practice of design process through simple space planning problems focused on residential and small commercial installations.

17B. Fundamentals of Interior Architecture (4) II. Beretta
    Studio—8 hours. Prerequisite: course 17A. Problems emphasize energy considerations, structure, building systems, and architectural harmony in the urban environment.

17C. Fundamentals of Interior Architecture (4) III. Harrison and staff (Olsen in charge)
    Studio—8 hours. Prerequisite: course 17B. Problems emphasize the design of special and technical environments such as laboratories, medical facilities, and computer installations. Personal environments for the handicapped, aged, and very young.

17D. Furniture Design (4) III. Olsen
    Studio—8 hours; some or two field trips. Prerequisite:
course 21; course 180A recommended. Development of furniture for interior and exterior spaces. Includes behavioral and physical requirements; cultural and historical expression; structural and aesthetic considerations.

140. History of Design (4) II. The Staff (Olsen in charge)
Lecture—4 hours. Prerequisite: Art 1A or the equivalent. Historical survey of the changing relationship of society to its practices and techniques of making and using tools and objects; technological changes, development of design terminology; consumer goods, handworkmanship, and industrial design.

142A. World Textiles: East and Pacific (4) I. Rivers
Lecture—4 hours, field trip. Prerequisite: courses 132A, 132B, 1604A, or 1704A (concurrently) highly recommended; courses 1A, 1B, 1C also recommended. Textiles arts of Japan, China, Africa, India, Oceania, Indonesia, and the Pacific Islands with emphasis on the aesthetic and stylistic qualities of these cultures.

142B. World Textiles: Middle East, Europe and the Americas (4) III. Lacy
Lecture—4 hours; two field trips. Prerequisite: courses 1A, 1B, 1C or the equivalent. Historical survey of the changing relationship of society to its practices and techniques of making and using tools and objects; technological changes, development of design terminology; consumer goods, handworkmanship, and industrial design.

143. History of Costume Design (4) II. Stabb
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. The Staff (Olsen in charge)
Lecture—4 hours. Prerequisite: course 140 and Art 1C or the equivalent. History of interior design in Europe from the classical period to modern times. Emphasis on the dwelling in its cultural setting and the development of the theory of modern interior design.

1604A-160B-160C. Textile Design (4-4-4) II, III, IV. The Staff (Olsen in charge)
Study—6 hours; one or two field trips. Prerequisite: courses 12 and 13 recommended. Exploration of the design and appreciation of hand printed textiles; emphasis on the unique qualities of the individual as a producer.

170A-170B-170C. Costume Design (4-4-4) III-IV-III. Stabb
Study—6 hours; field trip. Prerequisite: courses 11 and 23. Studio projects in costume design; consideration of the historic and contemporary, and projected image of man as expressed through costume.

180A. Advanced Interior Architecture (4) I. Olsen and staff (Olsen in charge)
Study—6 hours; field trip. Prerequisite: course 134C and senior standing. Advanced problems in interior architectural design emphasizing re-use of existing buildings. Focus is on commercial and retail environments, codes requirements, color and lighting.

180B. Advanced Interior Architecture (4) II. Harrison and staff (Olsen in charge)
Study—6 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. Bertaux
Study—6 hours; field trip. Prerequisite: course 180B. Design of a complex facility, including the integration of interior design, building structure and building systems.

190. Proseminar (1) I. Harrison
Seminar—1 hour. Prerequisite: design major or consent of instructor. Philosophies of design explored through discussion and presentation of research results. May be repeated three times for credit. (P/NP grading only.)

191A-D. Workshops in Design (4-12) I, II, III. The Staff (Olsen in charge)
Seminar—1 hour; studio or field experience—3 hours per unit (determined by instructor and student); field trip. Prerequisite: courses 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 grading by contract.

192. Internship (1-6) I, II, III. Summer. The Staff (Olsen in charge)
Internship—3-6 hours. Prerequisite: completion of 84 units and consent of instructor. Supervised internship, off and on campus, in areas of design including cultural, costume, textile, museum, display and interior design. Enroll limited to 3 units per quarter or 6 units per summer session. (P/NP grading only.)

197T. Tutoring in Design (1-5) II, III, IV. The Staff (Olsen in charge)
Discussion—3-15 hours. Prerequisite: upper division standing and consent of instructor. Leading of small discussion groups or studio meetings affiliated with one of the department's regular courses. (P/NP grading only.)

98. Directed Group Study Group (1-5) I, II, III. The Staff (Olsen in charge)
Prerequisite: upper division standing and consent of instructor. (P/NP grading only.)

199. Special Study of Advanced Undergraduates (1-5) I, II. The Staff (Olsen in charge)
(P/NP grading only.)

Graduate Courses

290. Directed Group Study for Graduate Students (1-5) I, II, III. The Staff (Chairperson in charge)
Study—variable hours. Prerequisite: consent of instructor. (SU/G grading only.)

299. Directed Individual Study for Graduate Students (1-5) I, II, III. The Staff (Chairperson in charge)
Study—variable hours. Prerequisite: consent of instructor. (SU/G grading only.)


Development, Resource, and Consumer Economics

See Agricultural and Managerial Economics

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 courses as nutrition science majors, but in dietetics there is less emphasis on laboratory aspects of the science courses. Instead, dietetics majors take additional courses such as education, sociology, communication skills, and food service management to prepare for work with the public. Dietetics students spend the first two years completing preparatory course work in the basic biological sciences, along with several of the social sciences. In the final two years, students take courses in normal and clinical nutrition, food science, biochemistry, and management techniques.

Career Alternatives. The dietetics major qualifies students to apply for the American Dietetics Association "accredited internship," enabling them to become a Registered Dietitian, the professional credential necessary to work in a clinical setting. Once dietitians are registered, they generally seek employment in administrative, therapeutic, teaching, research, or public health/public service positions in clinics, hospitals, schools, or other similar institutions. There is a growing role for dietitians working in settings outside of the traditional hospital (for example, in state and federal nutrition programs, nutrition education, Peace Corps and Cooperative Extension work). Students who complete the undergraduate preparation in dietetics are also qualified to enter graduate programs in dietetics, nutrition science, public health nutrition, and food service management.

B.S. Major Requirements:

(Fo 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 ........................................... 9-8
See College Requirements

Preparatory Subject Matter ......................................................... 55-53
Biological sciences (Biological Sciences 1A, 1B) .................. 10
Chemistry (Chemistry 1A, 1B, 2A, 2B) .............................. 16
Computer science (Agricultural Science 1C, 2C, and Management 1 or Computer Science 110) ..................... 3
Economic principles (Economics 1A or 1B) .............................. 5
Microbiology (Microbiology 102, 102L) .............................. 6
Psychology (Psychology 1) ......................................................... 4
Social science theory (Sociology 1 or 3 or Anthropology 2) .... 4-6
Statistics (Statistics 131) .............................................................. 4
Breath/General Education ......................................................... 6-24
Satisfaction of General Education requirement ..................... 6-24

Depth Subject Matter ................................................................. 71-72
Agricultural Economics 112 ..................................................... 4
Applied Behavioral Sciences 173 or Education 110 or 111 .... 4
Biological chemistry (Biochemistry 101A-101B or Physiology 101A-101B) ......................................................... 6-7
Food Science and Technology 100A, 100B ......................... 10
Food Service Management 120, 120L, 121, 122, 123, 124, 144, 148, 148L, 118, 119 ......................................................... 26
Phyology (Phyology 110, 110L) ................................................. 7
Unrestricted Electives ................................................................. 23-43
Total Units for the Major ......................................................... 190

Major Adviser. J. Prophet (Nutrition).

Advising Center for the major is located in 1151 Meyer Hall (916-752-9212).

Graduate Study. See the Graduate Division section in this catalog.
Dramatic Art

(College of Letters and Sciences)

Robert A. Fahnner, Ph.D., Chairperson of the Department
Department Office, 222 Dramatic Art Building (916-752-0888)

Faculty
Elizabeth Carolin, M.F.A., Assistant Professor
Ruby Cohn, Ph.D., Professor (Dramatic Art, Comparative Literature)
Everard d'Hemoncourt, Ph.D., Professor Emeritus
Robert A. Fahnner, Ph.D., Professor
Ralph Fehrer, M.A., Associate Professor
Harry C. Johnson, M.A., Professor
William E. Kleb, D.F.A., Associate Professor
Phyllis J. Kress, M.F.A., Adjunct Lecturer
Robert K. Serlo, Ph.D., Professor
Daniel E. Snyder, Professor
Ain A. Stambusky, D.F.A., Professor
Craig Volk, M.F.A., Assistant Professor
Darrin F. Winn, M.A., Adjunct Lecturer

The Major Program

The Department of Dramatic Art offers students an opportunity to develop their talents and abilities through a broad spectrum of courses combining both artistic and scholarly skills. The dramatic art major is designed for students planning a career in the field of theatre, preparing students for a career that involves both artistic and technical skills.

Productions and Facilities. Productions each year are selected from three "seasons." The University Theatre Season consists of five major productions of established plays. Five smaller productions of new and student-written plays play in the Studio Theatre, while the New Studio Season consists of five smaller productions of new plays. Also included in the annual program is an opportunity to study theatre through the production of an experimental and varied schedule of plays.

Guest Artists. The department’s Granada Artists-in-Residence program brings distinguished British theatre artists to the department each quarter to teach and direct.

Career Alternatives. The various skills involved in a career in theatre education open doors to many career possibilities. Arts management is a relatively new area calling for people with artistic training. Graduates from the department will find career opportunities in community theatre, museums, lighting firms, and advertising. Training in acting helps those interested in the pursuit of law, business, public relations, or public office. There are always those few who--with talent and luck--succeed as actors, directors, or designers for stage, film, or television.

A.B. Major Requirements:

- Preparatory Subject Matter: 22 units
- Additional units to equal a total of 22 lower division units in Dramatic Art: 4-6 units
- Total Units: 67

Additional Requirements
During the undergraduate career majors are expected to participate in at least eight dramatic productions (exclusive of classroom projects). Participation must include work in acting, scene construction, costume construction, lighting, stage managing or directing. Majors are also expected to attend theatre performances.

Total Units for the Major: 62

Minor Program Requirements:

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<th>Units</th>
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Dramatic Art 124A, 124B, 124C, or 124D, 127A, 127B, or 150B, 156, 157, 158, 159, 180, 190A, 190B: A minimum of 4 elective units chosen from the following: Dramatic Art 115, 121A, 121B, 124C, 124D, 126, 150, 153, 156; or, if the student's career involves work in language and literary studies.

Courses in Dramatic Art

Lower Division Courses

10. Introduction to Acting (3)
11. I, II, III. The Staff
12. Laboratory-discussion--3 hours; film viewing--2 hours, prerequisite: course 218 and consent of instructor. Theory and practice of acting focusing on performance problems and the maximization of individual resources.

13. A. Advanced Acting (4)
14. I, II. The Staff
15. Introduction to Film Making (2)
16. I, II, III. The Staff
17. Lecture--discussion--3 hours; film viewing--2 hours, prerequisite: course 151 or consent of instructor. Students in small groups will work, shoot, and edit 6 mm films, and prepare sound tracks for them.

20. Introduction to Dramatic Art (4)
21. I, II. Volk
22. Lecture--discussion--3 hours; discussion--1 hour.

23. Fundamentals of Acting (4)
24. I, II. The Staff
25. Lecture--discussion--3 hours; laboratory--2 hours. Prerequisite: course 240 and consent of instructor. Theory and practice of acting with emphasis on character analysis, interpretation, and development. Acting in a student-directed project. Viewing of theatre productions. At least 60% of units must be under the direction of the student.

27. I, Snyder
28. Lecture--discussion--3 hours; laboratory--2 hours. Understanding and appreciation of the visual aspects of dramatic art: theatre architecture, scenery, lighting, costume, and makeup.

29. Technical Aspects of Dramatic Art (2)
30. I, II. The Staff
31. Lecture--1 hour; laboratory--2 hours. Understanding and appreciation of the technical principles of dramatic production: basic tools and materials, principles of scene construction; scene painting, costume construction, stage lighting, and sound equipment and control systems.

32. Fundamentals of Playwriting and Directing (3)
33. I, II. Klein
34. Discussion--2 hours; workshop--2 hours; reading of selected texts in the theory of directing and playwriting.

35. Course: consent of instructor. Exercises in conceiving and developing theatre pieces with emphasis upon the creative collaboration of playwright and director.

36. Theatre Laboratory II (5-5)
37. I, II, III. The Staff
38. Prerequisite: courses 215 or consent of instructor. Projects in acting, production, scene design, costuming, lighting, directing, and playwriting. Participation in departmental productions. May be repeated for credit up to a total of 8 units.

39. Directed Group Study II (5-5)
40. I, II, III. The Staff
41. Chairperson in charge
42. Primarily for lower division students.

43. Special Study for Undergraduates II (5-5)
44. I, II. The Staff
45. (P/NP grading only)

Upper Division Courses

46. Advanced Study of Major Film Makers (4)
47. I, II. The Staff
48. Lecture-discussion--3 hours; film viewing--2 hours. Prerequisite: course 15. Analysis of the contribution of some outstanding film creators. Study of diverse aesthetic theories of cinema and their application to selected films. May be repeated for credit when different film creator studied.

49. A. Advanced Acting I (4)
50. I, Johnson
51. Lecture--discussion--3 hours; laboratory--4 hours. Prerequisite: course 218 and consent of instructor. Theory and practice of directing focusing on performance problems and the maximization of individual resources.

52. Advanced Acting II (4)
53. I, II. The Staff
54. Lecture--discussion--3 hours; laboratory--4 hours. Prerequisite: course 218 and consent of instructor. Theory and practice of directing focusing on performance problems and the maximization of individual resources.

55. Principles of Theatrical Design: Scenery (4)
56. I, II. The Staff
57. Lecture-discussion--4 hours. Prerequisite: course 24 and consent of instructor. Designers of scenic elements of design, execution of designs for modern and period plays.

58. Principles of Theatrical Design: Lighting (4)
59. I, Winn
60. Lecture-discussion--4 hours. Prerequisite: course 24 or consent of instructor. Designers of lighting the stage, equipment and control systems, execution of lighting designs.

61. Principles of Theatrical Design: Costume (4)
62. I, Kloss
63. Lecture-discussion--4 hours. Prerequisite: course 24 or consent of instructor. Designers of costume, execution of designs for modern and period plays.

64. Production Management (3)
65. I, II. Winn
66. Lecture-discussion--3 hours. Prerequisite: course 25. Theatrical production is a living organism from the beginning through production: techniques of stage management, technical direction, cueing procedures and audience control. Offered in alternate years.

67. Principles of Directing (4)
68. I, Stambusky
69. Lecture--2 hours; laboratory--4 hours. Prerequisite: courses 21A, 21B, or 27; 156, 157, 158, or consent of instructor. The director's creative approach to the play and its staging.
127B. Principles of Directing (4) II. Stambusky Lecture—2 hours; laboratory—4 hours; rehearsal. Prerequisite: course 127A and consent of instructor for non-majors. The director’s creative approach to the plays.

150. American Theatre and Drama (4) II. Sarlés 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. Kiepe Lecture—4 hours. History and development of the American Musical as a unique theatrical form. Offered in alternate years.

155. Black Theatre and Drama (4) III. Johnson Lecture—4 hours. Black theatre and drama today; the history, impact and current direction of the work of Blacks in the theatre. Offered in alternate years.

156. Theatre and Drama: Aeschylus to Machiavelli (4) II. 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/Non-Introductory. Recommended GE preparation: History 4A or 4B.

157. Theatre and Drama: Shakespeare to Schiller (4) II. The Staff Lecture—4 hours. Selected plays and the history of the theatre from the English Renaissance through the German and French Romanticism. General Education credit: Civilization and Culture/Non-Introductory. Recommended GE preparation: History 4A or 4B.

158. Theatre and Drama: Ibsen to Albee (4) III. Fahy Lecture—4 hours. Selected plays and the history of the theatre from English Romanticism to the present. 159. Contemporary Experimental Theatre and Drama (4) III. Kiepe Lecture—4 hours. Examination and evaluation of the "New Theatre." Course includes attending theatre events.

160A-160B. Principles of Playwriting (4-4) II. Volk, Kiepe Lecture/seminar—4 hours. Prerequisite: two courses in Dramatic Art or related courses in other departments. Analysis of dramatic structure; preparation of scenarios; the composition of plays.

180. Theatre Laboratory (1-5) I, II, III. The Staff Prerequisite: upper division standing and course 25, or consent of instructor. Projects in acting, production, scene design, costuming, lighting, directing, and playwriting. Participation in departmental productions. May be repeated for credit.

192. Directed Dramatic Art (1-12) I, II, III. The Staff (Chairperson in charge) Internship—3-36 hours. Prerequisite: upper division or graduate work in dramatic art; upper division course related to the project; consent of instructor and Department Chairperson. Internship outside the academic department enabling students to practice their skills. May be repeated for credit for a total of 12 units. (P/NP grading only.)

197T. Tutoring in Dramatic Art (1-5) I, II, III. The Staff (Chairperson in charge) Tutoring—1-5 hours. Prerequisite: upper division or graduate standing with major in dramatic art; consent of department chairperson. Leading of small voluntary groups affiliated with one of the department’s regular courses. May be repeated for credit. (P/NP grading only.)

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

199. Special Study for Advanced Undergraduates (1-5) I, II, III. The Staff (Chairperson in charge) Prerequisite: consent of Instructor. (P/NP grading only.)

Graduate Courses

200. Methods and Materials in Theatre Research (4) I. The Staff Seminar—3 hours; term paper. Essential research tools in theatre and related fields; bibliographies, primary sources; methods of evaluating and presenting evidence; delineating research areas in the field.

211. Advanced Voice and Speech (2) I, II, III. Carlin Laboratory—4 hours. Open to advanced undergraduates with consent of Instructor. Voice production and speech related to specific acting problems in classical plays, particularly in verse. May be repeated for credit.

212. Advanced Stage Movement (2) I, II, III. The Staff Laboratory—4 hours. Prerequisite: open to advanced undergraduates with consent of instructor. Rhymic movement, relation to acting problems in classical and modern plays. May be repeated for credit.

221. Special Problems In Advanced Acting (4) I, II, III. Carlin Seminar—2 hours; laboratory—4 hours. Prerequisite: consent of Instructor. Advanced acting problems arising from differences in the type and style of plays selected from Greece to the present. May be repeated for credit.

224A. Visual Problems In Theatre and Performance (4) I, Snyder Seminar—3 hours; term project. Special problems in visual and auditory aspects of theatrical production culminating in a single performance project. Open to Dramatic Art, Art, 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. Selected problems in the design of stage scenery and costumes; practice in design. May be repeated for credit.

224C. Advanced Principles and Theories of Theatrical Design (4) III. Snyder Seminar—3 hours; term paper. Design of a production for three different types of theatres: open stage, arena, and prosenium. May be repeated for credit.

224D. Advanced Principles and Theories of Theatrical Costume (4) II, III. Kress Seminar—3 hours; research and design projects—30 hours (minimum) total. Prerequisite: course 124D or consent of instructor. Costume design projects emphasizing research, principles, and theories; the planning and presentation of costume renderings, detail accessory sketches, and scale drawings of patterns. Projects from classical theatre, musical comedy, ballet, and opera. Offered in alternate years.

224E. Advanced Principles and Theories of Theatrical Lighting Design (4) II. Winn Seminar—3 hours; laboratory—2 hours. Prerequisite: course 124C, a scenic design course, and consent of instructor. Design concepts, script/directorial color, composition and style. Projects presented in studio atmosphere. Also included: renderings, written analyses, and draft plots. Offered in alternate years.

227. Seminar In Directing Theory: Reallam (4) III. Granada 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) IV. Volk 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. Carlin, Granada Seminar—2 hours; laboratory—2 hours; rehearsal—4 hours. Prerequisite: consent of Instructor. Projects in directing selected scenes from classical to modern theatre.

Seminar—3 hours; term paper. The theatre of Greece, Rome and Middle Ages; emphasis on relationship of dramas of the period to physical circumstances of production. Course 220A (may be taken separately) includes readings and discussion; 220B emphasizes research culminating in a substantial scholarly paper.

235A-235B. Renaissance and Baroque Theatre (4-4) I, II. Fahmy, Sarlés Seminar—3 hours; term paper. The theatre of Italy, Spain, England, and France, 1500-1660; emphasis on relationship of dramas of the period to physical circumstances of production. Course 225A (may be taken separately) includes readings and discussion; 225B emphasizes research culminating in a scholarly paper.

240A-240B. Neoclassic and Romantic Theatre (4-4) I, II. Fahmy, Sarlés Seminar—3 hours; term paper. The theatre of France, England, Germany, Italy, and America, 1660-1860; emphasis on relationship of dramas of the period to physical circumstances of production. Course 240A (may be taken separately) includes readings and discussion; 240B emphasizes research culminating in a scholarly paper.

250. Modern Theatre (4) II. Sarlés Seminar—3 hours; term paper. The theatre of Europe and America, 1860-1940, with emphasis on the relationship of the dramas of the period to the physical circumstances under which they were produced. Offered in alternate years.

259. Contemporary Theatre (4) I. Cohn Seminar—3 hours; term paper. Selected aspects of contemporary Western theatre, with attention to their modes of production.


265. Theory of Dramatic Art (4) I. Kiepe Seminar—3 hours; term paper. Theory and aesthetic principles of dramatic art as a fine art. Offered in alternate years.

280. Theatre Laboratory (1-12) I, II, III. The Staff Advanced practice in acting, designing, directing, playwriting, and technical theatre. May be repeated for credit.

289. Group Study (1-5) I, II, III. The Staff (Chairperson in charge) Prerequisite: consent of instructor.

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

299D. Dissertation Research (1-12) I, II, III. The Staff (Chairperson in charge) (SU grading only.)

Professional Course

413. Stage Make-up (1-1) I. The Staff Lecture/laboratory—2 hours. Prerequisite: consent of instructor. Approved for graduate degree credit. Lectures, demonstrations, and practical work in aspects of theatrical make-up.

Earth Sciences and Resources

(A Graduate Group)

Students admitted into the Earth Sciences and Resources Graduate Group before June 30, 1950 will be allowed to complete the degree in this subject. New students however, should see the Hydrologic Sciences Graduate Group section in this catalog.

Information. 113 Veihmeyer Hall (916-752-3240(43S))
Courses in Earth Sciences and Resources

Graduate Courses
200. Survey of Earth Sciences and Resources (2) G. Grimes
Lecture—1 hour; discussion—1 hour; paper. Prerequisite: open to students in the Earth Sciences and Resources program. Introductory course exposes students to the diversity of sciences involved in the program. Students prepare a paper and presentation in their area of interest. May be repeated once for credit. (S/U grading available.)

201. Earth Science and Resources (3) II. Moore (Geology)

297. Seminar in Earth Sciences (3) III. The Staff Seminar—3 hours. Prerequisite: graduate standing; consent of instructor. Seminar on current area of research in earth sciences and resources. Topic will change from year to year. May be repeated for credit.

298. Group Study (1-5) I, II, III. The Staff (Chairperson in charge)
Prerequisite: graduate standing and consent of instructor. (S/U grading only)

299. Research (1-12) I, II, III. The Staff (Chairperson in charge)
Prerequisite: graduate standing and consent of instructor. (S/U grading only)

### East Asian Studies

(College of Letters and Science)

Susan Mann, Ph.D., Program Director
Program Office, 922 Sproul Hall (916-752-1219)

**Faculty**
Robert Sorgen, Ph.D., Associate Professor (Chinese and Japanese)
Chia-ning Chang, Ph.D., Assistant Professor (Chinese and Japanese)
Mary Fong, PhD, Professor (Art and Art History)
Donald Gibbs, Ph.D., Associate Professor (Chinese and Japanese)
Susan Griswold, Ph.D., Assistant Professor (Chinese and Japanese)
Gary G. Hamilton, Ph.D., Professor (Sociology)
Joyce K. Kallgren, Ph.D. (Political Science)
Earl Kim, Ph.D., Professor (History)
Whalen W. Lai, Ph.D., Professor (Religious Studies)
Kwong-ching Liu, Ph.D., Professor (History)
Susan Mann, Ph.D., Professor (History)
Mau-ngie Ng, Ph.D., Associate Professor (Chinese and Japanese)
Don C. Price, Ph.D., Professor (History)
G. William Skinner, Ph.D. Professor (Anthropology)
Janet S. Smith, Ph.D., Professor (Anthropology)
Marlan Ury, Ph.D., Professor (Comparative Literature)
Benjamin E. Wallacker, Ph.D. Professor (Chinese and Japanese)
Michelle Yeh, Ph.D., Associate Professor (Chinese and Japanese)

**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 are normally advised to take 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., in journalism, business, government service, teaching, and counseling), or as preparation for graduate studies in the East Asian field.

**A.B. Major Requirements:**

| Course                          | Units
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<tr>
<td>Preparatory Subject Matter</td>
<td>4-8</td>
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<tr>
<td>History 9A, 9B</td>
<td>8</td>
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One course from Art 1D, Chinese 10, 11, Comparative Literature 53A, History 90A, Japanese 10, 25, Religious Studies 70, 75. 3-4

Two years (or the equivalent) of Chinese or Japanese language study (Chinese 1-2, Japanese 1-2). 23-24

Deep Subject Matter Requirements

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:**
- History 100B-109C, 149B-149C
- Anthropology 148A, 148B, 149A, 149B
- Economics 171
- Geography 127
- Political Science 148A, 148B
- Sociology 147

**Humanities:**
- Art 183A, 183B, 183C, 164
- Chinese 104, 106, 107
- Japanese 101, 102, 103
- Religious Studies 172

At least 12 additional units must be selected from the above courses, or from the following: Anthropology 110, 111, 112, 120, 122, 123, 124, 125, Chinese (any upper division course); Economics 115A, 115B, 116, 160A, 160B, 160D; Geography 143; History 102G, 102H, 102N, 102X, 102Y, 190A, 190B, 190C, 190D, 190E; Japanese (any upper division course); Linguistics 100; Political Science 127, 133, 138, 145, 148C; Sociology 115, 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: 74-75

**Recommended**
Students are strongly urged to take a substantial number of courses in Euro-American civilization as a basis for comparison for a deeper understanding of America's relations with East Asia.

**Minor Program Requirements:**
Courses taken for the minor are expected to reflect a predominant interest in either China or Japan, but also to provide some exposure to the other of the two countries. All courses counting towards the East Asian Studies major, including Individual and group study courses (198, 199), may be used to fulfill the requirements for the minor program, as long as they deal predominately with China, Japan, or both.

**East Asian Studies**

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<th>Course</th>
<th>Units</th>
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<tr>
<td>History 9B and 18 upper division units, of which at least 12 must be in courses focusing on China; OR History 9A and 18 upper division units, of which at least 12 must be in courses focusing on Japan</td>
<td>23-24</td>
</tr>
</tbody>
</table>

**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. Communist Chinese Society
- 148A. Traditional Japanese Society
- 148B. Contemporary Japanese Society

**Art**
- 1D. Asian Art
- 183A. Chinese Art
- 183B. Chinese Painting
- 183C. Painting in the People's Republic of China
- 184. The Arts of Japan

**Chinese**
- All courses.

**Comparative Literature**
- 53A. Literature of China and Japan
- 153. Forms of Asian Literature

**Economics**
- 127. Contemporary East Asia

**Geography**
- 127. Contemporary East Asia

**History**
- 9A. History of East Asian Civilization (China)
- 9B. History of East Asian Civilization (Japan)
- 102G. Undergraduate Seminar: China to 1800
- 102H. Undergraduate Seminar: China since 1800
- 102N. Undergraduate Seminar: Japan
- 102X. Late Imperial China: Background to Revolution
- 102Y. The Chinese Revolution
- 103A. Classical China
- 103B. High Imperial China
- 103C. History of the People's Republic of China, 1949 to the Present
- 104A. Aristocratic and Feudal Japan
- 104B. Early Modern Japan
- 104C. Modern Japan
- 104D. Business and Labor in Modern Japan
- 104E. Education and Technology in Modern Japan

**Japanese**
- All courses.

**Linguistics**
- 100. Languages of Eastern Asia

**Political Science**
- 133. The American Role in East Asia
- 138. International Relations: East Asia

**Sociology**
- 147. Sociological Perspectives on East Asia

**Religious Studies**
- 70. Introduction to Buddhism
- 75. Chinese Philosophy: An Introduction
- 172. Ch'an (Zen) Buddhism

**Sociology**
- 147. Sociological Perspectives on East Asia

**Courses in East Asian Studies**

**Upper Division Courses**

<table>
<thead>
<tr>
<th>Course</th>
<th>Units</th>
</tr>
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<tbody>
<tr>
<td>113. Cinema and Society in China (4)</td>
<td>3</td>
</tr>
</tbody>
</table>
Internship—3—36 hours; term paper. Prerequisite: upper division standing and consent of instructor. Work experience in the East Asian Studies field, with analytical term paper on a topic approved by the instructor. (P/NP grading only.)

194H. Special Study for Honors Students (1-6) I, II, III. The Staff (Chairperson in charge)
Individually arranged. Prerequisite: open only to majors of senior standing who qualify for honors program. Guided research, under the direction of a faculty member, leading to a senior honors thesis on a topic in East Asian Studies culture, society, or language. (P/NP grading only.)

196A-196B. Honors Seminar (4-4) I-II. The Staff Seminar—2 hours; conference—2 hours. Prerequisite: a GPA of 3.5 in the major, senior standing, and consent of instructor. A two-quarter research project culminating in an Honors thesis. A grade of B or higher must be earned to qualify for the student honors distinction at graduation. Deferred grading only, pending completion of sequence.

198. Directed Group Study (1-6) I, II, III. The Staff (Chairperson in charge)
Prerequisite: consent of instructor. (P/NP grading only.)

Ecology (A Graduate Group)

Theodore C. Fonn, Ph.D., Chairperson of the Group
Group Office, 3122 Wickson Hall (916-752-6752)
Faculty. The Group includes faculty from 43 departments in five schools and colleges, and the Bogdes Marine Laboratory.

Graduate Study. The Graduate Group in Ecology offers the M.S. and Ph.D. degrees in several areas of specialization within the spectum 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 graduate work in any of the biological, social or behavioral, and physical sciences, mathematics, or engineering. Applicants will normally be expected to have completed two courses each in introductory biology, general chemistry, physics, mathematics, statistics, and evolution. Applicants in human ecology areas may substitute quantitative social science courses for up to two courses of chemistry or physics. Each of the three broad areas requires certain advanced preparation appropriate to the option. Details may be found in the Group Announcement.

Graduate Adviser. T.C. Fonn, J.H.L. Leith.

Courses in Ecology

Graduate Courses

200A. Principles and Application of Ecological Theory (4) I. Elliott-Fisk
Lecture—3 hours; discussion—1 hour. Prerequisite: first course in ecology; Statistics 102; Mathematics 16A, 16B. Critical evaluation of ecological theory and applications to ecological management. Historical development of ecological theory is emphasized. Critical evaluation of ecological principles pertaining to the structure and dynamic properties of ecological systems, their organization and evolution.

200B. Principles and Application of Ecological Theory (4) II. Elliott-Fisk
Lecture—3 hours; discussion—1 hour. Prerequisite: course 200A or continual registration of course 200A. Critical evaluation of theory and application in the areas of ecological adaptation and system plasticity, spatial and temporal scales, ecological energetics, and system dynamics. Synthesis of ecological theory into testable predictions. (Same course as Environmental Studies 200A.)

203. Physiological Ecology of Animals (3) III. Patterson (Environmental Studies)
Lecture—2 hours; discussion—1 hour. Prerequisite: Zoology 125 or Physiology 110 or the equivalent; elementary knowledge of general biology required. Examination of several major animal groups addressing fundamental physiological mechanisms that shape the ecology of the animal group.

204. Population and Community Ecology (4) I. Toft, Schoener, Salt (Zoology)
Lecture—3 hours; discussion—1 hour. Prerequisite: Environmental Studies 100 or Zoology 125, Mathematics 21A-21B, or consent of instructor; Mathematics 128A strongly recommended. Review of major theoretical concepts of population and community ecology, with emphasis on both the rationale of the theory and its correspondence to natural phenomena.

205. Structure of Ecological Communities (4) II. Qaunn (Environmental Studies)
Lecture—3 hours; discussion—1 hour. Prerequisite: Environmental Studies 100 or Zoology 125 or Botany 117, Genetics 102, or Mathematics 144, or Mathematics 21A-21B; Ecology 204 and Mathematics 22A-22B strongly recommended. Provides entry-level graduate students and advanced undergraduates an introduction to current literature and contemporary research into processes structuring ecological communities. Particular emphasis placed on ecological phenomena with a significant spatial component, e.g., gene flow, colonization, and extinction.

206. Concepts and Methods in Plant Community Ecology (4) I. Rejmanek (Botany), Barboun (Botany), Menke (Agronomy)
Lecture—3 hours; laboratory—4 hours. Prerequisite: introductory courses in statistics and plant ecology; consent of instructor. Principles and techniques of vegetation analysis, including structure, composition, and dynamics. Emphasis given to sampling procedures, analysis, interpretation, processes, and mechanisms of succession, and classification. Most techniques are demonstrated or conducted during field trips and laboratories. Offered in alternate years.

207. Plant Population Biology (3) II. Rice (Agronomy), Jain (Agronomy)
Lecture—2 hours; laboratory-discussion—1 hour. Prerequisite: advanced undergraduate ecology course (e.g., Environmental Studies 125, Botany 117, or Entomology 104) and advanced undergraduate course in genetics and/or evolution (e.g., Genetics 100, 103, or Botany 100). Provides entry-level graduate students and advanced undergraduates with an introduction to the applied research in plant population biology. Emphasis will be placed on linking ecological and genetic approaches to plant population biology. Offered in alternate years. (Same course as Agronomy 207.)

210. Advanced Topics in Human Ecology (4) III. Orlove (Environmental Studies)
Lecture—2 hours; discussion—2 hours. Prerequisite: graduate standing. Course stresses the commonalities that human ecologists have as social scientists who specialize in processes relating human populations and environmental variables. General epistemological issues are reviewed. Similarities and differences of human and biological ecology are examined. Offered in alternate years.

211. Advanced Topics in Cultural Ecology (3) I. Orlove (Environmental Studies)
Lecture—3 hours. Prerequisite: graduate standing. Discussion of comparative 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 methodology, and implications of selection. Offered in alternate years. (Same course as Anthropology 211.)

212A. Environmental Policy Analysis (4) III
Lecture—3 hours; discussion—1 hour; seminar paper. Prerequisite: course in public policy (e.g., Political Science 107 or 108); course in bureaucratic policy making (e.g., Environmental Studies 168 or Political Science 181); course in intermediate statistics (e.g., Sociology 100 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 Environmental Studies 212A.)

212B. Environmental Policy Analysis: Evaluation (4) I. Schwartz (Environmental Studies)
Lecture—1 hour; discussion—1 hour; seminar—2 hours. Independent evaluation project. Prerequisite: Economics 100 or the equivalent; Environmental Studies 168A (or the equivalent course in policy analysis or resource economics), intermediate level statistics (e.g., Sociology 100 or Agricultural Economics 106). Examination of recent research and practice in the evaluation of environmentally related policies, programs and plans. Ex-ante and ex-post evaluation will be studied. Offered in alternate years. (Same course as Environmental Studies 212B.)

213. Population, Environment, and Social Structure (4) I. The Staff Seminar—3 hours; term paper. Prerequisite: at least one course in population or human ecology, or in environment and resources. Relationships among population dynamics, resource scarcity and environmental problems, and responses to these problems on demographic content of global ecological models and simulations, ecological content of modern demographic theories, and debates about scarcity, inequality, and social conflict and change. Offered in alternate years.

221. Chemical Aspects of Ecology (3).
Lecture—3 hours. Prerequisite: Chemistry 1A-1B-1C and 11B or 11BC (or the equivalent); a course in biological ecology; graduate standing and consent of instructor. A week will be spent on each of nine subjects including chemical ecology of reproduction, nutrition, defense, communication, adaptation, and ecosystem structure and function. Offered in alternate years.

220. Analysis of a Selected Ecosystem (4) I.
Lecture—3 hours; discussion—1 hour. Prerequisite: graduate standing. Application of basic ecological principles to the interpretation of biotic and abiotic interrelationships of a particular ecosystem. Recent advances in theory, technique, and basic information are emphasized.

232. Theoretical Ecology (3) III. Hastings (Environmental Studies).
Lecture—3 hours. Prerequisite: courses 204, 205 and Mathematics 22A-22B; or Environmental Studies 100, Environmental Studies 128 or Zoology 125, and Mathematics 118B. A review and critique 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.

250. Seminar in Ecology (1-3) I, II, III. The Staff (Chairperson in charge)
Seminar—1 to 3 hours. Prerequisite: consent of instructor. Topics in biological, human, physical, and chemical ecology. Students are expected to present an oral seminar on a particular aspect of the general topic under consideration. (S/U grading only.)

291. Biological Conservation (3) I. Schonenwald-Cox (Environmental Studies).
Lecture—3 hours. Prerequisite: graduate standing or consent of instructor. Examines characteristics of populations that make them vulnerable to extinction and examines various methods that can be used in the restoration process. Although both plants and animals are of interest, emphasis will be on vertebrates. Offered in alternate years.

296. Topics in Ecology (1) I, II, III. The Staff (Chairperson in charge)
Seminar—1 hour. Prerequisite: graduate standing in Ecology, or consent of instructor. (S/U grading only.)

297T. Tutoring in Ecology (1) I, II, III. The Staff (Chairperson in charge)
Lecture—1 hour; discussion—1 hour. Prerequisite: graduate standing in ecology; consent of instructor.

*Course not offered this academic year.
Economics

(College of Letters and Science)

Robert Feenstra, Ph.D., Chairperson of the Department

Department Office, 381 Kerr Hall (616) 752-0741

Faculty

Gaetano Bonanno, Ph.D., Associate Professor
Severin Borenstein, Ph.D., Associate Professor
Andrzej Brzezski, Ph.D., Professor
Colin Cameron, Ph.D., Assistant Professor
Gregory Clark, Ph.D., Associate Professor
Robert C. Feenstra, Ph.D., Professor
Bruce Glassburner, Ph.D., Professor Emeritus
W. Eric Gustafson, Ph.D., Senior Lecturer
L. Jay Helms, Ph.D., Associate Professor
Kevin D. Hirt, Ph.D., Assistant Professor
Hiromitsu Kanaeda, Ph.D., Professor
Tracy R. Lewis, Ph.D., Professor
Petre H. Lindert, Ph.D., Professor
Louis Mokwueli, Ph.D., Associate Professor
Arthur M. O'Sullivan, Ph.D., Associate Professor
(Economics, Management)

John E. Roemer, Ph.D., Professor
Kevin D. Salyer, Ph.D., Assistant Professor
Staven M. Sheffrin, Ph.D., Professor
Joaquim Silvestre, Ph.D., Professor
Robert V. Trist, Ph.D., Assistant Professor
Elias H. Turra, Ph.D., Professor
Gary M. Watson, Ph.D., Professor (Economics, Management)

Leon L. Wegge, Ph.D., Professor

Wing T. Wong, Ph.D., Assistant Professor

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. Economics majors are free to concentrate the remainder of their units in various areas of interest including more courses in economic theory or history, International economics, labor, industry, alternative economic systems, economic development, public finance, econometrics, or mathematical economics.

Internships and Career Alternatives. Internships for economics majors have been arranged at banks, brokerage houses, 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. Students interested in professional work in International relations. It is also a good background for careers in management and positions with the government.

A.B. Major Requirements:

Preparatory Subject Matter. 22-26

Economics 1A-1B, 10

Statistics 13, 32, or 102 3-4

Mathematics 16A-16B-16C or 21A-21B-21C 9-12

Depth Subject Matter. 40

Economics 100 or 101M 10

One course from Economics 110A, 110B, 110A, 111B 10


Additional economics courses to achieve a minimum of 20 upper-division units 18

Total Units for the Major 62-66

Recommened

Students considering graduate study in economics or business administration are strongly urged to take Mathematics 21A-21B-21C and 22A.

The Economics Department suggests that Economiy 100 and 101 be taken as soon as possible after the introductory courses.

Except under extraordinary circumstances, not more than three economics courses may be taken in any one quarter. In special cases, the department will accept a limited number of advanced upper division courses from other departments. In satisfactation of the economics upper division course requirements, Approval from a departmental advisor is required in all such cases.

Graduation with High or Highest Honors. To be eligible for departmental recommendation for High or Highest Honors in Economics at graduation, a student must take all upper division courses in Economics for a letter grade, earn at least a 3.5 grade point average in those courses, and complete at least six units of course work that result in the submission of an Honor's project. Consult the College of Letters and Science section of this catalog and contact the Department for more information.

Major Advisers. S. Borenstein, A. Brzezski, C. Cameron, G. Clark, W.E. Gustafson, K.D. Hoover, H. Kanaeda, L. Makwueli, J. Nelson, K. Salyer, R.K. Trist, E.H. Turra, W. Wob. American History and Institutions. This University requirement can be satisfied by completion of Economics 111A, 111B. (See also under University requirements.)

Teaching Credential Subject Representative. A. Brzezski. See also the Teacher Education Program.


For information on admission to graduate study, degree requirements, and financial aid, consult the Graduate Annucement and contact the chairperson of the Department.


Courses in Economics

Lower Division Courses

1A. Principles of Microeconomics (5) I. Borenstein

Gustafson; II. Wount; III. Guastafson, Trist

Lecture—3 hours, discussion—1 hour. Prerequisite: 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 in economic systems. General Education credit for non-GE course sequence (1A-1B) which will satisfy one GE course: Contemporary Societies/Introductory. (CAN Eon 4)

18. Principles of Macroeconomics (5) I. Kandek; II. Lindert, Shefenn; III. Tuma

Lecture—3 hours, discussion—2 hours. Course 1A and 1B may be taken in either order. Analysis of the economy as a whole; determinants of the level of income, employment, and prices; money and banking, economic fluctuations, International trade, economic development; the role of public policy. General Education credit for non-GE course sequence (1A-1B) which will satisfy one GE course: Contemporary Societies/Introductory. (CAN Eon 2)

11A. Elementary Accounting (4), II. The Staff

Lecture—3 hours; discussion—1 hour. History and basic concepts of accounting; the ledger, journals, income statement, and the balance sheet; inventory valuation; depreciation; introduction to cost accounting; analysis of financial statements. (CAN Bus 2)

11B. Elementary Accounting (4) II. The Staff

Lecture—3 hours; discussion—1 hour. Prerequisite: course 11A. Continuation of course 11A. (CAN Bus 4)

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 firms must have completed course 11A-11B, consent of instructor. Intensive study of practical application of concepts in economics, stressing research methods and empirical analysis. (P/NP grading)

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)

99. Individual Study for Undergraduates (1-5) I, II, III. The Staff (Chairperson in charge)

Prerequisite: consent of Instructor. (P/NP grading only)

Upper Division Courses

100. Intermediate Micro Theory (5) I, II, III. The Staff

Lecture—4 hours; discussion—1 hour. Prerequisite: courses 1A-1B and Mathematics 16A or 21A with a grade of C- or better in each course. Price and distribution theory under conditions of perfect and imperfect competition; welfare economics. (Not open to students who have received credit for course 100 or Agricultural Economics 100A or 100B.)

*100M. Intermediate Micro Theory (5) I. Silvestre

Lecture—4 hours; discussion—1 hour. Prerequisite: course 1A-1B; Mathematics 16A-16B or Mathematics 21A-21B each with a grade of C- or better. Theory of the consumer and the firm. Markets under perfect and imperfect competition. General Equilibrium and Welfare Economics. Use of calculus concepts and techniques. (Not open to students who have completed course 100. Agricultural Economics 100A or 100B.)

101. Intermediate Macro Theory (5) I, II, III. The Staff

Lecture—4 hours; discussion—1 hour. Prerequisite: courses 1A-1B and Mathematics 16A or 21A with a grade of C- or better in each course. Theory of income, employment and prices under static and dynamic conditions.

103. Economics of Uncertainty and Information (4) I. Bonanno

Lecture—3 hours; discussion—1 hour. Prerequisite: course 100 or 100M, Mathematics 16A and 16B or Mathematics 21A and 21B. Optimal decisions under uncertainty, expected utility theory, economics of insurance, asymmetric information, signaling in the job market, Incentives and Principal-Agent theory, consumption, research and the reservation price principle.

*135. History of Economic Thought (4) II, III. The Staff

Lecture—3 hours; to be arranged—1 hour. Prerequisite: courses 1A-1B or consent of Instructor. Historical study of economic doctrines of Classical School and its antecedents. Neoclassical thought, criticism of classical thought, emergence of modern economic thought.
changes in nominal GNP. Also discusses the effect of changes in money supply on interest rates.

235B. Monetary Theory (4) II. Hoover
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 measurement of money, its relation to inflation and the real economy and to its role in models of finance.

235C. Monetary Policy (4) II. Mayer
Lecture—3 hours; discussion—1 hour. Organization of the Federal Reserve Bank, the definition of money, and tools of monetary policy, alternative targets for monetary policy, impact of monetary policy, the problem of lags, alternative policies.

240A. Econometric Methods (4) II. Burt (Agricultural Economics)
Lecture—4 hours; term paper. Prerequisite: Statistics 131B or 130B; Mathematics 22A. Statistical models and their use in estimation of economic relationships; single and multiple equation systems. (Same course as Agricultural Economics 240A.)

240B. Econometric Methods (4) III. Havenner (Agricultural Economics); III. —— (Agricultural Economics)
Lecture—4 hours. Prerequisite: course 240A. Covers a variety of topics including 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 I. Wagge
Lecture—3 hours; discussion—1 hour. Prerequisite: course 240B. Finite sampling theory; non-linear and dynamic econometric models; asymptotic distribution theory. (Same course as Agricultural Economics 240C.)

240D. Topics in Econometrics (4) II. Cameron
Lecture—3 hours; discussion—1 hour. Prerequisite: course 240B. Advanced topics in non-linear econometric modeling. Contents may vary from year to year. (Same course as Agricultural Economics 240D.)

*250A. Labor Economics (4) II. Triest
Lecture—3 hours; discussion—1 hour. Prerequisite: course 150A or 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. Triest
Lecture—3 hours; discussion—1 hour. Prerequisite: course 151A or consent of instructor; course 204 or 200A recommended. Microeconomic theory of labor supply and labor demand, estimation of labor supply and demand functions; human capital theory; labor market analysis.

*256. Applied Econometrics (4) II. The Staff
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 Agricultural Economics 256.)

260A. International Economics (4) I. Feenstra
Lecture—3 hours; discussion—1 hour. Prerequisite: course 200A or 204. Theory of trade determinants; gains from trade; tariffs and effective protection; economic unions.

260B. International Economics (4) II. Woo
Lecture—3 hours; discussion—1 hour. Prerequisite: courses 200D and 200E. Balance of payments and unbalanced mechanisms; foreign exchange markets' theories of balance of payments policy and international monetary mechanisms.

260C. International Economics (4) III. Woo (Chairperson in charge)
Seminar—4 hours. Prerequisite: corss 260A and 260B. Survey of current literature in international trade theory.

280. Orientation to Economic Research (2) II. Mayer.
Discussion—2 hours. Course tries to bridge the gap between students' coursework 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 Econometrics (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.

290P. 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)

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

399. 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, examination and evaluation procedures. (SU grading only)

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**Economy, Justice, and Society**

John E. Roemer, Ph.D., Program Director and Professor of Economics (916-752-3229)

Graduate Study. Beginning in the academic year 1992-93, the Program on Economy, Justice, and Society will offer a designated emphasis in Economy, Justice, and Society. This new emphasis will be open to students pursuing a doctoral degree in philosophy, political science, or economics. The designated emphasis will provide interdisciplinary training in related aspects of economic theory, political theory, and political philosophy. Students choosing this emphasis 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 choosing 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 Adviser: Consult the office of the Program on Economy, Justice, and Society (752-9204).

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**Education**

(Intercollege Division)

Harry T. Traub, Ph.D., Director of the Division and Associate Dean of the College of Letters and Science (168 Kerr Hall)

G. Philip Cartwright, Ph.D., Associate Director of the Division

Barbara G. Goldman, Ph.D., Special Assistant to the Director and Assistant Head of Teacher Education

Jon Wagner, Ph.D., Head of Teacher Education and Director of the CRESS Center

Division Office, 180 Kerr Hall (916-752-8256, FAX: 916-752-5411)

Student Advising, 174 Kerr Hall (916-752-0757)

CRESS Center Office, 202 Wellman (916-752-0281; FAX: 916-752-6135)

Faculty

Donald G. Arnette, Ph.D., Professor
Hugh C. Black, Ph.D., Professor Emeritus
G. Philip Cartwright, Ph.D., Professor
Vincent A. Crockett, Ph.D., Senior Lecturer
Concha Delgado-Gaitan, Ph.D., Associate Professor
Sharon S. Dugdale, Ph.D., Associate Professor
Linnea C. Enzi, Ph.D., Professor
Richard A. Figueroa, Ph.D., Professor
Patricia C. Gandara, Ph.D., Assistant Professor
Barbara G. Goldman, Ph.D., Lecturer in and Supervisor of Teacher Education (Education, Applied Behavioral Sciences)

Jack E. Lowry, M.A.T., Lecturer in and Supervisor of Teacher Education

Barbara J. Merino, Ph.D., Associate Professor
Douglas L. Minne, Ed.D., Senior Lecturer
Sandra M. Murphy, Ph.D., Associate Professor
Susan A. Oestergard, Ed.D., Lecturer in and Supervisor of Teacher Education

Jonathan H. Sadoway, Ph.D., Professor
Julius M. Sassareeth, Ph.D., Professor Emeritus
Carlton J. Spring, Jr., Ph.D., Professor
Larry F. Trouber, Ph.D., Professor Emeritus

Karen A. Watson-Gege, Ph.D., Professor

George D. Yonge, Ph.D., Professor

Cooperative Research and Extension Services for Schools (CRESS) Staff

Pam Castor, M.A., Education Extension Specialist for Science

Marcia Renee Goodman, Ph.D., Coordinator of Publications, Acting Assistant Director

Jim Hahn, M.A.T., Coordinator for Teacher Research and Education Extension Specialist for Language Arts

Judith Kyes, M.A., Director, Northern California Mathematics Project

Keith R. Prior, B.A., Director, Northern California Science Project

Laura Stokes, M.A., Director, Area 3 Writing Project

Jon Wagner, Ph.D., Director

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**Program of Study**

The Division of Education does not offer an undergraduate major program. However, it does offer a minor.

**Minor Program Requirements:**

Educational theory 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) obtain a better understanding of the issues and concerns of public and private education.

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**Units**

Education (minimum units) .................. 20-23

Education 110 or 111 .................. 4

One course from Education 120 or 123 ........... 4

Depth courses .......................... 12-15

At least 12-15 units from Education not used above: 100, 110, 111, 115, 117, 118, 120, 122, 123, 130, 132, 142, 145, 151, 152, 153, 163, or 175, chosen in consultation with an Education adviser.

**Advisers:** All faculty members who teach undergraduate courses.
Teacher Education Curricula
For a statement of complete requirements and appointments with credential advisors, contact the divisional Student Advising Office, 174 Kerr Hall. Interested students are urged to do this as early as possible in their academic career.

Applicants to the basic (multiple subject or single subject) credential programs should contact the Student Advising Office for forms and procedural information early in the fall quarter of their senior year.

Credentialed Counselors: Multiple Subject: S.A. Ostergard, D.R. Wemple.
Bilingual Emphasis: B.J. Merino.
Credentialed Counselors: Single Subject: J.E. Lowry.
Graduate Adviser: J. Wagner (Credential Program).
Graduate Study: The Division offers programs of study and research leading to the M.A. degree in Education. Detailed information regarding graduate study may be obtained by writing the Graduate Adviser, Division of Education.
Graduate Adviser: G.D. Yonge (M.A. degree).

Courses in Education
Lower Division Course
98. Directed Group Study (1-5) I, II, III. The Staff
Director in charge
Prerequisite: consent of instructor. Primarily for lower division students. (P/NP grading only)

Upper Division Courses
100. Introduction to Schools (4) I, II, III. Lowry, Minnis, Wemple
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. Ehr and staff
Lecture/discussion—4 hours. Prerequisite: Psychology 1 or upper division standing. An introduction to the human aspects of education (educational psychology) with special emphasis on the psychological perspective of the teacher. Topics include learning, teaching, and the learning process, and the methods of instruction. (P/NP grading only)

114. Quantitative Methods in Educational Research (4) I. Yonge
Lecture/discussion—4 hours. Prerequisite: two years of high school algebra. A study of research methods in educational research. Design of research projects. Some consideration of procedures utilized by digital computers.

115. Educating Handicapped Children (2) II, III. Cartwright, Figueroa, Spring
Lecture—2 hours. Prerequisite: upper division standing. For elementary education and teaching processes involved in teaching handicapped children.

117. Psychology of Reading (4) I. Ehr
Lecture/discussion—4 hours. Prerequisite: Psychology 1 and upper division standing. Theory and research on psychological processes involved in learning to read. Topics include reading readiness, word recognition and spelling, knowledge of the orthographic system, phonological awareness, interactive processes, and influence of dialects of poorer readers.

118. Comprehension in Reading and Listening (4) II. Spring
Lecture/discussion—4 hours. Prerequisite: upper division standing. Theories and research of comprehension and learning of verbal material. Written and spoken material of two types, narrative and expository, considered. Topics include vocabulary acquisition as well as instruction of verbal skills at the sentence and passage levels.

Lecture/discussion—4 hours. Prerequisite: upper division standing. Philosophical, historical, and sociological foundations of formal and informal education and the school in our society. General Education credit: Education/Philosophy/History; Non-Introductory: Recommended General preparation: Political Science 1.

123. John Dewey and the Foundations of Education (4) I. Armitage

125. Issues in Higher Education (4) III. Crockettberg, Armitage, Milton (Mathematics)
Lecture/discussion—3 hours; field work—3 hours. Prerequisite: upper division standing or consent of instructor. Analysis of current issues in higher education and their implications for the social, economic, and philosophical approaches to the role of the university.

132. Church, State and School (4) III. Crockettberg
Lecture/discussion—4 hours. Prerequisite: upper division standing. Course 122 or the equivalent. Examination of issues in higher education and their implications for the social, economic, and philosophical approaches to the role of the university.

140. School Desegregation and the Civil Rights Movement (4) I. Crockettberg
Lecture/discussion—4 hours. Prerequisite: upper division standing. Course 122 or the equivalent. Examination of issues in higher education and their implications for the social, economic, and philosophical approaches to the role of the university.

151. Language Development in the Chicanos Child (3) I. Marino
Lecture—3 hours. Prerequisite: some knowledge of Spanish and linguistics recommended. Bilingualism, first and second language acquisition, bilingual education, language assessment, Chicanos, and Spanish, and the role of dialect variability in the classroom.

152. Communication Skills for Bilingual Teachers (3-III). The Staff (Marino in charge)
Lecture/discussion—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 and nonstandard Spanish dialects in teaching school, social science, social science, music, and art, and language arts to bilingual elementary school pupils.

153. Cultural Diversity and Education (2) III. Marino, Minnis, and staff
Lecture/discussion—2 hours. Prerequisite: upper division standing. Analysis of research on learning styles among culturally diverse students with reference to relevant curricula and classroom teaching techniques. The ethnographic view as a research tool.

160. Peer Counseling (2) I, II. The Staff
Seminar—2 hours. Prerequisite: upper division standing; consent of instructor. Study of peer counseling techniques and development of peer counseling skills. (P/NP grading only)

163. Guidance and Counseling (4) I. Figueroa, Sandoval, and staff
Lecture—2.5 hours; discussion—1.5 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.

175. Critical Thinking in Classrooms (4) III. Minnis, Friedman (Philosophy)
Lecture—2.5 hours; discussion—1.5 hours. Prerequisite: upper division standing. Critical thinking skills and rigorous analysis of argumentation in classrooms on the basis of philosophical and educational theory. Enables teachers to utilize existing school curricula to engage children in discussions of significant scientific, social, ethical, and philosophical issues.

180. Computers in Education (3) I, II, III. Cartwright, Dugdale, Murphy
Lecture—2 hours; seminar—1 hour; laboratory—3 hours. Prerequisite: upper division standing. Applications of computers in education as instructional, intellectual, and communication tools.

192. Internship (1-5) I, II, III. The Staff (Director in charge)
Lecture—1 hour; field work—2 to 15 hours; term paper. Prerequisite: upper division standing; consent of instructor. Internship in schools under supervision of a faculty member. May be repeated for credit. (P/NP grading only)

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

199. Special Study for Advanced Undergraduates (1-5) I, II, III. The Staff (Director in charge)
Prerequisite: upper division standing and consent of instructor. (P/NP grading only)

Graduate Courses
Ehr
Lecture—1.5 hours; discussion—1.5 hours. Prerequisites: introductory statistics and graduate standing in education or consent of instructor. Designing educational research questions, reviewing relevant literature, developing research questions, selecting research instruments, selecting appropriate data analysis procedures, and writing research projects. A case study presentation will be required in the course.

201. Ethnographic Research in Schools IV: Current Theory and Practice (4) II. Delgado-Gaitan, Trueba
Lecture—4 hours. Prerequisite: graduate standing. Review of current literature from anthropology and sociology related to schools, with emphasis on the ethnographic process and how to train ethnographers.

202. Ethnographic Research in Schools II: Field-Based Research Projects (4) III. Trueba, Watson-Gego
Lecture—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 the instructor as a group throughout the quarter to discuss specific projects.
205. The Concept of Mind in Teaching (3) III. Armstrong Seminar—4 hours. Philosophical analysis of the problem of mental causality, which are created, aggregated, and sometimes solved by varying conceptualizations of mind and thinking.

207. Concepts of the Curriculum (4) I, Armstrong, Crockett Seminar—4 hours. Discussion—2 hours. Prerequisite: graduate standing or consent of instructor. Development of the skills of philosophical analysis and an argument for the establishment of a point of view, in the context of educational theory and practice. Classical and contemporary approaches to subject matter and activity emphasis, hidden curriculum, and moral education.

208. Education and the Law (4) II. Crockett Seminar—4 hours. Prerequisite: graduate standing. Analysis of how selected areas of school law have developed, in particular the rights of students and teachers under the First and Fourteenth Amendments to the U.S. Constitution, critical of the present state of that law, and an understanding of needed legal reforms.

209. Pedagogics (4) III. Yenget Seminar—4 hours. Critical analysis of the literature available on English dealing with theoretical and practical issues in education in terms of Pedagogics (i.e., an existential phenomenological approach to the systematic study of education).

210. Psychology of Education (4) III. Yenget 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.

211. Language and Intellectual Development (4) III. Ehr Lecture—4 hours. Prerequisite: consent of instructor. Theories and research on the development of language and thought in children; emergence of grammatical, semantic systems, and operational thought; implications for education.

213. Individual Assessment (4) III. Sandoval Lecture—4 hours. Prerequisites: courses 114 and 218, admission to school psychology credential program. Theories of intellectual functioning and the measurement of cognitive abilities in school-aged children. Supervised practice in administration and scoring of contemporary tests for children including the WISC-R, the WAIS-R, the Stanford Binet, the McCarthy Scales of Children’s Ability.

214. Assessment of Children’s Personality (4) II. Sandoval Lecture—3 hours; field work—3 hours (minimum). Prerequisite: admission to school psychology credential program; courses 215 and 218; and familiarity with basic personality theory and theories of motivation. Study of the projective hypothesis; concepts of personality and its measurement; legal and ethical issues in personality assessment; interviewing techniques in assessment of social and affective functioning; specific measures in personality assessment; reporting on personality assessments; school interventions. Offered in alternate years.

215. Motivation and Behavior Modification (4) III. Spring Seminar—4 hours. Prerequisite: graduate standing or consent of instructor. Factors related to influencing behavior in educational settings, including analyses of intrinsic and extrinsic motivation, psychological reactance, locus of control, achievement attribution, and behavior modification.

217. Testing Minority Children (4) I. Figueras Lecture—3 hours; field work—3 hours. Prerequisite: admission to school psychology program or to M.A. bilingual education program or consent of instructor. Emphasizing tests and techniques that are appropriate for use with Hispanic students. The use of multicultural assessment. Review studies and guidelines on use of tests with minority children.

219. Educational Testing and Evaluation (3) III. The Staff 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 general ability and reading tests.

261. Research in Bilingual and Second Language Education (3) III. Merino Seminar—3 hours. Prerequisite: course 161; knowledge of a foreign language. Discussion and analysis of recent research in bilingual and second language education. Topics include: language acquisition in second and third language learners and bilinguals, second language teaching methods, language-use models in bilingual education, interaction analysis in bilingual cross-cultural classrooms, use of the vernacular in classroom.

252. Multicultural Teaching and Curriculum (3) III. Merino Seminar—2 hours; field work—3 hours. Prerequisites: 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.

253. Language and Literacy in Linguistic Minorities (3) III. Merino, Watson-Gage 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.

270A. Reading Diagnosis and Prescription (3) III. Gathright Lecture-discussion—3 hours. Prerequisite: course 300 or the equivalent. The diagnosis and treatment of reading disabilities and the recognition of reading abilities. Analysis of clinical techniques, testing, use of material and teaching techniques.

271. Recent Developments in Social Studies Education (3) III. Lowry Lecture—2 hours; field work—2 hours. Prerequisite: consent of instructor. Analysis of the rationales, goals, objectives, and assumptions about learning and teaching strategies, and evaluation techniques in selected social studies curriculum projects.

272. Recent Developments in Science Education (3) II. Perkel Lecture—3 hours. Prerequisite: consent of instructor. Analysis of contemporary science programs with special emphasis upon philosophical, psychological and pedagogical attributes of their design; trends, issues, and research in science curriculum and instruction.


275. Effective Teaching (4) I. Minnissen 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.

277. Staff Development and Supervision of Teachers (4) II. Meermann Seminar—4 hours. Prerequisite: graduate standing, course 110, 120. Use of research and legislative guidelines to design staff development for school personnel. Emphasis on school change resulting from staff development and the supervision of the supervisory staff. Supervision as a diagnostic skill and means of teaching teachers skills. Offered in alternate years.

290C. Research Conference in Education (1) I, II, III. The Staff (Director in Charge)

Discussion—1 hour. Prerequisite: graduate standing. Presentations and critical discussions of research in education by graduate students with their major professor. May be repeated twice for credit. (SU grading only.)

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 (1-6) I, II, III. The Staff (Director in Charge)

Independent study—3-18 hours. Research for individual graduate students. (SU grading only.)

Professional Courses

300. Reading in the Elementary School (4) III. The Staff (Wagner in charge) Lecture—3 hours; field work—3 hours. Prerequisite: graduate standing. Principles, procedures, and curriculum materials for teaching of reading. Includes developing skills with emphasis on reading comprehension skills, study skills, and reading in the content areas.

301. Reading in the Secondary School (4) I, II. Murphy Discussion—4 hours. Prerequisite: must be teaching or student teaching. Principles, procedures, and materials to help secondary school teachers improve the reading competence of their students. The teaching of phonics, structural analysis, and alternative methods of coping with the problem reader in the classroom.

302. Language Arts in the Elementary School (2) I. The Staff (Wagner 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 (Director in charge) Lecture-discussion—2 hours. Laboratory—2 hours. Prerequisite: admission to multiple subject credential program. Understanding the principles of education in the arts through participation. Development of concepts, introduction to media, and techniques suitable for the elementary school with emphasis on cross-discipline exploration.

304A. Teaching in the Elementary Schools (5-8) I. The Staff (Wagner in charge) Lecture—2 hours; seminar—2 hours; student teaching—15-30 hours. Prerequisite: acceptance into a teacher education program. Supervised teaching in regular or special education classrooms in preschool or elementary schools. Selection and organization of teaching materials. Introduction to techniques of diagnosing school achievement of children.

304B. Teaching in the Elementary Schools (5-8) II. The Staff (Wagner 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 specific teaching methods.

304C. Teaching in the Elementary Schools (5-8) III. The Staff (Wagner in charge) Lecture—2 hours; seminar—2 hours; student teaching—15-30 hours. Prerequisite: course 304B; acceptance into a teacher education program. Supervised teaching in regular or special education classrooms in preschool or elementary schools. Evaluation of teaching materials including audio-visual aids. Current elementary school curriculum with emphasis on contributions from fine arts and humanities.

305A. Teaching in the Middle Grades (5-8) I. The Staff (Wagner in charge) Lecture—2 hours; seminar—2 hours; student teaching—15-30 hours.
Education Abroad Program

Carolyn F. Wall, Ph.D., Campus Coordinator
Program Office, 323 South Hall (916-752-3014)

Programs of Study

The Education Abroad Program (EAP) of the University of California offers students who meet the minimal admission requirements an opportunity to experience a different culture while making progress toward degree objectives. Students interested in the language, literature, art, culture, history, or governmental-political areas of study will find that the program offers a uniquely rich and rewarding educational experience.

Estimated all-inclusive minimum costs for the nine- to twelve-month program range from $7,000 to $18,000 (varies depending upon the country).

Application

Normally, students participate in the program during their junior year, but a limited 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 early in the fall quarter concerning 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:

- At least three regular session quarters completed in residence at UC by the time of participation
- At least 64 quarter units completed by the time of participation, except for specific short-term programs
- At least a 3.0 grade-point average for course work completed at UC at the time of application and departure; except, for Mexico SPE and Tojo SPE programs where the minimum GPA requirement is 2.0
- In most cases, 2 years (6 quarters) of University-level foreign language or the equivalent, with a 3.0 grade-point average (not applicable when classes are in English), but consult EAP Office for specific requirements
- An academic plan approved by your major adviser and the campus coordinator
- Endorsement of the Academic Senate

Committee on the Education Abroad Program Application forms are available 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 cannot be considered.

For study abroad during the 1992-93 academic year, the application deadlines are as follows: mid-October for the Asian programs, the USSR, and the Japan Global Security Studies spring quarter program; mid-November for the United Kingdom and Ireland, and the summer quarter programs in Mexico and Costa Rica; mid-December for Aus-tralia and New Zealand, and the spring quarter program in Costa Rica; and mid-to-late January for all other study centers.

If you intend to participate in a study program during your senior year, careful advance planning is necessary to make sure that all degree requirements are completed.

*Course not offered this academic year.*
will be met. Consult with your major adviser, the Dean's Office of your college, and the campus EAP coordinator for information on EAP centers and study programs. For more information, refer to EAP in the Programs and Courses sections of this catalog.

Students who do not meet the minimal requirements for acceptances (see Education Abroad in the International section) should consult the Campus Coordinator. Students who will have accumulated more than 145 units prior to the beginning of their planned year of study abroad must receive permission from the Campus Coordinator before submitting an application. The probability of such students being accepted is low.

**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 take appropriate courses dealing with the country of their interest in preparation for the year abroad. Applicants who are taking or have completed such courses at the time of the campus process tend to have an increased probability of receiving an endorsement from the Committee, other factors being equal. List of suggested courses and requirements is available in the EAP Office. Once the completed application materials have been filed, an applicant will be interviewed by a selection committee consisting of faculty and EAP renovuses. Among other things, academic goals, knowledge of the host country and the United States, and proficiency in the language of the host country, 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 decisions will be made.

**Academic Program**

In most cases, students from the University of California will take courses at the host country and 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 to different, often unfamiliar, educational practices, tutorials are a part of the academic program of most centers. Tutorials also assist in overcoming language problems and provide cultural background that may be necessary in the classes. 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 been 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 United Kingdom, Ireland, Canada, Australia, Egypt, Ghana, Hungary, Kenya, and New Zealand); (2) a full year of academic courses; (3) broad opportunity to audit courses within the host university. It is expected that students will complete a minimum of 36 units during the academic year in addition to units earned in the Intensive language program.

**Graduation Requirements**

All prospective applicants, but particularly students who intend to study abroad during their senior year, should plan their course programs for Davis and abroad carefully in order to satisfy University, College, and major requirements for the degrees. The provisional planning form is intended to take care of this, but a few potential problems deserve emphasis. Although units and grade points earned in the EAP are incorporated into the University transcript and GPA, the major departments and programs retain the right to determine which EAP courses will be accepted in satisfaction of major requirements. Several major programs have identified key upper division courses which must be completed at the host university. Davis. Major advisers should be consulted early so that the pre-departure program at Davis will be planned appropriately.

All degree candidates must meet the University residence requirement. Students planning to graduate immediately upon completion of participation in the EAP may satisfy residence requirements within the final 45 units preceding entrance into the EAP. Otherwise, subject to final approval of the major department or program concerned, the requirement may be satisfied as follows: Within the final 90 units earned toward the degree, 35 units must be completed in residence in the student's College or School, 12 units of which must be completed after returning from EAP participation. With this option, no more than 55 units taken abroad may be applied toward the unit requirement for graduation. The application to College or School Dean is the source for information on the University residence requirement and additional residence requirements that may be imposed.

Participants who satisfy all degree requirements while abroad and expect to graduate upon completion of the year abroad should file for candidacy to receive the degree in September. Unfortunately, transcripts from abroad take a long time to get to the home campus and are not received in time for EAP returnees to be included on the June degree list. Such returning students may participate in the June commencement ceremony, however.

**Study Centers**

At any one center, the courses and fields of study open to UC students are limited. Moreover, each of the host institutions has special areas of excellence and strength. The listings of centers below incorporates selected information concerning these points. More information is available in the flyers describing each of the centers and from the EAP adviser in South Hall.

In addition to the programs listed below, Davis students have access to a variety of study and work abroad opportunities. Information can be obtained at the EAP Office in South Hall.

**Europe**

**Austria**

The program is small and is designed to offer an opportunity to be exposed to a limited number of highly qualified students. A compulsory intensive language program in Slovene and German precedes the beginning of the academic year. All courses are taught in German.

- University of Vienna: Eastern European studies (Balkans, Soviet Union), fine arts (history of art, music, theatre arts), folklore, history.

**Denmark**

A compulsory summer intensive language program precedes the academic year and continues through the fall semester. Instructors are in Danish, though examinations in English may be available. Most students concentrate on their major or a closely related field; independent study under faculty supervision is expected. Students may also apply to the Danish Language Program only as a short-term program option.

Universität of Copenhagen: Broad availability of humanities, sciences, 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. Courses in the universities are taught in French. UC faculty directors are in residence at Bordeaux, Lyon, and Paris.

**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 Gronoble**

- 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 the social sciences.

**University of Lyon**

- Social sciences, art history, modern languages and linguistics, Arab studies.

**Paris Center for Critical Studies**

- Film theory, literary criticism, philosophy, theater (literature, criticism, and history), historiography, and limited art history.

**Pau-Paris**

- Participants spend the first semester at the University of Paris at the end of January, they move to Paris to take courses at the Paris Center for Critical Studies. In addition to required core courses in French civilization, students take courses in humanities and social sciences, with emphasis on comparative cultural studies, French language, and critical studies.

**University of Pau**

- Pau-Paris core courses, humanities, social sciences. Program in Basque studies is available for students of Basque or Iberian cultural background.

**University of Politie**

- Humanities is taught with major emphasis in history and medieval studies; mathematics; physics.

**Georgia**

- A compulsory intensive language program precedes the beginning of the academic year. All courses are taught in German.

**Hungary, Budapest University of Economics, Budapest**

- A fall semester or full-year program jointly sponsored by UC and the University of Wisconsin at Madison. Offerings developed for the program include conversational Hungarian and courses in Central European history, culture, economics, and economic history.

- Italy

- A compulsory intensive program in language and history precedes the beginning of the academic year. Students who have completed only one year of Italian may be eligible for participation by attending the summer session. Offerings are available in Italy in order to attain the required third-level year, followed by the normal compulsory intensive-language program in Padua. A UC faculty director resides in Padua and administers all EAP programs in Italy. All courses are taught in Italian.

**University of Bologna**

- Humanities, social sciences, economics, history.

**University of Padua**

- History of art (including archaeology), Italian literature (including linguistics), and political science (including political science, geography, and demographics, as well as political science in the American sensor). Sciences are not available for UC students.

**University of Venice, Economics, history, history of art.**


**Accademia della Belle Arti di Venezia, Venice.**

- Studio and some art history. Colored slides of portfolio of artistic work and successful completion of entrance examination required for admission.

**Il Bionto International School of Graphic Arts, Etching and lithography for advanced undergraduates.**

- Colored slides of portfolio of etchings must be submitted for admission.

**Norway**

- Knowledge of Norwegian is not required, but a compulsory intensive course in Norwegian (mid-June to mid-August) precedes the beginning of the academic year. Intensive language study is continued during the fall semester. All courses are taught in Norwegian.

**University of Bergen**

- Humanities, social sciences, natural sciences, and mathematics are available, but space in the sciences may be limited. The usual pattern is a study of a single subject, usually the major or a closely allied field, for the entire year.

**Portugal**

- A six-week summer intensive-language
Israel. First priority is given to students who have completed at least one year of Hebrew. A compulsory Intensive Hebrew course in Haifa precedes the beginning of the academic year.

Hebrew University, Jerusalem. Broad curriculum; emphasis on Israeli and Middle Eastern studies. UC students enroll in a special program for foreign students in English. The program offers courses in Judaic, Israeli, Middle Eastern studies, and a few courses on the general social sciences and humanities, science and business. Students with command of Hebrew have access to a broad curriculum throughout the University.

Asia
Hong Kong. A limited 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 Chinese program precedes the beginning of the academic year. All students are required to include 18 units of Mandarin or Cantonese in their annual program.

Chinese University of Hong Kong. Humanities and social sciences programs. The academic program consists of Chinese language courses and a research project to be completed under the guidance of a Chinese professor. Prior language courses are not required.

Kyushu Institute of Technology, Kitakyushu. This program, which specializes in Civil, Mechanical, and Electrical Engineering, is primarily for undergraduate students. While pursuing a research project, students will engage in language courses and seminars or Japanese-American comparative engineering methods. One year of university-level Japanese required prior to departure.

Kyushu University, Fukuoka. This program is for graduate-level economics students. The academic program consists of Japanese language courses and a research project to be completed under the guidance of a Japanese professor. Prior language courses are not required.

Nagoya University, Nagoya. This program is for graduate level economics students. The academic program includes intensive Japanese language, culture, 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 study of English, Japanese, and Korean cultures, political sciences, economics, and business are available. Many are taught in English. The prerequisite is one year of university-level Japanese.

Tokyo Institute of Technology, Graduate students proficient in Japanese may do research and take courses in science and engineering.

People's Republic of China. EAP offers a full-year program in Beijing and a fall semester program in Tianjin. Intensive language study in Chinese is the primary emphasis of all programs.

Beverly University of Science and Technology. Students receive a half-year of academic credit and financial support for studying standard Chinese and teaching English to Chinese students. The prerequisite is two years of Chinese language and one course in teaching English as a foreign language.

Kansai University, Osaka. This fall semester program includes Chinese language study and courses taught in English on Chinese culture and civilization. The prerequisite is one year of college-level Chinese. Students must take an intensive language program in July and August prior to the semester.

Peking University. A year-long program focuses on advanced-level instruction in Chinese language and literature. Courses are conducted by the Chinese Language Teaching to Foreigners Division of Pecking University. The prerequisite is the program is two years of college-level Chinese.

Taiwan, Republic of China. Students participating in the Chinese Language and Culture Studies program in Taipai receive instruction in the Chinese lan-

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 in Arts and Sciences. All students are required to take at least one-year-long course in Arabic. Offerings in science are limited.
guage and enroll in lecture courses (taught in English) on Chinese culture and society arranged by CSU International Programs. Courses in art history, literature, economics, history and political science are available. Prior course work in Chinese culture, history and language are recommended. (This is a cooperative program with California State University, Northridge.)

Thailand. An eight-week summer intensive language program at Chiangmai University is required for all students. This is followed by a seven-week inter-term program of continued study of the Thai language, which includes a Thai language class taught in English. Most students will remain at Chiangmai University for the second semester and continue taking courses in Thai language and area studies classes taught in Thai. Students with sufficient language background (more than two years of University-level Thai language) have the option of enrolling at Chulalongkorn University in Bangkok for the second semester. Instruction is in Thai, though English-speaking tutors are available. It is possible to apply for the summer intensive-language program only. Students may take more advanced language courses in subsequent years.

Africa

Ghana. University of Ghana, Legon-Accra. Open to undergraduate and graduate students. Instruction is in English. As in the British system, students take a year-long program of study in a single area. Each year is one academic year and is mandatory for credit to be awarded.

Offerings include humanities and social sciences, with emphasis on African studies. There is a strong program in ethnography.

Kenya. Enrolls open to undergraduate and graduate students. As in the British system, students take a year-long program of study in their major or area of specialization. Examinations are given once, at the end of the academic year, and are mandatory for receiving credit.

University of Nairobi. Humanities and social sciences, with emphasis in African studies. Limited opportunities in the sciences and in veterinary science. Graduate students in history, political science, sociology, architecture, and design may associate with the Institute for Developmental Studies, Institute for African Studies, or the Housing and Research Development Unit.

Togo. Study and field experience (SFE). An eight-week summer program developed by UC. Four weeks of academic coursework in French language and contemporary Africa are taught at the University of Benin, Lomé, followed by four weeks of field work.

Latin America

Brazil. Language requirements for admission to this program are: two years of college-level Portuguese or the equivalent of one year of college Portuguese and one year of college Spanish, or two years of college Spanish and completion of an Intensive course in Portuguese prior to departure. Since courses are taught in Portuguese, the equivalent of one year of college-level Portuguese is the absolute minimum. A compulsory intensive language course precedes the beginning of regular coursework.

University of São Paulo. Brazilian literature, Portuguese, social sciences. (This is a cooperative program administered by the Council on International Educational Exchange (CIEEE).)

Costa Rica. University of Costa Rica, San José. As in all countries in this Hemisphere, the academic year extends from early March through December. UC participants leave in January. Application for participation in this program is due in May for a January departure.

A mandatory intensive language program precedes the academic year. During the academic year, courses in Central American studies (history, literature, political science, etc.) form half of the curriculum, with the remaining courses taken from any of the faculties at the University of Costa Rica.

Costa Rica Tropical Biology Quarter at Monteverde. This spring quarter program provides an unusual opportunity for undergraduates to study and do field research in a tropical cloud forest. Applicants should have completed a year of biology, including one upper-division course, and have some background in Spanish language.

Costa Rica Medical Quarter at San Jose. This winter quarter program provides medical students the opportunity to combine intensive medical Spanish instruction and clinical studies. Conversational ability in Spanish is required.

Ecuador. (This is a temporary option through the 1991-92 academic year, with the possibility of becoming a permanent program.) As an instruction is in Spanish, students must have completed at least two years of university-level Spanish prior to departure.

Pontificia Universidad Católica del Ecuador, Quito. During the fall semester students take Spanish language courses and study the history, politics, and culture of Ecuador and Latin America. In the spring, students can study in a variety of fields, including languages and literature, anthropology, biology, economics, linguistics, and sociology.

Mexico. Universidad Nacional Autónoma de México (UNAM), Mexico City. A compulsory intensive language program precedes the beginning of the school year, augmented by courses in contemporary Mexican history (art, literature, etc.). Students have the option of spending one semester (two UC quarters) at UNAM, or a full year. All instruction is in Spanish.

Study and Field Experience (SFE) in Mexico. Available for either Fall or Spring Quarter, the SFE program begins in Mexico City with six weeks of intensive language courses and a course on contemporary Mexico. The final weeks of the program are spent doing volunteer work in a community outside of Mexico City. The final course work is designed to help students complete a minimum of one year of university-level Spanish or the equivalent, by departure.

Summer Intensive Language Quarter in Morelia. This program provides total immersion in Mexican society and Spanish language instruction for students who have completed one year of University-level Spanish before departure. It is not appropriate for advanced students in Spanish.

Peru. A compulsory intensive language course precedes the beginning of the academic year. All courses are taught in Spanish.

University of Lima. Humanities, social sciences. (This is a program of the University of Lima, which is operated by Lima University and a number of California universities.)

Canada

Students may enroll for a full year. Studies on the major or a closely allied field is expected.

University of British Columbia (UBC), Vancouver. Most academic disciplines are available. Areas of special interest include Pacific Rim and Canadian Studies.

Australia and New Zealand

As is appropriate in the Southern Hemisphere, the academic year extends from the beginning of instruction in early March through the examination period, which starts in November. UC participants must leave in February, and will be unable to attend classes during the winter term preceding departure. Applications for participation in these programs are due in May for a February departure. The universities follow the British system of higher education.

The Australian programs include the Australian National University in Canberra. There are also programs in the Melbourne area, University of Melbourne, Monash University and La Trobe University; the Uni-

*Course not offered this academic year.
synthesis, second messenger phenomena, and hormonal control of gene expression.

298. Seminar (1, 2, 3, 4) 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.

299. Group Study (1-5) I, II, III. The Staff (Chairperson in charge) Prerequisite: consent of instructor.

299. Research (1-12) I, II, III, IV. The Staff (Chairperson in charge) (SU grading only)

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Endocrinology and Metabolism

See Internal Medicine in Medicine, School of

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Engineering

(College of Engineering)

M. S. Ghasouli, Ph.D., Dean
Benjamin J. McCoy, Ph.D., Associate Dean—Research
Zubair M. Murti, Ph.D., Associate Dean—Graduate Studies
James M. Shackleford, Ph.D., Associate Dean—Undergraduate Study
Billy Sanders, Ph.D., Assistant Dean
College Office, 213 BCriteria Hali (816-752-0503)

Undergraduate Study

Fifteen undergraduate engineering curricula, including four formal double-major programs, are offered. Each of these is a four-year program leading to the degree of Bachelor of Science. The Agricultural, Chemical, Civil, Electrical, Mechanical Engineering, Astronautical Science and Engineering, and Computer Science and Engineering curricula are seven programs which have been accredited by the Engineering 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 Division section of the catalog. For additional information refer to the College of Engineering Bulletin, obtainable from the Dean's Office, or phone the Graduate Study Office (916-752-0592).

Lower Division Programs

If you enter the College of Engineering with fewer than 64 quarter units of credit, follow one of the four Lower Division Programs shown below. The first program (I) is common to majors in Aeronautical Science and Engineering, Civil Engineering, Materials Science and Engineering, Mechanical Engineering, and combinations of these majors; (II) is for those majoring in Agricultural Engineering and the three Agricultural Engineering options; Aquacultural Engineering, Food Engineering, and Forest Engineering; the third (III) is for those majoring in Chemical Engineering and the double major, Chemical Engineering/Materials Science and Engineering; and the fourth (IV) is for those majoring in Computer Science and Engineering, Electrical Engineering and the double major Electrical Engineering/Materials Science and Engineering.

The lower division program for students who enter the College with 64 or more quarter units of credit is explained in the Bachelor's Requirements section, under "College of Engineering, Unit Requirements."

Lower Division Program

Requirements for Aeronautical Science and Engineering, Civil Engineering, Chemical Engineering/Materials Science and Engineering, Mechanical Engineering, and Chemical Engineering/Materials Science majors only.

**QUARTER USUALLY TAKEN**

<table>
<thead>
<tr>
<th>Course</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>Calculus—Mathematics 21A-21B-21C</td>
<td>12</td>
</tr>
<tr>
<td>Linear algebra—Mathematics 22A</td>
<td>3</td>
</tr>
<tr>
<td>Differential equations</td>
<td>3</td>
</tr>
<tr>
<td>Vector analysis—Mathematics 22C</td>
<td>3</td>
</tr>
<tr>
<td>General physics—Physics 9A-9B</td>
<td>16</td>
</tr>
<tr>
<td>General chemistry</td>
<td>4</td>
</tr>
<tr>
<td>Introduction to engineering systems</td>
<td>3</td>
</tr>
<tr>
<td>Engineering 3</td>
<td>3</td>
</tr>
<tr>
<td>Engineering 3 is designed for freshmen. More advanced students may petition to substitute 3 units of technical electives for Engineering 3.</td>
<td></td>
</tr>
<tr>
<td>General chemistry, Chemistry 1A-1B or 4A-4B...</td>
<td>10</td>
</tr>
<tr>
<td>Expository writing</td>
<td>3</td>
</tr>
<tr>
<td>Expository writing 1 or 2, or Comparative Literature 1, 2...</td>
<td>4</td>
</tr>
<tr>
<td>Introduction to public speaking group communication</td>
<td>4</td>
</tr>
<tr>
<td>Rhetoric and Communication 1 or 3...</td>
<td>4</td>
</tr>
<tr>
<td>Humanities-Social Sciences electives and for General Education electives</td>
<td>7</td>
</tr>
<tr>
<td>Unrestricted electives*</td>
<td>6</td>
</tr>
<tr>
<td>Total Lower Division Units</td>
<td>90</td>
</tr>
</tbody>
</table>

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Lower Division Program II

Requirements for major in Agricultural Engineering, and the three Agricultural Engineering options (Aquaticultural Engineering, Food Engineering, and Forest Engineering) only.

**QUARTER USUALLY TAKEN**

<table>
<thead>
<tr>
<th>Course</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>Calculus, Mathematics 21A-21B</td>
<td>12</td>
</tr>
<tr>
<td>Linear algebra—Mathematics 22A</td>
<td>3</td>
</tr>
<tr>
<td>Differential equations</td>
<td>6</td>
</tr>
</tbody>
</table>

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Mathematics 228 | 3 |

Vector analysis—Mathematics 22C | 3 |

General physics—Physics 9A-9B | 4 |

General chemistry—Chemistry 1A-1B | 10 |

Organic chemistry—Chemistry 8A | 6 |

Biological Sciences 1A, 1B, 1C | 15 |

Engineering graphics | 3 |

Total Lower Division Units | 97-100 |

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Lower Division Program III

Requirements for major in Chemical Engineering and the double major, Chemical Engineering/Materials Science and Engineering only.

**QUARTER USUALLY TAKEN**

<table>
<thead>
<tr>
<th>Course</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>Calculus—Mathematics 21A-21B-21C</td>
<td>12</td>
</tr>
<tr>
<td>Linear algebra—Mathematics 22A</td>
<td>3</td>
</tr>
<tr>
<td>Differential equations—Mathematics 22B</td>
<td>6</td>
</tr>
<tr>
<td>Vector analysis—Mathematics 22C</td>
<td>3</td>
</tr>
<tr>
<td>General Physics—Physics 9A-9B</td>
<td>12</td>
</tr>
<tr>
<td>Physics 9D or Microbiology 102</td>
<td>6</td>
</tr>
<tr>
<td>General Chemistry—Chemistry 1A-1B</td>
<td>15</td>
</tr>
<tr>
<td>Organic Chemistry—Chemistry 12A, 12B</td>
<td>6</td>
</tr>
<tr>
<td>Organic Chemistry Laboratory—Chemistry 12A</td>
<td>2</td>
</tr>
<tr>
<td>Engineering—Applications of computer systems—Engineering 5</td>
<td>3</td>
</tr>
<tr>
<td>Circuits—Engineering 17</td>
<td>3</td>
</tr>
<tr>
<td>Statics—Engineering 38</td>
<td>5</td>
</tr>
<tr>
<td>Properties of materials—Engineering 45</td>
<td>3</td>
</tr>
<tr>
<td>Expository writing</td>
<td>4</td>
</tr>
<tr>
<td>Introduction to public speaking group communication</td>
<td>4</td>
</tr>
<tr>
<td>Rhetoric and Communication 1 or 3...</td>
<td>4</td>
</tr>
<tr>
<td>Humanities-Social Sciences electives and for General Education electives</td>
<td>7</td>
</tr>
<tr>
<td>Unrestricted electives*</td>
<td>6</td>
</tr>
<tr>
<td>Total Lower Division Units</td>
<td>90-100</td>
</tr>
</tbody>
</table>

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Lower Division Program IV

Requirements for major in Electrical Engineering, Electrical Engineering/Materials Science and Engineering, and Computer Science and Engineering only.

**QUARTER USUALLY TAKEN**

<table>
<thead>
<tr>
<th>Course</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>Calculus, Mathematics 21A-21B-21C</td>
<td>12</td>
</tr>
<tr>
<td>Linear algebra—Mathematics 22A</td>
<td>3</td>
</tr>
<tr>
<td>Differential equations</td>
<td>6</td>
</tr>
</tbody>
</table>

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Mathematics 228 | 3 |

Vector analysis—Mathematics 22C | 3 |

General physics—Physics 9A-9B | 4 |

General chemistry—Chemistry 1A-1B | 10 |

Organic chemistry—Chemistry 8A | 6 |

Biological Sciences 1A, 1B, 1C | 15 |

Engineering graphics | 3 |

Total Lower Division Units | 97-100 |

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*Course not offered this academic year.
Aeronautical Science and Engineering

Aeronautical Science and Engineering is the branch of engineering that applies scientific knowledge to the design, manufacture, and operation of aircraft. The program leading to the Bachelor of Science degree in Aeronautical Science and Engineering is designed to provide a broad background and fundamental education in mathematics, the physical sciences, and the engineering sciences. These fundamentals, when complemented by the required technical courses, prepare the student for employment in government or industry while simultaneously establishing an excellent foundation for graduate studies.

The fundamental disciplines of this branch of engineering apply to all bodies and vehicles whose applied loads are influenced by aerodynamic forces. Within this context, aeronautical engineers are involved with automobiles, trains, ships, and submarines, aircraft, rockets, missiles, spacesport equipment, and varieties of energy systems.

The fundamental engineering discipline is supplemented with courses in aircraft propulsion, aerodynamics, aircraft performance, stability and control, aircraft preliminary design, aeronautical structures, and aeronautical systems.

A broad range of technical elective courses is available. Some students choose their electives from one area and others from another, developing a specialization. Others choose courses from several areas in order to broaden their background in the sciences and engineering. Typical aeronautical science and engineering courses include aerodynamics, propulsion systems, aircraft performance, stability and control, aeronautical structures, and aeronautical systems.

Each area is involved with producing, handling, packaging, storing, and transporting biological materials. The practice of agricultural engineering requires an understanding of the unique properties of these materials and the knowledge to control their environment, thereby creating optimal conditions for biological activity.

Agricultural engineers often work in interdisciplinary teams with biological scientists and other engineering specialists. The growth of biotechnology, environmental issues, and concern for the health of farm workers continues to expand the fields of search for new and exciting opportunities. Agricultural engineers are needed to provide engineering solutions for the taking advantages in the biological sciences of the laboratory and the field.

The program allows students to select one of four curricula, depending on their specific interests, while it retains the versatility to adapt to careers in several areas. All curricula share a common lower division program and a common core of courses in the upper division. The first upper division curriculum provides a general program in Agricultural Engineering, with the opportunity to focus on a particular area of interest. The remaining curricula provide options for (2) Aquacultural Engineering, (3) Food Engineering, and (4) Forest Engineering.

Agricultural Engineering Curriculum 1

(Founded by the Accreditation Commission of the Accreditation Board for Engineering and Technology.)

Agricultural engineers are concerned with the production, processing, packaging, and use of biological materials. This program requires the integration of engineering with a specialty of biological disciplines and creates the ability for students to specialize in many areas of specialization, depending on student interest.

For example, Irrigation and drainage specialists apply engineering principles to the design and operation of water systems for biological production. Structures and environment specialists design structures to provide optimum environments for plant production in greenhouses, production storage and conditioning, and animal production. Power and machinery specialists design, develop, and apply machinery and energy systems for crop production and processing. Electronics and electrical systems specialists develop sensors, instrumentation, and control systems for monitoring and controlling production environments and post-harvest processes.

The junior year design project provides students with an opportunity to focus on an area of special interest. Additional courses in this area can be selected with the help of an advisor.

Minimum units required for major, 156.

Agricultural Engineering

Combine a broad general training in engineering with a basic understanding of biological phenomena and you have the preparation for a challenging and socially useful career.

Agricultural engineers create systems, equipment, and processes for the production and utilization of biological materials. They integrate a cross section of engineering disciplines, with special attention to the interface between biological systems and biological products. Agriculture (including nursery and greenhouse enterprises), food processing and manufacturing, timber production and forest management, and development of many new areas in which agricultural engineers are prepared to serve.

Subject Areas and Courses

Electronic circuits and microcomputers—Engineering 100 and Agricultural Engineering 106.

Applied mechanics and thermodynamics—Engineering 102A, 102B, 103A, 104A, 104B, and 105A.

Economics of agriculture—201.

Mathematics—Applied Science Engineering 115 or Engineering 160.

Statistics—Civil Engineering 114.

Agricultural engineering—Civil Engineering 114, 125, 132, and 145. Professional engineering design—11.

(a) Agricultural Engineering 170A, 170B, 170C, and 170D.

(b) Select one course from Civil Engineering 132A, 145, Mechanical Engineering 150A.

Professional responsibilities—Engineering 190.

Humanities-Social Science electives and General Education electives—15.

Biological and agricultural sciences—9.

Subject Areas and Courses

Electronic and microcomputer systems—Engineering 100 and Agricultural Engineering 106.

Applied mechanics and thermodynamics—Engineering 102A, 102B, 103A, 104A, 104B, and 105A.

Economics of agriculture—201.

Mathematics—Applied Science Engineering 115 or Engineering 160.

Statistics—Civil Engineering 114.

Agricultural engineering—Civil Engineering 114, 125, 132, and 145. Professional engineering design—11.

(a) Agricultural Engineering 170A, 170B, 170C, and 170D.

(b) Select one course from Civil Engineering 132A, 145, Mechanical Engineering 150A.

Professional responsibilities—Engineering 190.

Humanities-Social Science electives and General Education electives—15.

Biological and agricultural sciences—9.

Subject Areas and Courses

Electronic and microcomputer systems—Engineering 100 and Agricultural Engineering 106.

Applied mechanics and thermodynamics—Engineering 102A, 102B, 103A, 104A, 104B, and 105A.

Economics of agriculture—201.

Mathematics—Applied Science Engineering 115 or Engineering 160.

Statistics—Civil Engineering 114.

Agricultural engineering—Civil Engineering 114, 125, 132, and 145. Professional engineering design—11.

(a) Agricultural Engineering 170A, 170B, 170C, and 170D.

(b) Select one course from Civil Engineering 132A, 145, Mechanical Engineering 150A.

Professional responsibilities—Engineering 190.

Humanities-Social Science electives and General Education electives—15.

Biological and agricultural sciences—9.

Subject Areas and Courses

Electronic and microcomputer systems—Engineering 100 and Agricultural Engineering 106.

Applied mechanics and thermodynamics—Engineering 102A, 102B, 103A, 104A, 104B, and 105A.

Economics of agriculture—201.

Mathematics—Applied Science Engineering 115 or Engineering 160.

Statistics—Civil Engineering 114.

Agricultural engineering—Civil Engineering 114, 125, 132, and 145. Professional engineering design—11.

(a) Agricultural Engineering 170A, 170B, 170C, and 170D.

(b) Select one course from Civil Engineering 132A, 145, Mechanical Engineering 150A.

Professional responsibilities—Engineering 190.

Humanities-Social Science electives and General Education electives—15.

Biological and agricultural sciences—9.

Subject Areas and Courses

Electronic and microcomputer systems—Engineering 100 and Agricultural Engineering 106.

Applied mechanics and thermodynamics—Engineering 102A, 102B, 103A, 104A, 104B, and 105A.

Economics of agriculture—201.

Mathematics—Applied Science Engineering 115 or Engineering 160.

Statistics—Civil Engineering 114.

Agricultural engineering—Civil Engineering 114, 125, 132, and 145. Professional engineering design—11.

(a) Agricultural Engineering 170A, 170B, 170C, and 170D.

(b) Select one course from Civil Engineering 132A, 145, Mechanical Engineering 150A.

Professional responsibilities—Engineering 190.

Humanities-Social Science electives and General Education electives—15.

Biological and agricultural sciences—9.
Agricultural engineers are involved in the design, fabrication, and management of equipment and facilities, including farming, harvesting, and handling aquatic plants and animals. Maintenance of proper habitat and environmental conditions in controlled aquaculture operations is a primary consideration. Minimum units required for major: 202.

Subject Areas and Courses

<table>
<thead>
<tr>
<th>Course Title</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>Electronic circuits and microcomputers—Engineering 100 and Agricultural Engineering 165</td>
<td>8</td>
</tr>
<tr>
<td>Electronics and thermodynamics—Engineering 102A, 102B, 103A, 104A, 104B, and 105A</td>
<td>16</td>
</tr>
<tr>
<td>Design—Engineering 114, 125, and 145</td>
<td>6</td>
</tr>
<tr>
<td>Select one course from Agricultural Engineering 114, 125, 132, and 145</td>
<td>12</td>
</tr>
<tr>
<td>Select one course from Civil Engineering 132A, 145, Mechanical Engineering 160A</td>
<td>15</td>
</tr>
</tbody>
</table>

Forestry Engineering

<table>
<thead>
<tr>
<th>Course Title</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>Select from Animal Science 118, Entomology 110, and Environmental Studies 120</td>
<td>15</td>
</tr>
<tr>
<td>Select from Animal Science 118, Entomology 110, and Environmental Studies 120</td>
<td>15</td>
</tr>
<tr>
<td>Biological and agricultural sciences—Engineering 114, 141, 149, 149A, 149B</td>
<td>18</td>
</tr>
</tbody>
</table>

Total units for Upper Division Program: 125

Chemical Engineering

Chemical Engineering is concerned with the application of the principles of chemistry and engineering to the development of useful processes. The products of the process industries range from antibiotics to zirconium, from integrated circuits to integrated management of wastes, from food and agricultural chemicals to synthetic fibers. Chemical engineers are increasingly concerned with chemical and engineering processes related to the environment, food, and pharmaceutical production, and medicine. Preparation for careers in chemical engineering requires an understanding of both engineering and chemical principles to develop proficiency in conceiving, designing, and operating new processes.

The Chemical Engineering curriculum has been planned to provide a sound knowledge of engineering and chemical sciences so that the student may achieve competence in treating not only current technical problems but also those that will arise in the technologies of the future. In the junior year, attention is focused on basic engineering courses, particularly thermodynamics, fluid mechanics, and energy transfer. In the senior year these fundamentals are drawn together and applied in a study of mass transfer phenomena, process design, and process dynamics and control. The program is strengthened and broadened with introductory courses in the electrical and mechanical sciences.

The curriculum includes 12 units of technical electives and 8 units of advanced chemistry electives which allow the student to strengthen specific areas in Chemical Engineering, explore new areas, or provide areas of specialization. All the most popular areas of specialization, together with lists of suggested technical electives, are identified and discussed in the following paragraphs. Please talk to the instructors of the courses listed about possible prerequisites before enrolling.

AREAS OF SPECIALIZATION:

1. Applied Chemistry: Chemical Engineering curriculum includes an important core of chemistry courses. Students can take advantage of this background to build a strong foundation in chemistry by choosing electives from among advanced undergraduate chemistry courses.
Suggested technical electives:
Textiles and Clothing 100, 110

**Applied Mathematics.** The mathematics specialization is designed both to strengthen the student’s understanding of the foundations of engineering science and to improve the ability to treat complex engineering problems. Courses in abstract algebra, advanced calculus, and the theory of differential equations are designed to provide a theoretical background, while courses in analytical and numerical analysis provide the techniques for solving a wide range of engineering problems.

Suggested technical electives:
Applied Science Engineering 115, 116

**Biochemical Engineering.** This area of specialization prepares students to do graduate work in biochemical engineering and for employment in the biotechnology, pharmaceutical, and food industries.

Suggested technical electives:
**Strongly recommended**
Microbiology 102 (Instead of Physics 90), 102L, 135A, 135B, and 130L
Biochemistry and Biophysics 101A, 101B
Chemical Engineering 161

**Recommended**
Genetics 100, 102A, 102B, 102L
Biochemistry and Biophysics 101L, 123, 123L, 133
Plant Sciences 140
Viticulture and Enology 186

**Computers and Automation.** This specialization offers the opportunity to master various computational techniques to formulate, solve, and analyze chemical engineering problems. In addition, the student is exposed to the theory and practice of monitoring and operation of chemical processes using microprocessor-based control systems. The common ingredient in all 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 extensive use of computers. The following list of elective courses is suggested to help the student 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 Engineering 153

**Automation Control:**
Electrical and Computer Science Engineering 150, 151, 157B
Mechanical Engineering 176
Food Science and Technology 166

**Electronics Processing.** Because the manufacture of semiconductor devices, integrated circuits, and magnetic memories, tapes, and disks involves the application of chemical and engineering principles, chemical engineers are finding productive careers in the electronics industry. The electronics processing specialization introduces the student to the analysis and construction of 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 162
Electrical and Computer Science Engineering 145A, 145B, 145C
Physics 140A, 140B

**Energy Engineering.** This area of specialization is designed to introduce the student to the various energy sources and energy conversion methods.

Suggested technical electives:
Agricultural Engineering 112
Chemical Engineering 111, 112
Environmental Studies 187, 189
Mechanical Engineering 161, 162, 163
Reservoir Sciences 103

**Environmental Engineering.** The environmental engineering option prepares the student to deal with problems of environmental quality by developing knowledge of fundamental chemical and transport phenomena, chemical reaction processes coupled with fluid mechanics, heat transfer, and mass transfer. Such a foundation in basic chemical engineering science, plus the usual chemical engineering analysis and design courses and courses on environmental topics, prepares the student 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 Engineering 149A
Recommended
Atmospheric Science 121A, 121B, 159
Civil Engineering 242A, 242B, 242BL, 244
Environmental Studies 110
Environmental Toxicology 101, 112A, 112B, 131

**Water Environment**

**Strongly recommended**
Chemical Engineering 161
Civil Engineering 140, 140L, 148A, 148B
Microbiology 102 (Instead of Physics 90)
Recommended
Biochemistry and Biophysics 101A, 101B
Civil Engineering 147, 240, 243A, 243B, 244, 245, 246, 248A
Environmental Studies 110, 150A, 151
Environmental Toxicology 101, 112A, 112B
Water Science 41

**Food Process Engineering.** This area of specialization prepares students to do graduate work in food science and technology and to work in the food processing industry.

Suggested technical electives:
**Strongly recommended**
Microbiology 102 (Instead of Physics 90)
Biochemistry and Biophysics 101A, 101B
Chemical Engineering 162
Civil Engineering 132
Food Science and Technology 104, 104L, 111
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 products.

Suggested technical electives:
Management 250, 251
Agricultural Economics 113, 130, 136
Psychology 186
Statistics 103

**Prebiomedical Engineering.** This area of specialization is designed to prepare the student for graduate work in biomedical engineering. Early planning of a complete course schedule in consultation with a Biomedical Engineering advisor is important to provide space for Biomedical Science courses.

Suggested technical electives:
Four to six courses from:


**Premedical.** Inclusion of both organic and physical chemistry in the curriculum allows the student to complete the premedical requirements while satisfying the requirements of the Chemical Engineering major. Those electing the premedical (including preprofessional) area of specialization should verify the specific preparation requirements with the Health Sciences Advising Office before making a final decision on electives. To insure that room is provided in the program for the biology courses, it is important to prepare a course schedule with a Chemical Engineering advisor early in the freshman year.

Suggested technical electives:
Anatomy 100
Chemistry 128C, 129B, 129C
Six biology or biochemistry courses, such as Biochemistry and Biophysics 101A, 101B, Biological Sciences 1A, 1B, 1C, Genetics 100, Microbiology 102, Physiology 110, 112, 113, 114, Zoology 100, 121.

**Chemical Engineering**
(Accredited by the Engineering Accreditation Commission of the Accreditation Board for Engineering and Technology, Inc.)

Minimum units required for major: 193.

**Subject Areas and Courses**

**Engineering—Engineering 100, 106.**


**Chemistry—Chemistry 110A, 110B, 110C...**

**Advanced chemistry electives.**

To be selected from upper division courses in Chemistry, Biochemistry, and Biophysics, Chemical Engineering 161, 163, Civil Engineering 144A, 149A, Engineering 134, 144, 147, Environmental Toxicology 112A-112B, Food Science and Technology 100A-100B, 101A-101B, 104, 111, 119, Physiological Sciences 101A-101B.

**Technical electives.**

**12 Humanities—Social Sciences/General Education electives.**

**Total Units for Upper Division Program.**

**100**

**Chemical Engineering/Materials Science and Engineering**

Minimum units required for major: 200.

**Subject Areas and Courses**

**Engineering—Engineering 100, 106.**


**Chemistry—Chemistry 110A, 110B, 110C...**

**Materials science—Materials Science Engineering 132, 132, 134, 138, and two courses chosen from Materials Science Engineering 140, 142, 144, and three laboratory courses chosen from Materials Science and Engineering 132L, 134L, 138L, 140L, 142L, and 144L.**

**21**

**Humanities—Social Sciences electives and/or General Education electives.**

**8**

**Total Units for Upper Division Program.**

**103**

**Civil Engineering**

Civil engineering is devoted to the improvement of the human environment for the purposes of making our activities productive, safe, and enjoyable, and to providing aesthetically pleasing surroundings. 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; freedom from disease-carrying wastes; land-, water-, and air-transportation; housing and other structures; food control; and large recreational facilities.

Areas of specialization within civil engineering include (1) Civil Engineering Planning; (2) Environmental Engineering; (3) Structural Engineering; (4) Structural Mechanics and Geotechnical Engineering; (5) Transportation Planning and Engineering; and (6) Water Resources Engineering. You may specialize in one or more of these areas by selecting appropriate technical electives; however, such specialization is not required. While developing your individual program, you are urged to consult a faculty advisor.

Because of the direct concern of professional civil engineers for the quality of human life, civil engineering students are encouraged to include among their technical electives courses such as Economics 125 and 125B, Environmental Studies 180 and 180B, Political Science 109, 111, 186, and Sociology 143A. 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 planning resources utilization and development of projects on an urban or regional scale. Civil engineering planning requires an understanding of the basic principles of engineering, economics, planning concepts and techniques, environmental sciences, public administration, and politics. You are encouraged to plan your program early with a faculty advisor to complement the suggested technical electives with courses in the humanities and social sciences.

Suggested technical electives:
- Agricultural Economics 147, 148, 176
- Civil Engineering 137, 146, 152, 153, 160, 161, 162
- Economics 125, 125B, 130, 131
- Environmental Studies 180, 180B, 180A, 180B, 180C, 180D, 180E
- Geography 155, 162
- Political Science 100, 101, 102, 107, 108
- Water Science 150, 154
- Water Resources Engineering 142, 147, 148, 152, 154
- Chemical Engineering 154A, 154B, 156A, 156B
- Chemistry 107A, 107B, 110A, 120A, 120B
- Civil Engineering 141C, 141D, 142, 145, 146, 147, 148A, 148B, 152
- Engineering 180
- Environmental Studies 152A, 152B, 150C, 151, 156
- Engineering 120A, 120B, 120C
- Microbiology 102, 103, 130A
- Statistics 30A, 30B
- Suggested advisors: D.P.Y. Chang, J. Derby, O.G. Raabe, E.D. Schroeder, G. Tchobanoglous

Structural Engineering, Structural Mechanics, and Geotechnical Engineering. This area is concerned with the design and analysis of structures, both as isolated structures and as parts of larger systems such as buildings, bridges, highways, and dams. Structural Engineering encompasses structures made from materials such as steel, concrete, reinforced concrete, or timber. Geotechnical Engineering encompasses natural and man-made types of structures such as foundations or slopes which are composed of rock or soil. Structural mechanics emphasizes more theoretical aspects of structures—such as mathematical analysis and characterization of material properties.

Suggested technical electives:
- Agricultural Science and Engineering 135, 137
- Art 121A
- Engineering 122, 123, 124, 125
- Environmental Studies 180B, 180C

Transportation Planning and Engineering. Specialization in this area is 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 principles of engineering, economics, and planning in the development of policies, programs, and projects. Transportation systems engineering blends knowledge of many engineering disciplines in the design, construction, operation, and maintenance of transportation facilities. In the form of an integral system. Students should acquire an awareness of the social sciences and environmental sciences through courses in these areas.

Suggested technical electives:
- Civil Engineering 137, 146, 152, 153, 160, 161, 162, 163
- Engineering 180
- Environmental Studies 180A, 180B, 180C, 180D, 180E
- Suggested advisors: P. Jovanis, R. Kitaruma, P. Mokhtarian, D. Sperring

Water Resources Engineering. This area includes hydrology, hydraulics, and water resource systems planning and design. Hydraulics is concerned with flow in open-channel and closed-channel systems and through hydraulic structures. Water resources system planning and design is concerned with the comprehensive development of water resources for multiple use. Emphasis is placed on principles of planning, analysis, and engineering design and operation as related to the water needs of industry, agriculture, recreation, and other activities.

Suggested technical electives:
- Agricultural Economics 147, 176
- Atmospheric Science 120, 121A, 121B
- Chemical Engineering 154A, 154B, 156A, 156B
- Chemistry 107A, 107B, 110A, 120A, 120B
- Civil Engineering 140C, 141D, 142, 145, 146, 147, 148A, 148B, 152
- Engineering 180
- Environmental Studies 152A, 152B, 150C, 151, 156
- Mathematics 120A, 120B, 120C
- Microbiology 102, 103, 130A
- Statistics 30A, 30B
- Suggested advisors: D.P.Y. Chang, J. Derby, O.G. Raabe, E.D. Schroeder, G. Tchobanoglous

Civil Engineering

(Accredited by the Engineering Accreditation Commission of the Accreditation Board for Engineering and Technology, Inc.)

Minimum units required for major: 180.

UNITS

Subject Areas and Courses

Electronic circuits—Engineering 100 or equivalent. \( \geq 3 \)

Applied mechanics—Civil Engineering 102A, 103A, 104A, 104L \( \geq 10 \)

Applied thermodynamics—Engineering 105 or Chemistry 110A \( \geq 3 \)

Structures—Engineering 131A \( \geq 6 \)

Soil mechanics—Civil Engineering 171, 171L \( \geq 5 \)

\( ^* \)One unit of Engineering 100 applies toward the Technical electives requirement.

\( ^* \)Civil Engineering 10 is a required prerequisite to Civil Engineering 171. The extent of further specialization is chosen by the student with the help of departmental advisors.

Hydraulics and water resources—Civil Engineering 141, 141L, 142 \( \geq 7 \)

Environmental—Civil Engineering 148A \( \geq 3 \)

Civil engineering design—Civil Engineering 132B, 132C \( \geq 3 \)

Civil engineering materials—Civil Engineering 132A, 132C, 134, 139, 145, 147, 148B, 152, 162, 173 (must include one course from Economics 125, 125B, 125C, 134, 145, 148B, 162, or 173) \( \geq 18 \)

Economics—Engineering 106 \( \geq 3 \)

Engineering mathematics—Applied Science Engineering 115, 116 \( \geq 3 \)

Environmental—Civil Engineering 148A \( \geq 3 \)

Civil engineering design—Civil Engineering 132B, 132C \( \geq 3 \)

Materials science—Materials Science Engineering 132, 132C, 134, 134L, 136, 138L, and two courses from Materials Science Engineering 140, 142, 144, 147 or Civil Engineering 133 \( \geq 18 \)

Humanities-Social Sciences electives and/or General Education electives \( \geq 11 \)

Total Units for Upper Division Program \( \geq 90 \)

Civil Engineering/Materials Science and Engineering

Minimum units required for major: 184.

UNITS

Subject Areas and Courses

Electronic circuits—Engineering 100 \( \geq 4 \)

Applied mechanics—Civil Engineering 102A, 103A, 104A, 104L \( \geq 10 \)

Applied thermodynamics—Engineering 105 or Chemistry 110A \( \geq 3 \)

Structures—Engineering 131A \( \geq 6 \)

Soil mechanics—Civil Engineering 171, 171L \( \geq 5 \)

Hydraulics and water resources—Civil Engineering 141, 141L, 142 \( \geq 7 \)

Environmental—Civil Engineering 148A \( \geq 3 \)

Civil engineering design—Civil Engineering 132B, 132C \( \geq 3 \)

Materials science—Materials Science Engineering 132, 132C, 134, 134L, 136, 138L, and two courses from Materials Science Engineering 140, 142, 144, 147 or Civil Engineering 133 \( \geq 18 \)

Humanities-Social Sciences electives and/or General Education electives \( \geq 11 \)

(Civil Engineering 137 recommended.)

Total Units for Upper Division Program \( \geq 94 \)

Electrical Engineering and Computer Science

(See also Computer Science)

The Department of Electrical Engineering and Computer Science administers three undergraduate curricula: Electrical Engineering, Computer Science and Engineering, and Electrical Engineering/Materials Science and Engineering. The Department, through the Division of Computer Science, also administers a Computer Science curriculum in the College of Letters and Science which is described in detail under the listing “Computer Science” in this Catalog.

The upper division requirements for the degrees in Electrical Engineering, Computer Science and Engineering, and Electrical Engineering/Materials Science and Engineering are described below. Lower division requirements are covered in the Lower Division Curricula at the beginning of the Engineering section. Please note that the lower division requirements for these majors are found in “Lower Division Program.”
Electrical Engineering

Electrical Engineering involves the design, analysis, and effective use of electrical systems. Electrical systems play central roles in nearly all aspects of modern life, including homes, entertainment, space exploration, medicine, communications, transportation, energy, industrial automation, defense, computer science, and more.

The Electrical Engineering curriculum combines a strong background in the scientific and theoretical aspects of electrical engineering with a practical knowledge of the design of electrical systems to prepare students both for careers in industry and graduate study.

The Electrical Engineering curriculum is designed to provide you with a solid background in mathematics and physical science preparatory to a study of fundamental electrical engineering principles, including electromagnetics, physical electronics, and electronic circuits. Through the choice of upper division technical electives, you are then able to concentrate your studies in one of the many specialized fields of electrical engineering. Examples of some of the possible fields of specialization are circuits and electronics, signal processing, computer engineering, controls, automation, optical engineering, communication, microwaves, and electronic circuits. You should select the elective courses leading to a specialty in consultation with a faculty advisor.

Electrical Engineering/Materials Science and Engineering

In addition to the general Electrical Engineering curriculum, the Department of Electrical Engineering and Computer Science offers a double major in Electrical Engineering/Materials Science and Engineering. In the past decade, the fields of solid-state electronics, opto-electronics, magnetics, and superconductors have developed to the point that demands for new materials now pace progress in these fields. Materials scientists with an electronic or computer engineering background are now in high demand in these areas. The Electrical Engineering/Materials Science and Engineering curriculum is designed to provide such a background.

Computer Science and Engineering

Computer Science and Engineering encompasses the organization, design, development, analysis, theory, programming, and application of digital computers. It spans the hardware-software spectrum and, thus, combines many aspects of computer science and computer engineering.

The Computer Science and Engineering curriculum has been designed to meet the demand for graduates knowledgeable in all major aspects of computing. As a consequence, it is broader than either traditional computer science or computer engineering. Compared with computer engineering (i.e., the Electrical Engineering degree with a specialization in computer design), it is distinguished by the additional study of software systems and computational theory. Compared with computer science, it is distinguished by the inclusion of many engineering and design-oriented courses.

Through the selection of upper division technical electives, students are able to emphasize either hardware or software design within the Computer Science and Engineering curriculum.

Electrical Engineering

(Electrical Engineering Accreditation Commission of the Accreditation Board for Engineering and Technology, Inc.)

Minimum units required for major: 180.

**Subject Areas and Courses**

- Circuits, systems, and electronics — Engineering 100, Electrical and Computer Science Engineering 131A, 140B, 151, 157A, 183, 171
- Professional and technical electives — Engineering 190
- Engineering science — Engineering 102A, 105A
- Probability Theory — Mathematics 131A or Mathematics 131
- Additional technical electives — Mathematics 131
- Humanities-Social Sciences electives and/or General Education electives — 12

**Total Units for Upper Division Program** — 92

**Computer Science and Engineering**

(Electrical Engineering Accreditation Commission of the Accreditation Board for Engineering and Technology, Inc.)

Minimum units required for major: 186.

**Subject Areas and Courses**

- Circuits, systems, and electronics — Engineering 100, Electrical and Computer Science Engineering 131A, 140B, 151, 157A, 183, 171
- Electromagnetic fields and physical electronics — Electrical and Computer Engineering 110A, 110B, 120A, 120B, 140A, 140B
- Design — select two courses from the following list: Engineering 110A, 110B, 120A, 120B, 140A, 140B
- Probability Theory — Statistics 111A, 111B
- Additional technical electives — Mathematics 131
- Humanities-Social Sciences electives and/or General Education electives — 12

**Total Units for Upper Division Program** — 98

**Materials Science and Engineering**

Materials Science and Engineering is directed towards understanding of the structure, properties, and behavior of materials and new and improved materials with capabilities superior to common metals, alloys, and ceramics. New materials are needed for high-speed transportation systems, surgical and dental implants, new generations of power plants, and solid-state electronic devices in computer and communication technology.

Both the development of new materials and the understanding of processing materials demand a thorough knowledge of basic engineering and scientific principles including crystal structure, elastic and plastic behavior, thermodynamics, phase equilibria and reaction rates, and physical and chemical behavior of engineering materials.

The services of materials engineers are required in many different engineering operations; they study subjects ranging from fracture behavior in automobile to fatigue behavior in alloys. Research is involved in the design behavior in petro-chemical refineries to radiation-induced damage in nuclear power plants, and from fabrication of steel to design of semiconductors. Materials engineers are also increasingly involved in developing the new materials needed to attain higher efficiencies in existing and proposed energy conversion schemes, and will play a central role in the development of new technologies based on composites and high temperature superconductivity.

The 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 a set of "fundamentals" courses (Materials Science Engineering 130, 132, 134, 136). After that background, you are then ready for the "applications" courses (Materials Science Engineering 142, 144, 147, 149) which are recommended for the fourth year.

Twelve technical elective units may be selected to complete the undergraduate Materials Science Engineering program. By selecting the appropriate technical electives and Humanities and Social Science/General Education electives, you may orient the program to suit your interests and career objectives. These objectives include: product design and development, applied research, basic research, teaching, and management.

Upper-division courses in engineering, chemistry, physics, mathematics, and biological sciences are generally accepted as technical electives in Materials Science and Engineering.
Measurements and laboratory—Materials Science Engineering 132L, 134L, 138L, 140L, 142L, 144L, 146L, Mechanical Engineering 170L
Materials science—Materials Science Engineering 132, 134, 138, 142, 144, 147, 148
Advanced materials—Chemistry 110A, and 110C or Physics 140A-140B
Technical electives (Engineering 104B recommended) ...................................................... 12
Humanities-Social Science, and General Education electives ........................................... 15
Total Units for Upper Division Program ................................................................. 94

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 in the development of machines, energy conversion systems, materials, and equipment for guidance and control. Preparation for 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 core of engineering courses taken in the first two years. Your third year is spent in further study of fundamental courses, and in the fourth year you may tailor your studies to your own interests by selecting optional courses and systems analysis. Fluid mechanics, heat transfer, thermodynamics, mechanical design, and materials science. You can either prepare for graduate study in Mechanical Engineering or obtain a broad background for entering engineering practice at the bachelor's level. You are encouraged to select elective courses from among the areas of specialization listed below.

AREAS OF SPECIALIZATION:
Creative design. The creation and improvement of products, processes, or systems that are in nature unique to the primary activities of a professional mechanical engineer. The solutions to such major problems as environmental pollution, lack of energy transport, and appearance of raw materials will depend heavily on the ability to create new types of mechanical and materials systems.
The engineer-designer must have a solid and relatively broad background in the basic physical and engineering sciences and have the ability to solve a variety of problems. In addition to having technical competence, the designer must be able to consider the social and economic consequences of the design and its possible impact on the environment. Product safety, reliability, and economics are other considerations.
Suggested technical electives:
Aeronautical and Astronautical Engineering 130
Agricultural Engineering 119, 165
Applied Science Engineering 115
Civil Engineering 119
Engineering 122

Suggested areas of courses:
Electronic circuits—Engineering 100 ................................. 4
Applied mechanics—Engineering 102A, 103A, 130A, 134A ................................. 12
Applied thermodynamics—Engineering 105A, 130A ................................. 8
Engineering design elective—select from Aerospace Science and Engineering 137, Civil Engineering 132A, 132B, 133, Mechanical Engineering 150A, 150B, 150L ................................. 8
Materials in design—Materials Science Engineering 140, 146 ................................. 8

Suggested technical electives:
Engineering 168
Mechanical Engineering 183, 184

Systems Dynamics and Control. Engineers are increasingly concerned with problems in integrated dynamic systems, in which it is not possible to optimize component parts without considering the overall system. Systems Dynamics and Control is concerned with the modeling, analysis, and design of all types of dynamic systems and with the use of automatic control techniques to change the dynamic characteristics of systems in useful ways. The emphasis in this program is on the physical systems that are closely related to mechanical engineering, but the techniques for studying these systems apply to social, economic, and other dynamic systems.
Graduate research includes projects on continuously variable transmissions, active and semi-active suspension systems, anti-skid braking systems, electromechanical actuator design, design and control of rolling machines, electronically controlled steering, mathematical modeling of motorcycle dynamics, and the analysis of fuel management systems. An Automotive Systems Laboratory is being developed for testing components such as engines, transmissions, brakes, and steering systems as well as complete test vehicles. As plans for campus laboratories and a test track proceed, ten experimental vehicles are housed in a rented facility and research on vehicle component proceeds in various Mechanical Engineering laboratories.

Suggested technical electives:
Aeronautical and Astronautical Engineering 128, 129, 131
Mechanical Engineering 134, 152, 172, 184A, 184B, 187

Suggested areas of courses:
Electronic circuits—Engineering 100 ................................. 4
Applied mechanics—Engineering 102A, 102B, 104A, 104B ................................. 12
Applied thermodynamics—Engineering 105A, 150B, Mechanical Engineering 165 ................................. 10
Fluid mechanics—Engineering 103A, 103B ................................. 8
Mechanical engineering design—Mechanical Engineering 150A, 150B, 150L, or 172, and one course from 184A-184B, 185, 186, 187, 188 ................................. 13
Controls and systems analysis—Mechanical Engineering 171 ................................. 4
Computers and graphics. Introduction to engineering design. (Can Engr 2)

5. Applications of Computers (3) I, II, III. The Staff Lecture—2 hours; discussion—1 hour. Prerequisite: Mathematics 16A or 21A, Digital computer and computer programming; FORTRAN and their interprogramming; debugging of programs; approximate computing-accuracy and significance; solving simple numerical and non-numerical problems. (Can Csl 4)

11A-11B. Issues in Engineering (1-1) II, III, 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 engineering professions: its methods, principles, design, and development process; career opportunities; and professional resources.

17. Circuits (3) I, II, III. The Staff Lecture—3 hours. Prerequisite: Mathematics 22B (may be taken concurrently); Physics 3C. Basic electrical 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. (Can Engr 6)

20. The Technological World (3) I. The Staff Lecture—3 hours, Prerequisite: high school algebra. The nature of the technology: computers and automation; energy; electricity; electronics; transportation, analysis, and problem solving; metric system; pattern and creativity. Technology and social change; technology assessment and technological choices. Intended primarily for students who are not engineering or science majors. Engineering or physical science students may receive only units of credit. General Education credit: Nature and Environment/Introduction.

35. Statics (3) I, II, III. The Staff, (Shin In Charge) Lecture—2 hours, Mathematics 22C (may be taken concurrently); Physics 9A. Force systems and equilibrium conditions with emphasis on engineering problems. (Can Engr 8)


50. Computer Engineering (3) I, II, III. The Staff, (Shin In Charge) Lecture—1 hour, Philosophy 1. Prerequisite: Mathematics 22C. Introduction to computer science, including computer hardware and software, programming languages, and computer networks. Engineering and/or General Education credit: Engineering Materials.

51. Computer Networks (3) I, II, III. The Staff, (Shin In Charge) Lecture—1 hour, Philosophy 1. Prerequisite: Mathematics 22C. Introduction to computer science, including computer hardware and software, programming languages, and computer networks. Engineering and/or General Education credit: Engineering Materials.

52. Computer Engineering (3) I, II, III. The Staff, (Shin In Charge) Lecture—1 hour, Philosophy 1. Prerequisite: Mathematics 22C. Introduction to computer science, including computer hardware and software, programming languages, and computer networks. Engineering and/or General Education credit: Engineering Materials.


55. Computer Networks (3) I, II, III. The Staff, (Shin In Charge) Lecture—1 hour, Philosophy 1. Prerequisite: Mathematics 22C. Introduction to computer science, including computer hardware and software, programming languages, and computer networks. Engineering and/or General Education credit: Engineering Materials.

56. Computer Engineering (3) I, II, III. The Staff, (Shin In Charge) Lecture—1 hour, Philosophy 1. Prerequisite: Mathematics 22C. Introduction to computer science, including computer hardware and software, programming languages, and computer networks. Engineering and/or General Education credit: Engineering Materials.

57. Computer Networks (3) I, II, III. The Staff, (Shin In Charge) Lecture—1 hour, Philosophy 1. Prerequisite: Mathematics 22C. Introduction to computer science, including computer hardware and software, programming languages, and computer networks. Engineering and/or General Education credit: Engineering Materials.

58. Computer Engineering (3) I, II, III. The Staff, (Shin In Charge) Lecture—1 hour, Philosophy 1. Prerequisite: Mathematics 22C. Introduction to computer science, including computer hardware and software, programming languages, and computer networks. Engineering and/or General Education credit: Engineering Materials.
122. Introduction to Mechanical Vibrations (3) I. Hull Lecture—3 hours. Prerequisite: course 102B. 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) I. Jungfernan, Craig Lecture—3 hours. Prerequisite: Physics 50A, 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. Corequisite: course 160B. General Education credit: Nature and Environment/Non-Introductory. Recommended GE preparation: Physics 10.

162. Advanced Energy Technology (4) I. Craig Lecture—3 hours discussion—1 hour. Prerequisite: course 105A or consent of instructor. Technical overview of energy technologies. Emphasis on quantitative understanding. About 20 percent of course is policy oriented. Designed to mesh with course 162A, which is primarily policy. (P/N grading only.) Offered in alternate years.

180. Engineeering Analysis (3) I, III. Hafiz, Brandon Lecture—3 hours. Prerequisite: Mathematics 22B. Analysis of steady-state and nonsteady-state problems and basic aspects of the design of continuous systems: analytic and approximate solutions. Typical engineering problems in heat transfer, fluid mechanics, electrical networks, mechanical vibrations, and elasticity.

195. Professional Responsibilities of Engineers (3) I, III. The Staff Lecture—3 hours—laboratory—1 hour. Prerequisite: upper division standing. Organization of the engineering profession; engineering and management; innovation; competition; and specifications; and business law; technical writing: oral presentations on the interactions between engineering and society.

Graduate Courses
254. Manufacturing Engineering (3) II. Dorf Lecture—3 hours. Prerequisite: course 106, Statistics 120, and Electrical and Computer Science Engineering 157A or Mechanical Engineering 172. Manufacturing and processing engineering, productivity, planning, production and operations, inventory and facilities, quality, robots and flexible manufacturing systems.

281. Seminar in Teaching (1) I. Baughn Seminar—1 hour. Discussion of previous experience as a student and actual practice as a teacher. (SU grading only.)

Engineering: Agricultural
(Colloge of Engineering)
Henry E. Studer, M.S., Chairperson of the Department
Department Office, 2030 Bainer Hall (916-732-0102)

Faculty
Norman B. Aksenov, M.S., Professor Emeritus
Robert H. Burg, M.S., Professor Emeritus
William J. Church, Ph.D., Professor
Phillip L. Chen, Ph.D., Professor
Michael J. Delwiche, Ph.D., Associate Professor
Roger E. Garrett, Ph.D., Professor
D. Kontrac, Ph.D., Assistant Professor
John R. Gross, M.S., Professor Emeritus
Mark E. Gramer, Ph.D., Associate Professor
Bruce R. Hartsough, Ph.D., Associate Professor
S. Milton Henson, M.S., Sc.D., Professor Emeritus
David J. Hills, Ph.D., Professor
Bryan M. Jenkins, Ph.D., Associate Professor
Robert A. Kepner, B.S., Professor Emeritus
John M. Krochta, Ph.D., Professor
Coby Lorenzen, Jr., M.S., Professor Emeritus
Miguel A. Manfo, Ph.D., Professor
Kathryn McCarthy, Ph.D., Assistant Professor
Michael J. McCarthy, Ph.D., Assistant Professor
R. Larry Mertens, Ph.D., Professor Emeritus
John A. Miles, Ph.D., Professor
Stanton R. Morrison, Ph.D., Professor Emeritus
Loren W. Neflauber, Ph.D., Professor Emeritus
Michael O'Ryan, Ph.D., Professor Emeritus
Paul H. Pradelnta, Ph.D., Assistant Professor
Thomas R. Rumsay, Ph.D., Associate Professor
Verne H. Scott, Ph.D., Professor Emeritus
R. Paul Singh, Ph.D., Professor
David C. Slaughter, Ph.D., Assistant Professor
Henry E. Studer, M.S., Professor
Shirinovas K. Upadhyaya, Ph.D., Associate Professor
Wesley W. Wallender, Ph.D., Associate Professor
Wesley E. Yannis, M.S., Professor Emeritus

Courses in Engineering: Agricultural

Lower Division Courses
1. Introduction to Agricultural Engineering (1) II. Studer Lecture—1 hour. Introduction to the types of problems addressed by agricultural engineers working with biological systems: agricultural production; forest engineering; aquacultural engineering; food engineering and biological engineering. Opportunities for engineers with interests and backgrounds in biology. (P/N grading only.)

2. Introduction to Forest Engineering (1) III. Hartsoough Discussion/laboratory—3 hours. Introduction to the engineering aspects of forest problems, including nursery operations, reforestation, harvesting, log transport, milling and residue utilization. (P/N grading only.)

92. Internship in Agricultural Engineering (1-5) I, II, III. The Staff (Studer in charge) Internship. Prerequisite: lower division standing: project approval prior to period of internship. Supervised work experience in agricultural engineering. May be repeated for credit. (P/N grading only.)

98. Directed Group Study (1-5) I, II, III. The Staff (Studer 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, III. The Staff (Studer in charge) (P/N grading only.)

Upper Division Courses
112. Combustion Engines (4) I. Jenkins Lecture—3 hours—laboratory—3 hours. Prerequisite: Engineering 5 and 105A. Theory of design and operating characteristics of internal combustion engines. Thermodynamics of relevant power cycles, performance testing, engine mechanics, fuel metering systems, ignition systems for both spark-ignited and compression-ignited engines. Design for engine applications. Comparison of alternative fuels and engines.

114. Principles of Field Machinery Design (3) III. Studer Lecture—2 hours—laboratory—3 hours. Prerequisite: Engineering 102A. Fundamental requirements and basic operating principles of field machines: elements of field machinery design: use of instrumentation and computer techniques for analysis of specific machines.

115. Forest Engineering (3) III. Hartsoough Lecture—3 hours. Prerequisite: Engineering 104A; Forestry and Resource Management 103, 125 (Berkeley campus). Applications of engineering principles to problems in forestry, including those in forest regeneration, harvesting and transportation.

116. Forest Engineering Field Problems (2) I. Miles Lecture—1 hour; three-weekend field trips to Bigelow Forest. Prerequisite: course 114 or 115. A field study and critical analysis of operations, techniques, and equipment common in forest management, with particular consideration to measurements, data analysis, safety of operations, and maintenance practices.

117. Stability and Traction of Off-Road Vehicles (2) I. Chen Lecture—2 hours. Prerequisite: Engineering 102A and 104A. Drive train elements, suspensions, tires, tracks, chassis configuration and steering systems mechanics for heavy-duty vehicles. Performance, stability, and traction problems in design, testing, design and transport. Vehicle interactions with off-road terrain conditions.

119. Hydraulic Systems (3) III. Chen Lecture—2 hours; laboratory—3 hours. Prerequisite: Engineering 103A. Principles of operation, characteristics, testing and selection of hydraulic system components: pumps, motors, cylinders, control elements, and accessories. Design and analysis of hydraulic systems.

125. Agricultural Structures: Environmental Aspects (3) II. Jenkins Lecture—3 hours. Prerequisite: Engineering 105A. Fundamentals of heat transfer, solar radiation, psychrometric, ventilation, animal energetics, lighting with respect to plant growth, crop production, and respect to storage of agricultural products. Application of this information to the design of animal and plant production and product storage structures.

132. Unit Operations In Food Engineering (4) III. Studer, T. Rumsay Lecture—3 hours; laboratory—3 hours. Prerequisite: Engineering 103A, 105A. Mechanical unit operations applied to such processes as non-Newtonian flow, size reduction, sorting and mixing of granular materials. Thermal operations related to refrigeration, freezing, evaporation and drying of foods.

145. Irrigation and Drainage Systems (4) II. Wallender, Grimmer, Hills Lecture—4 hours. Prerequisite: Engineering 103A or Water Science 142. Engineering and scientific principles applied to the design of surface, sprinkler and micro irrigation systems and drainage systems within economic and environmental constraints. Interaction between irrigation and drainage will be emphasized. (Same course as Water Science 145.)

165. Digital Instrumentation in Agricultural Engineering (4) I. Delwiche Lecture—3 hours; laboratory—3 hours. Prerequisite: Engineering 100. Digital logic concepts and devices: assembly language programming; data acquisition and control.

170A. Engineering Projects: The Design and Evaluation of Projects (2) I, III. Lecture—1 hour; laboratory—3 hours. Prerequisite: two courses from the following (one may be taken concurrently) — courses 114, 115, 125, 132, Civil Engineering 145, Mechanical Engineering 150A, Water Science 160. Principles and procedures for project design and evaluation with emphasis on agricultural and forestry projects. Project selection, data sources, agricultural and forestry factors, specifications, failure modes, human factors, safety, test design, measurement techniques. Develop proposals for course 170B.

170B. Engineering Projects: Design (3) II. Miles Laboratory—discussion—three 3-hour sessions. Prerequisite: course 170A. Individual or group projects involving the design of devices, structures, or systems to solve specific problems in agriculture or forestry. Students may select their projects, subject to approval of instructor.

170C. Engineering Projects: Design Evaluation (3) III. Miles Laboratory—three 3-hour sessions. Prerequisite: course 170B strongly recommended. Individual or group projects involving fabrication, assembly and testing of components, devices, structures or systems designed to solve specific problems in agriculture or forestry. Projects selected by the student from those designed in course 170B.
Graduate Courses

215. Soil-Machine Relations in Tillage and Trac-
tion (3) J. Chancellor
Lecture—3 hours. Prerequisite: course 114 or 117.
Mechanics of interactions between agricultural soils
and tillage and traction devices; determination of rele-
vant physical properties of soils; analyses of stress
and strains in soil due to machine-applied loads;
experimental and analytical methods for synthesizing
characteristics of overall systems.

216. Energy Systems in Agriculture (3) III. Jenkins
Lecture—3 hours. Prerequisite: Engineering 105A.
Theory and application of energy systems in agricul-
ture. Energy transformation during irrigation and
optimal systems design utilizing stock and flow
energy resources. Offered in alternate years.

220. Pilot Plant Operations in Aquacultural Engi-
neering (3) III. Pedlar
Lecture—3 hours; laboratory—6 hours. Prerequisite:
Civil Engineering 243A-243B or Agricultural Engi-
neering Technology 161A-161B. Topics in water
treatment as they apply to aquaculture operations.
Laboratory study of unit operations in aquaculture.
Offered in alternate years.

235. Advanced Unit Operations in Process and
Food Engineering (3) II. T. Runyan
Lecture—3 hours. Prerequisite: an upper division
course in food engineering. Basic principles appli-
cable to process and food engineering. Heat and
mass transfer applications to drying, dehy-
dration and freezing; flow of food and semi-fluid
materials; size reduction; and bio-materials.

240. Infiltration and Drainage (3) II. Grimmer
Lecture—3 hours. Prerequisite: Soil Science 107;
Water Science 140. Aspects of multiphase flow in
soils and their application to infiltration and drainage.
Geosynthetic materials for development and use in
transient and transient drainage with nonlinearity,
capillarity, and evapotranspiration considered. Offered
in alternate years.

241. Sprinkle and Trickle Irrigation Systems (3) III.
Hill
Lecture—2 hours; laboratory—3 hours. Prerequisite:
course 145. Computerized design of sprinkle and
trickle irrigation systems. Consideration of emitter
mechanics, distribution functions and water yield
functions.

242. Hydraulics of Surface Irrigation (3) III. Val-
lender
Lecture—3 hours. Prerequisite: a course in differen-
tial and integral calculus; a course in hydraulics or
fluid mechanics including some open-channel flow;
a course in irrigation principles. Mathematical mod-
els of surface-irrigation systems for prediction of the
ultimate disposition of water flowing onto a field.
Quantity of runoff and distribution of infiltrated water
over field length as a function of slope, roughness,
infiltration and inflow rates.

245. Agricultural Wastes Management (3) I. Hills
Lecture—3 hours. Animal, crop and food processing
wastes; pesticides, fertilizers, odors, dust and smoke.
In relation to environmental pollution. Disposal
needs, present and future. Regulation, economics
and public concern; coordination with municipal and
industrial wastes management. Offered in alternate
years.

250. Design of Mechanical Systems (2)
Lecture—2 hours. Prerequisite: mechanical design
and economics recommended. Experience with
design; evaluating design concepts and establishing
design criteria; analysis and synthesis in design;
optimization techniques; human factors in design.

260. Analog Instrumentation (4) II. DelVicche
Lecture—4 hours; laboratory—3 hours. Prerequisite:
Engineering 100. Instrument characteristics; general-
ized Instrument models, calibration, and frequency
response. Signal conditioning: operational amplifier
circuits, filtering, and noise. Transducers: motion,
force, pressure, flow, temperature, and photoelectric.
Offered in alternate years.

265. Design and Analysis of Engineering Experi-
ments (4) II. Upadhyaya
Lecture—3 hours; laboratory—3 hours. Prerequisite:
at least one undergraduate course in statistics or
consent of Instructor. Design, development, and
analysis of engineering experiments with emphasis
on the selection and utilization of statistical
methods. Problems necessitating the use of campus
and departmental computing facilities will be
assigned.

270. Modeling and Analysis of Biological and
Physical Systems (3) II. Upadhyaya, T. Runyan
Lecture—3 hours. Prerequisite: Civil Engineering
212A. Mathematical modeling of biological systems:
model development; analytical and numerical solu-
tions. Computer simulation and specialty
specializations within Agricultural Engineering.
Offered in alternate years.

275. Physical Properties of Agricultural Materials
(3) I. Chen
Lecture—2 hours; laboratory—3 hours. Prerequisite:
consent of Instructor. Directed group study of spec-
fied topics in physical properties, such as mecha-
nical, optical, rheological, and aerodynamic properties, as related to the design of harvesting, handling, sorting, and processing equipment.
Techniques for measuring and recording physical properties of agricultural materials.

280. Selected Topics in Agricultural Engineering
(1-5), II, III. The Staff (Student In charge)
Lecture, laboratory, or combination. Prerequisite:
consent of Instructor. Directed group study of select-
ed topics with separate sections in (A) Simulation of
Food Processing Systems, (B) Thermal Process
Design, (C) Mass Transfer in Food and Biological
Systems, and (D) Alternate Energy Systems.

290. Research Methods in Agricultural Engineer-
ing (2), I. Giles
Lecture—1 hour; discussion—laboratory—1 hour.
Prerequisite: graduate student standing or consent
of Instructor. Planning, execution, and reporting of
research projects. Literature review techniques and
proposal preparation. Identification of sources for
support of research. Oral presentation of research
results. Written presentation of research results,
manuscript preparation, submission and review.

290C. Graduate Research Conference (1), II, III.
The Staff (Student In charge)
Discussion—1 hour. Prerequisite: consent of instruc-
tor. Research problems, progress and techniques in
agricultural engineering. May be repeated for credit.
(S/U grading only.)

297. Advances in Food Engineering (1), I, II, III.
Singh Seminar—1 hour. Prerequisite: consent of instruc-
tor. Review and discussion of current literature and
developments in food engineering. Presentations by
individual students. (S/U grading only.)

297T. Supervised Teaching In Agricultural Engi-
neering (1-3), I, II, III. Singh
Laboratory—3 hours; tutorial—3-9 hours. Prerequisite:
graduate standing; consent of Instructor. Tutoring
and teaching students in undergraduate courses
offered in the Department of Agricultural Engineer-
ing. Weekly meetings with instructor, evaluation of
teaching. Preparing for and conducting demonstra-
tions, laboratories, and discussions. Preparing and
gradeing exams. May be repeated for a total of 8
units. (S/U grading only.)

298. Group Study (1-3), II, III. The Staff (Student
In charge)
Research—1 hour; discussion—laboratory—1 hour.
Prerequisite: engineering 101. Research in agricul-
tural engineering. May be repeated for credit. (S/U
grading only.)

*Course not offered this academic year.

147. Arms Race Technologies and Strategies (3). 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; rearmament and arms control. Advantages and disadvantages of alternative realizations of weapons systems.


165B. Quantum Optics II (3) III. Yeh Lecture—3 hours. Prerequisite: course 165A or the equivalent. Quantum nature of interaction between light and matter: photoelectric counting statistics. Photon distributions in scattering processes and in nonlinear optical processes.

166A. Quantum Optics Laboratory (1) II. Yeh Labor—3 hours. Prerequisite: course 165A concurrently. On hand experience in working with lasers, photon spectroscopy, electro-optical devices and photoelectric counting statistics.

166B. Quantum Optics Laboratory (1) III. Yeh Labor—3 hours. Prerequisite: course 165B concurrently. Combination of course 166A.

180. Introduction to Plasma Physics and Controlled Fusion (3) I. DeGroot Lecture—3 hours. Prerequisite: Physics 110B and 112A, or consent of instructor. Equilibrium plasma properties, plasma sources, plasma diagnostics, magnetohydrodynamics, kinetic theory, plasma stability, plasma confinement systems and approaches to controlled thermonuclear fusion.


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

198. Special Study for Advanced Undergraduates (1-5) I, II, III. The Staff (Wooten in charge) Prerequisite: consent of instructor. (P/NP grading only)

Graduate Courses

228A-228B-228C. Properties of Matter (3-3-3) I-II, Hoover Lecture—3 hours. Prerequisite: Mathematics 222 and Physics 112B. Microscopic and macroscopic descriptions of matter; thermodynamics and kinetics; constitutive, electrical, mechanical and thermal properties.

230A-230B-230C. Structure of Matter (3-3-3) I-II, III. Yeh Lecture—3 hours. Prerequisite: course 205C. Classical properties of matter; Introduction of quantum mechanics by the correspondence principle; perturbation theory; electron theory of atoms, molecules, and solids; quantum theory of cooperative effects.


234A-234B-234C. Plasma Physics and Controlled Fusion (3-3-3) I-II, III. DeGroot 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.

289A. Special Topics In Applied Science (1-5) I, II, III. The Staff (Wooten in charge) 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) Paarla Physics; (I) Quantum Electronic; (J) Solid State. May be repeated up to a total of 5 units per segment.

290. Seminar (1-2) I, II, III. The Staff (Wooten in charge) Seminar—1-2 hours. (S/U grading only)

290C. Graduate Research Group Conference (1) I, II, III. The Staff Discussion—1 hour. Prerequisite: consent of instructor may be repeated for credit. (S/U grading only)

298. Group Study (1-5) I, II, III. The Staff (Wooten in charge) (S/U grading only)

299. Research (1-12) I, II, III. The Staff (Wooten in charge) (S/U grading only)

Livermore

Upper Division Courses

101. Data Structures (3) I. The Staff Lecture—3 hours. Prerequisite: consent of instructor. Introduction to high level language programming techniques that are used in scientific computing. Topics include programming language Pascal, lists, queues, trees, graphs, sorting and searching algorithms, and memory management algorithms.

102. Introduction to Computer Architecture (3) I. The Staff Lecture—3 hours. Prerequisite: consent of instructor. Basic hardware knowledge for computer science students. Main elements of computer hardware and how they function. Covers topics like number systems, symbolic logic, assembly language, and logic implementation. Several assembly language programs are required.

106. Concurrent Programming (5) III. The Staff Lecture—3 hours. Prerequisite: course 103 or 106 or the equivalent. Presentation of concepts surrounding concurrent programming, as an introduction to operating systems. Focus on concepts of processes and synchronization, emphasizing their use in solving classical problems. This material is then related to operating system design.

111. Introduction to Foundations of Computing (3) II, Blitzer Lecture—3 hours. Prerequisite: course 101; Computer Science Engineering 100. Basic ideas in the theory of computing and the analysis of algorithms. Topics included: finite automata, regular and context-free grammars, order of execution time and space, advanced programming techniques.

135. Introductory Nuclear Science and Technology (3). The Staff Lecture—3 hours. Prerequisite: Physics 121 or the equivalent. Introductions aspects of nuclear phenomena, nuclear masses, size, energy, and decay modes. Interaction of particles and electromagnetic radiation with matter. Instrumentation and theory of measurements, neutron technology, nuclear chemistry.

199. Special Study for Advanced Undergraduates (1-5) I, II, III. The Staff (Wooten in charge) Prerequisite: consent of instructor. (P/NP grading only)

Graduate Courses

201A. Software Engineering (3). Blatter Lecture—3 hours. Prerequisite: courses 101 and 106. Development of large, production-quality programs, project management techniques, software design methodologies, computer security, and the legal aspects of software development.

201B. Software Engineering (3) III. Blatter Lecture—3 hours. Prerequisite: course 201A. Automated and integrated software tools for program management. Small real environments will be studied in depth. Tools implemented by object-oriented software will be examined.

202. Data Base Management (3) III. The Staff Lecture—3 hours. Prerequisite: courses 101, 103. Designing and maintaining database implementations. Course roughly divided into three: physical organization, logical organization, and distributed systems.

203A. Computer Architecture (3) I. Venuri Lecture—3 hours. Prerequisite: course 103 or the equivalent. Detailed design and organization of computer hardware and associated input and output devices. Topics include logic families, addressing methods, memory design, IO devices, survey of various architectural structures, and communication systems. A programming project will be performed.

203B. Computer: Architecture (3) III. Venuri Lecture—3 hours. Research paper and programming project. Prerequisite: course 203A. Topics in computer communication, hardware features to enhance operating systems, and advanced architectures.

204A. Artificial Intelligence (3) III. Blatter Lecture—3 hours. Prerequisite: courses 101, 106, 111. Concepts required for artificial intelligence. Goal reduction, exploiting constraints, control mechanisms, and storing common sense knowledge are introduced. Lisp programming language is used. Offered in alternate years.

204B. Knowledge Representation (3) III. Blatter Lecture—3 hours. Prerequisite: courses 204A, 211, or 212. Representation of knowledge requires some language or communicative medium to describe knowledge about the world. Course explores expressive adequacy, computational efficiency, non-deductive and non-monotonic reasoning associated with some knowledge representation schemes. Offered in alternate years.

204C. Rule-Based Expert Systems (3) II. The Staff Lecture—3 hours. Prerequisite: course 204A. Construction of rule-based interpreters. Includes knowledge representation schemes, relational model of data, inferencing strategies, control strategies, and the practical use of rule-based expert systems. Offered in alternate years.


205B. Mathematical Methods (3) II. Newcomb Lecture—3 hours. Prerequisite: course 205A. Laplace transforms, Sturm-Liouville Theory, solution of second order linear ODE, approximate solutions of ODE, calculus of variations, characteristics.

205C. Mathematical Methods (3) III. Newcomb Lecture—3 hours. Prerequisite: course 205B. Spherical harmonics, Bessel functions, conformation mapping, hypergeometric functions, elliptic functions.

206. Programming Languages (3) III. The Staff Lecture—3 hours; programming project. Prerequisite: course 106 or the equivalent. Examines topics in language design as the contour model and binding times, abstract data types, functional languages, and syntax analysis.

207. Compiler Construction (3) III. The Staff Lecture—3 hours. Prerequisite: course 206. Syntax-directed translation techniques are used to implement a compiler for a block-structured, high-level programming language. Emphasis given to semantic analysis and code generation.

208. Operating Systems I (3) I. The Staff Lecture—3 hours. Prerequisite: courses 108, 203B. Design of an operating system. Emphasis given to mechanisms commonly used to implement systems and to the various policy options. Course stresses the Kernel design approach.
208B. Operating Systems II (3) II. The Staff
Lecture—3 hours. Prerequisite: course 208A. Concentration on operating system structure, interprocess communication, the abstract object model, distributed access control, error recovery, synchronization, naming; atomic actions; client/server model; implementation of a distributed kernel; example distributed applications.

208C. Operating Systems III (3) III. The Staff
Lecture—3 hours. Prerequisite: course 208B. Synchronization, resource allocation, deadlock, fault-tolerance, security, reliability, and trust; costing issues; theories of operating systems; virtual memory; operating system implementation; computer architecture and operating system interaction; fault-tolerant systems.

210A. Numerical Methods In Applied Science (3) I. The Staff
Lecture—3 hours. Prerequisite: calculus through differential equations and vector analysis. Numerical techniques used in a wide variety of applications of digital computers to problems in applied science. Emphasis placed on the common mathematical elements of the techniques developed.

210B. Numerical Methods In Applied Science (3) II. The Staff
Lecture—3 hours. Prerequisite: course 210A. Numerical methods applicable to the solution of partial differential equations. Emphasis on finite-difference, finite-element, and spectral methods for linear hyperbolic, parabolic, and elliptic systems and nonlinear hyperbolic systems.

210C. Numerical Methods In Applied Science (3) III. The Staff
Lecture—3 hours. Prerequisite: course 210B. Computational methods in various fields including: fluid mechanics, kinetic theory, solid mechanics, quantum mechanics.

211. Automata Theory and Formal Languages (3) I. The Staff
Lecture—3 hours. Prerequisite: course 111. Relation between type (0) through type (2) languages and their respective machines (turning machine, linear bounded automata, and push down automata), is discussed. Decidability and the Halting problem discussed.

212. Analysis of Algorithms (3) III. The Staff
Lecture—2 hours. Prerequisite: course 111. Investigation of various algorithms and the requirements of commonly used programming tasks, such as searching, sorting, set manipulation, and graph algorithms. NP completeness and intractability also discussed.

213A. Computer Graphs (3) II. Max Levine
Lecture—3 hours. Prerequisite: course 113. Development of algorithms for perspective line drawing of three-dimensional objects, as defined by polygons or bicubic patches.

213B. Computer Graphs (3) III. Max Levine
Lecture—3 hours. Prerequisite: course 213A. Emphasis on algorithms to produce color shaded raster renderings of three-dimensional models.

214. Computing with Symbolic Expressions (3) III. The Staff
Lecture—2 hours. Prerequisite: course 211 and 212. Theory and practice of computing with symbolic expressions. The LISP and SNOBOL programming languages. Writing programs to manipulate symbolic expressions. Algebraic manipulation. Proving the equivalence of algorithms. Survey of symbolic manipulation languages. Offered in alternate years.

215A. Mathematical Methods In Computer Science (3) II. The Staff
Lecture—2 hours. Prerequisite: course 210A. Mathematical techniques common to advanced computing 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) III. The Staff
Lecture—2 hours. Prerequisite: course 215A. Emphasis on the mathematical methods utilized in the study of data structures and computer architecture.

216A-G Special Topics In Computer Science (1-5) I, II, III
Lecture, laboratory, or combination. Prerequisite: consent of instructor. Special topics in the following areas: (A) Architecture; (B) Software Systems; (C) Language and 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. Prerequisites: courses 205A and 205B (may be taken concurrently). Designed for professional 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.

218A. Signal Processing (3) II. The Staff
Lecture—3 hours. Prerequisite: Mathematics 185A, 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.

218B. Signal Processing (3) III. The Staff
Lecture—3 hours. Prerequisite: course 218A. Signals and systems, convolution, causality, and stability. Z-transform, DFT, DFT, IIR, and FIR filters. Adaptive filters, time delay, spectral estimation, and image processing. Offered in alternate years.

220. Artificial Neural Networks (3) III. Vemuri

222. User Interfaces (3) II. The Staff
Lecture—3 hours. Prerequisites: 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.

224. Microprogrammable Microcomputer Architecture (3) III. The Staff
Lecture—3 hours. Prerequisite: consent of instructor. Concepts of microprogrammed design and implementation of the internal logic of a data to form the digital computer and the architecture of commercially available, user-programmable computers. Course includes a programming project on a department computer.

227. Chaos, Pratice, and Nonlinear Dynamics (3) III. Hoover
Lecture—3 hours. Prerequisite: course 115. Computational treatment of the mathematics of pervasive instabilities—sensitive dependence on initial conditions—called "chaos" link the second law of thermodynamics to nonlinear dynamics. Strange attractors which result are generally fractal objects with great aesthetic and intellectual appeal.

228A-228B. Properties of Matter (3-3) I-II, III. Hoover
Lecture—3 hours. Prerequisite: Mathematics 22B and Physics 112B. Microscopic and macroscopic descriptions of matter; thermodynamics and kinetics; constitutive, electrical, mechanical and thermal properties.

230A-230B. Structure of Matter (3-3) I-II, III. The Staff
Lecture—3 hours. Prerequisite: course 205C. Classical properties of matter; introduction of quantum mechanics by the correspondence principle; perturbation theory; electron theory of atoms, molecules and solids; quantum theory of cooperative effects.

*Course not offered this academic year.

233A-233B-233C. Theory and Applications of Solid-State Physics (3-3-3) I-II, III. The Staff (Wooten in charge)
Lecture—3 hours. Prerequisite: course 230C or the equivalent. Structure and properties of crystals; theory of dielectrics, metals and alloys; magnetics, superconductivity, and semiconductors. Applications to various solid-state devices.

234A-234B-234C. Electromagnetic Theory (3-3-3) I-II, III. 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 compressible and incompressible flows in two and three dimensions; problems of hydrodynamic instability; viscous hydrodynamics; boundary layer theory.

257. Magneto-hydrodynamics (3) III. Newcomb
Lecture—3 hours. Prerequisite: course 224B. Fundamental MHD equations, MHD waves (both linear and nonlinear), shocks, Lagrangian formulation; theory of stability, pyroacoustic effects, finite-relaxation effects.

262A-262B-262C. Atomic and Molecular Interactions (3-3-3) II, III. Grell
Lecture—3 hours. Prerequisite: course 230A-230B-230C or the equivalent. Atomic structure and specia, molecular structure and spectra, classical and quantum mechanical collision theory of electron and heavy particle scattering.

265A-265B. Laser Physics (3-3) I-II. Haas

266A-266B. Laser Physics Laboratory (3-3) I-II. Cameron

267. Nonlinear Optics (3) I-II. Haas

267L. Nonlinear Optics Laboratory (3) I-II. Cameron
Lecture—1 hour; laboratory—6 hours. Prerequisite: course 265A-265B. Experiments exploring the principles of nonlinear optics. Phenomena studied selected from: crystal-optics, electro-optics, acousto-optics, parametric oscillation and amplification, harmonic conversion, stimulated Raman and Brillouin scattering, self-focusing, four-wave mixing, phase conjugation and spectroscopy. Laser spectroscopy.

269A-269B-269C. Plasma Physics and Controlled Fusion (3-3-3) I-II, III. Hwang
Lecture—3 hours. Prerequisite: course 234B or consent of instructor. Equilibrium plasma properties; ein-
Engineering: Chemical

(Chemical Engineering)

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Brian G. Higgins, Ph.D., Professor
Alan P. Jacobson, Ph.D., Professor
David F. Katz, Ph.D., Professor (Chemical Engineering: Obstetrics and Gynecology)
Benjamin J. McCoy, Ph.D., Professor
Karen A. McDonald, Ph.D., Assistant Professor
Arnold N. Patouzio, Ph.D., Associate Professor
Robert L. Powell, Ph.D., Professor
Dewey D.T. Ryu, Ph.D., Professor (Chemical Engineering)
J. M. Smith, Sc.D., Professor Emeritus
Peter Strope, Sc.D., Professor
Stephen Whitaker, Ph.D., Professor

Courses in Engineering: Chemical

Lower Division Courses
1. The Scope of Chemical Engineering (11) I. The Staff (Chairperson in charge)
Lecture—1 hour. Demonstrations and discussions of the opportunities in chemical engineering for professionals in different areas of chemical engineering, with particular emphasis on the different types of work that can be done in various industries. (P/NP grading only.)
98. Directed Group Study (1-5) I, II, III. The Staff (Chairperson in charge)
Prerequisites: consent of instructor.

Upper Division Courses
150A. Chemical Engineering Fluid Mechanics (4) I. The Staff
Lecture—3 hours. Prerequisite: course 159. Fundamentals of dynamic modeling of chemical processes. Design and analysis of classical feedback control of chemical processes.
157L. Process Control Laboratory (1) I, II, III. The Staff
Laboratory—3 hours; discussion—1 hour. Prerequisites: course 157. Laboratory experiments in control system design and analysis.
159. Chemical Engineering Process Design (3) I. The Staff
Lecture—3 hours. Prerequisite: Engineering 106 (may be taken concurrently). Course 150A, 158C. Chemical Engineering process design optimization and economics.
159C. Chemical Engineering Analysis (3) I. The Staff
Lecture—3 hours. Prerequisite: Mathematics 22B. Chemical engineering applications of partial differential equations, tensors, systems of linear equations, and operational calculus.
160. Design of Pipings Systems and Heat Exchangers (5) I. The Staff
Lecture—4 hours. Prerequisite: courses 150B and 158C. Design of piping systems including pumps, compressors, and valves. Shortcut methods for approximating pressure drop in piping. Design of shell and tube heat exchangers.
161. Biochemical Engineering Fundamentals (3) I, II, III. McDonald
Lecture—3 hours. Prerequisite: Mathematics 128A. Fundamentals of biochemical engineering. Introduction to the principles of biochemical processes and their applications in bioengineering.
162C. Process Control Laboratory (1) I, II, III. The Staff (Chairperson in charge)
Prerequisites: consent of instructor. (P/NP grading only.)
163. Special Study for Advanced Undergraduates (1-5) I, II. The Staff (Chairperson in charge)
Prerequisites: consent of instructor. (P/NP grading only.)

Graduate Courses
206. Biochemical Engineering (3) I. Ryu
Lecture—3 hours. Prerequisite: course 161 and Microbiology 2, 3, Biochemistry and Biophysics 101A, 101B, and Food Science and Technology 205 recommended. Interaction of chemical engineering, biochemistry, and microbiology. Mathematical representation of microbial growth, kinetics of growth, death, and metabolism. Continuous fermentation, agitation, mass transfer, and scale-up in fermentation systems. Product recovery, enzyme technology. Offered in alternate years.
226. Enzyme Engineering (3) I, II. Ryu
246. Advanced Biochemical Engineering (3) II. Ryu Lecture—3 hours. Prerequisite: course 161, Chemical Engineering 206, or consent of instructor. Advanced topics in the field of biotechnology including genetic engineering, enzyme engineering, fermentation science, and renewable resources development. The important results of original research will be emphasized and understanding of the fundamental principles and potential for practical application.

252. Advanced Thermodynamics (3) I. The Staff Lecture—3 hours. Prerequisite: course 152B or Engineering 105B. A general treatment of the first and second laws of thermodynamics and thermodynamic relationships to phase and chemical reaction equilibria; introduction to statistical thermodynamics.

253A. Advanced Fluid Mechanics (3) I. The Staff Lecture—3 hours. Prerequisite: courses 150A, 150B, and 269 (may be taken concurrently) or the equivalent. Kinematics and basic principles of fluid flow. Principles of constitutive equations, Navier-Stokes equations for Newtonian fluids. Survey of creeping flow, ideal flow and boundary layer theory. Macroscopic mass, momentum, and mechanical energy balance.

253B. Advanced Heat Transport (3) II. The Staff Lecture—3 hours. Prerequisite: courses 153 and 259B (may be taken concurrently) or the equivalent. Fundamental energy conservation and derivation of microscale and macroscale energy equations. Mechanisms of conduction, free and forced convection, radiation and conduction, and radiation exchange. Free convection equations and correlations. Forced convection.

253C. Advanced Mass Transfer (3) II. The Staff Lecture—3 hours. Prerequisite: courses 154A, 154B, and 269 (may be taken concurrently) or the equivalent. Kinematics and basic conservation principles for multicomponent systems. Constitutive equations for momentum, heat and mass transfer. Applications to binary and ternary systems. Details of diffusion with reaction, and the effects of concentration.

254. Colloid and Surface Phenomena (4) III. Strege Lecture—4 hours; discussion—1 hour. Prerequisite: Chemistry 110C. Colloid and surface phenomena occur in a wide spectrum of problems encountered in engineering and science. Introduction to the behavior of surfaces and disperse systems. Fundamentals will be applied to the solution of practical problems.

255. Applied Kinetics and Reactor Design (4) III. The Staff Lecture—4 hours. Prerequisite: Mathematics 22A, 22B, 22C. Applications of methods of applied mathematics to the analytical and numerical solution of partial differential equations arising in the study of momentum, heat, and mass transfer.

256. Separation Processes: Particulate Systems (3) I. Bell Lecture—3 hours. Prerequisite: course 154A. Analysis of particle systems in pollution abatement and chemical process equipment. Micromechanics, crystalization, aerosols, hydrosols, colloids, Distribution functions, population balances, rarefied gas phenomena, concentration polarization in reverse osmosis and filtration. Offered in alternate years.

261. Separation Processes: Column Operations (3) III. McCoy Lecture—3 hours. Prerequisite: course 154B. Analysis and design of chemical separation processes: distillation, extraction, chromatography, adsorption, etc. Finite difference equations, unified design methods, axial dispersion models, probability and random walk theories, method of characteristics, moment analysis, optimization. Offered in alternate years.

262. Transport Phenomena in Multiphase Systems (3) III. Whitaker Lecture—3 hours. Prerequisite: course 253C. Heat, mass, and momentum transfer in multiphase, multicomponent systems with special emphasis on transport processes in porous media. Derivation of the averaging theorem and application of the method of volume averaging to multicomponent, reacting systems.

263. Rheology and Mechanics of Non-Newtonian Fluids (3) II. Powell Lecture—3 hours. Prerequisite: courses 253A and 259 or consent of Instructor. Mechanics of polymer solutions and suspension, especially the development of properly invariant constitutive equations. Topics include: viscometry, linear and non-linear viscoelasticity, classical rheology, mechanical, kinetic theory. Offered in alternate years.

264. Introduction to Hydrodynamic Stability Theory (3) IV. Higgs Lecture—4 hours. Prerequisite: course 253A. Mathematical structure for studying the stability of fluid motions. Introduction to bifurcation theory and the spectral problem for linear stability. Offered in alternate years.

267. Advanced Process Control (3) II. McDonald, Papazoglou Lecture—3 hours. Prerequisite: course 157 or the equivalent. Advanced course in analysis and synthesis of linear multivariable systems. Emphasis on frequently used design techniques and applications to chemical processes. Topics include singular value analysis, internal model control, robust controller design methods as well as self-tuning control techniques. Offered in alternate years.

268. Seminar (1-10, max 12) 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 on problems in chemical engineering. May be repeated for credit. (SU grading only.)

291. Seminar in Multiphase Transport Phenomena (1) I, II, III. The Staff Seminar—1 hour. Prerequisite: graduate or senior standing. Seminar devoted to the theoretical and practical applications of multiphase transport phenomena. Subjects will include flow in porous media, dispersion with adsorption and reaction, and heat and mass transfer in multiphase systems with chemical reaction. (SU grading only.)

292. Seminars in Process Dynamics and Control (1) I, II. Papazoglou Seminar—1 hour. Prerequisite: graduate or senior standing. Theoretical and practical aspects of process control will be addressed. Topics will include control algorithms and synthesis. Linear systems, feedback and state space methods, linear system design techniques, and advanced control techniques. (SU grading only.)

Professional Course

300. Teaching of Chemical Engineering (1) I, II, III. The Staff

305. Chemical Engineering (1) I, II, III. The Staff

306. Chemical Engineering (1) I, II, III. The Staff

307. Chemical Engineering (1) I, II, III. The Staff

308. Chemical Engineering (1) I, II, III. The Staff

309. Chemical Engineering (1) I, II, III. The Staff

400. Engineering: A Better Environment (4) II. The Staff

Courses in Engineering: Civil

Lower Division Courses

1. The Civil Engineer in Society (1) I. The Staff (Chairperson in charge) Lecture—1 hour. A description of the field of civil engineering and the function of the professional civil engineer. Discussion of professional practice with respect to application of engineering principles, ethics, and responsibilities. (P/NP grading only.)

10. Introduction to Surveying (3) II. The Staff (Chairperson in charge) Lecture—2 hours; laboratory—3 hours. Theory and practice of measurements for distance, elevations, and angles; the analyses and adjustments for systematic and random measurement errors; line directions, traverse computations, and plan and vertical curve; astronomical observations and calculations for latitude, longitude, azimuth, and time. (CEN Engr 10)

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, environmen-
146. Water Resources Simulation (3) I. Lund
Lecture—3 hours. prerequisite: course 142. Simulation techniques in the design and operation of water resource 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 return of treated wastes to the environment.

148. Water Quality Management (3) II, III. Schroeder
Lecture—3 hours. prerequisite: Engineering 103A. Open to Engineering students only. Introduction to basic concepts of water quality; fundamentals of water and wastewater treatment processes. Analysis of treatment process flowsheets. Analysis of water quality management alternatives.

148B. Water Quality Management System Design (3) I. Tchobanoglous
Lecture—2 hours; laboratory—3 hours. prerequisite: course 148A (may be taken concurrently). Introduction to the design of water and wastewater treatment processes.

149. Introduction to Air Pollution (3) I. Carroll (Land, Air, and Water Resources), Chang, Rabe
Lecture—3 hours. prerequisite: courses 22B, 22C. Chemistry 121A or Engineering 103A. Examination of physical and technical aspects of air pollution. Emphasis on geophysical processes and air movement, as well as physical and chemical properties of pollutants.

152. Introduction to Civil Engineering Planning (3) I. The Staff
Lecture—3 hours. Basic planning concepts: role of engineering, economic, environmental, and social information; institutional, political, and legal aspects. Case studies will illustrate planning of water regulation and distribution systems, waste treatment and disposal systems, land and water transportation systems.

153. Deterministic Optimization and Design (3) I. 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. Applications in water resources planning, transportation planning, systems engineering, and other civil engineering disciplines through computer-based design projects.

154. Probabilistic Design and Optimization (3) II. Lund
Lecture—3 hours. prerequisite: 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.

160. Introduction to Transportation Planning (3) I. Sperling
Lecture—3 hours. prerequisite: any two of course 122, Geography 5, and Economics 1A. Transportation systems associated with environmental problems confronting urban areas, and prospective technological and institutional solutions. Draws upon concepts and analytical techniques from economics, engineering, political science, and environmental studies. General Education credit: Contemporary Societies/Non- Introductory course. Corequisite: GE preparation: Geography 5.

161. Transportation System Operations (3) II. Jovanis
Lecture—3 hours. prerequisite: Engineering 102A. Principles of transportation system operation; traffic characteristics and methods of measurement; safety and operations; models of transportation operations and congestion applied to urban streets, freeways, and mass transit services.
Fundamental equations 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—4 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: Plasticity (3) III. Dafalias
Lecture—3 hours. Prerequisite: course 201. Fundamentals of plasticity, the concept of yield, strain-hardening, and the associated constitutive equations for elastic-plastic solids. Solution of selected practical problems involving elastic-plastic, strain-hardening materials. Slip line field theory and limit analysis. Offered in alternate years.

204. Viscous Behavior of Solids (3) II. Dafalias
Lecture—3 hours. Prerequisite: courses 201 and 204. Tensor formulation of the field equations for continuum mechanics. Solution of practical problems. Introduction to nonlinear elasticity and viscoelasticity. Solution of three-dimensional problems. Offered in alternate years.

211. Advanced Matrix Structural Analysis (3) III. Romstad
Lecture—2 hours; laboratory—3 hours. Prerequisite: course 131A. Theory of matrices applied to the solution of systems of linear algebraic equations. Introduction to computer techniques.

212A. Finite Element Procedures in Applied Mechanics (3) II. Ish
Lecture—3 hours. Prerequisite: course 131A, and course 131B or consent of instructor. Computer analysis of complex frameworks by the displacements and strain energy methods. Curve-beam and shell elements in foundation design; partially rigid connections; nonlinear and stability analysis; introduction to structural optimization.

212B. Finite Elements: Application to Linear and Nonlinear Structural Mechanics Problems (3) III. Herrmann
Lecture—2 hours; laboratory—3 hours. Prerequisite: course 212A. Application of the finite element method to linear and nonlinear, one-, two-, and three-dimensional problems in continuum mechanics, solid mechanics, and to plate and shell theories.

212C. Finite Elements: Application to Fluid Problems (2) III. Larrabee
Lecture—2 hours. Prerequisite: courses 141, 212A; additional knowledge of fluid mechanics recommended. Application of the finite element method to two- and three-dimensional fluid flow problems, including inviscid and viscous flow, convection-diffusion problems, and flow through porous media. Class lectures and independent study. Offered in alternate years.

213. Analysis of Structures Subjected to Dynamic Loads (3) III. Romstad
Lecture—3 hours. Prerequisite: courses 138, 211. Analysis of structures subjected to earthquake wind and blast loading; distributed, concentrated and lumped mass methods; development of a computer program for structural, nonlinear response spectrum analysis; frequency and time domain analysis.

221. Theory of Plates (3) III. Herrmann
Lecture—3 hours. Prerequisite: course 201 (may be taken concurrently). Development of plate bending theories including orthotropic behavior; application to transversely loaded, circular, and rectangular plates. Equivalent orthotropic properties for composite plates. Analytical and numerical methods for solution of practical problems.

222. Advanced Topics in Concrete Structures (3) I. Ramay and Taylor
Lecture—3 hours. Prerequisite: course 132B. Ductility of reinforced concrete; design for torsion of structural concrete; seismic requirements; 2-way slabs.

223. Advanced Design of Steel Structures (3) III. Ramay and Taylor
Lecture—3 hours. Prerequisite: courses 132A and 131A. Design considerations for steel column and frame buildings. Design of composite beams. Continuous composite design; design of connections. Design basis follows the AISC's LRFD and ASD specifications.

240. Water Quality (3) II. O'Connor
Lecture—3 hours. Prerequisite: courses 141 and 142. Quality requirements for beneficial uses of water. Hydrologic cycle of quality; Hydromechanics in relation to quality of surface and groundwaters; transport and fate of waterborne pollutants. Predictive methods, introduction to water quality modeling.

242A. Air Quality (3) III. Cheng
Lecture—3 hours. Prerequisite: Engineering 105A; courses 141 and 149, or the equivalent. Factors affecting air quality. Effects of air pollutants. Physicochemical fundamentals of atmospheric transport and reaction. Introduction to dispersion modeling.

242B. Airborne Particles and Scavenging Mechanisms (3) III. Raabe
Lecture—3 hours. Prerequisite: Engineering 103A, 105A, courses 141, 144, or the equivalent. Factors affecting air quality. Effects of air pollutants. Physicochemical fundamentals of atmospheric transport and reaction. Introduction to dispersion modeling.

242BL. Airborne Particles Laboratory (1) I. Raabe
Lecture—3 hours. Prerequisite: course 242B (may be taken concurrently). Laboratory exercises designed to familiarize the student with methods of general and characterization of airborne particles. Offered in alternate years.

243A. Water and Waste Treatment (3) I. Schroeder
Lecture—3 hours. Prerequisite: course 148A. Characterization of water and wastewater; treatment processes and process kinetics; treatment system design.

243B. Water and Waste Treatment (3) I. Schroeder
Lecture—3 hours. Prerequisite: courses 243A, 243C; consent of instructor. Continuation of course 243A.

244. Environmental Quality Modeling (3) III. O'Connor
Lecture—2 hours; laboratory—3 hours. Prerequisite: one of courses 240, 241, or 242A. Mathematical modeling of environmental water quality with emphasis on mathematical models of quality, their structure, capabilities and limitations, sensitivity and reliability as analytical and/or predictive tools. Offered in alternate years.

245. Applied Environmental Chemistry (3) III. Darby
Lecture—3 hours. Prerequisite: Engineering 105A; Chemistry 1A, 1B, or the equivalent; courses 140 and 140L or the equivalent; Chemistry 1C, 5, or 101A recommended. Characteristics of natural and polluted waters. Chemical kinetic and equilibrium principles, thermodynamics, carbonates systems, precipitation and dissolution, cation exchange, oxidation-reduction, and intermediates.

246. Pile Foundation Laboratory (3) III. Darby
Lecture—1 hour; laboratory—6 hours. Laboratory investigation of physical, chemical, and biological processes for water and wastewater treatment.

249A. Design of Water Systems for Wastewater Treatment (3) III. Smith
Lecture—2 hours; laboratory—3 hours. Prerequisite:
courses 243A, 243B. Procedures are presented for the design of natural aquatic and soil-based systems for treatment of municipal and industrial wastewater. 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.

   Lecture—3 hours. Prerequisite: course 251. Historical and current relationships between transportation and land use. Traditional land use models. Role of land use in urban transportation modeling. Relationship between energy consumption and urban form. Impact of telecommunications on urban form. Policies involving transportation/land use relationships.

251. Transportation Demand Analysis (3) I. Kita- mura
   Lecture—4 hours. Prerequisite: course 114 or the equivalent. Detailed discussions of a standard procedure used in urban passenger travel demand forecasting. Principles and assumptions of the model components (trip generation, trip distribution, and modal split). Computer exercises using empirical data to calibrate models and forecast travel demand. Offered in alternate years.

253. Transportation Safety Analysis (3) I. Kita- mura
   Lecture—4 hours. Prerequisite: course 114, 125. Human and vehicle factors in accident occurrence. Evaluation of safety investments; regression to the mean. Management of statistical models of accident occurrence. Offered in alternate years.

254. Discrete Choice Analysis of Travel Demand (3) II. Kita- mura
   Lecture—3 hours. Prerequisite: course 114 or the equivalent. Behavioral and statistical models 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 Network Analysis (3) III. Kita- mura
   Lecture—3 hours. Prerequisite: course 251. Discussions of methods for the analysis of transportation network flow and network optimization. Graphs and networks, flows on networks, shortest-path algorithms, equilibrium models, multiclass traffic assignment, optimal routing, optimal facility location, and optimum network design are covered. Offered in alternate years.

256. Urban Traffic Management and Control I (3) II. Jovenia
   Lecture—3 hours. Prerequisite: course 256. Microscopic and macroscopic traffic stream models; traffic signal delay models; queuing theory applications. Traffic surveillance and detection; traffic forecasting; applications to traffic control systems. Offered in alternate years.

256. Transportation Planning In Developing Countries (3) III. Sperling
   Lecture—3 hours. Prerequisite: course 160 or consent of instructor. Investigation of the role that transportation plays in the development of regions and countries. Emphasis is on identifying appropriate technologies, policies, and planning methods for designing transportation systems in regions of developing economic, geographic, and institutional settings. Offered in alternate years.

259. Advanced Highway Technology and Automation (3) I. Jovenia, Kita- mura
   Lecture—3 hours. Prerequisite: graduate standing.

Technologies covered include vehicle navigation and guidance, telecommunications and information systems, and highway electrification. Analysis and evaluation of new technologies and system implementations for on-the-road and off-road vehicles. Application of new technologies for driver response and pricing strategies and costs, and formulation of control theory.

260. Noncohesive Sediment Transportation (3) II. The Staff

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 operation. Offered in alternate years.

266A. Applied Stochastic Methods in Engineering (3) I. Kawas
   Lecture—3 hours. Markov processes and their applications to modeling of engineering systems. Review of probability and stochastic processes, Markovian processes, Brownian motion and Ornstein-Uhlenbeck processes within the framework of statistical fluctuation theory and their engineering applications to pollution transport problems.

266B. Applied Stochastic Methods in Engineering (3) II. Kawas
   Lecture—3 hours. Stochastic differential equations and their applications to the solution of engineering problems. Offered in alternate years.

267. Water Resource Management (3) I. Lund
   Lecture—3 hours. Prerequisite: basic probability (course 114 or the equivalent) and courses 141 and 142; course 55 recommended. Operation, maintenance, and modification of existing water resource systems; engineering, economic, financial, legal, and institutional considerations; decision, optimization, and multi-objective analysis.

268. Public Works Economics (3) II. Lund
   Lecture—3 hours. Prerequisite: Engineering 106 or Agricultural Economics 145; Economics 1A. Engineering economics applied to public works planning, operations, and maintenance problems; microeconomic and macroeconomic theories; cost-benefit analysis; effects of uncertainty; optimization economics; non-classical economics; public finance. Offered in alternate years.

269. Water Supply and Hydroelectric Power Planning (3) III. Jovenia
   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; planting alternatives. Capacity and energy determination; operations studies; planning alternatives; market requirements and load studies; analysis of system power and supply; regulatory considerations. Offered in alternate years.

270. Advanced Water Resources Management (3) III. Lund
   Lecture—3 hours. Prerequisite: courses 153 and 267 or the equivalent. Discussion of technical papers related to planning theory, system maintenance, regionalization, multi-objective methods, risk analysis, institutional issues, pricing, model application, economic development, forecasting, operations, and other topics.

271. Water Resources Planning Laboratory (3) II. Johnson
   Lecture—2 hours; laboratory—3 hours. Prerequisite: courses 142, 152. Application of hydrology, hydraulics, systems analysis, economics and principles of plan formulation and plan evaluation in conducting a water resources planning study. Lectures provide introduction to the methods and techniques used in the laboratory study. Offered in alternate years.

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*Course not offered this academic year.*
course 171. Analysis of the mechanical behavior of soils from consideration of clay mineralogy, colloidal phenomena, ion-exchange, and soil-water-electrolyte characteristics and soil structure. Laboratory includes methods of characterization of soils, quantification of soil structure, and testing cylinder tests to evaluate soil erosion.


288B. Pavement Systems Design (2) I. Aurland Lecture—2 hours. Prerequisite: course 171. Principles and methods of pavement design for highways and airfields. Offered in alternate years.

288. Advanced Foundation Design (3) II. Idries Lecture—3 hours. Prerequisite: course 173. Design and analysis of bulkheads; deep excavation; tieback systems; caisson dams; loads on buried conduits; lateral earth load capacity; pier foundations; and other related topics.

289. Geotechnical Earthquake Engineering (3) II. Idries Lecture—3 hours. Prerequisite: course 138, 281A. Characteristics of earthquake ground motions; empirical and simulation procedure for estimating these motions; local site response; liquefaction potential; residual strength and stability considerations; evaluation and dissipation of pore water pressures; settlement.

288. Earth and Rockfill Dams (3) III. Idries Lecture—3 hours. Prerequisite: course 288A, 281B. Site selection; preliminary design considerations; layout and construction; including considerations of fault movements; construction; instrumentation; maintenance.

289A. Selected Topics in Civil Engineering (1-5) I, II, III. The Staff (Chairperson in charge) Lecture—1 hour. Discussion of 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.)

299. 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. The Teaching of Civil Engineering (1) I, II, III. The Staff (Chairperson in charge) Discussion—1 hour. Prerequisite: meet qualifications for teaching assistant and/or associate-in Civil Engineering. Participation as teaching assistant or associate-in designated engineering courses.

Methods of leading discussion groups or laboratory sections, writing and grading quizzes, use of laboratory equipment, and grading laboratory reports. May be repeated for total of 9 units. (SU grading only.)

-- Engineering: Electrical and Computer Science --

(Graduate Engineering)

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K. Wayne Current, Ph.D., Professor
Andrew J. Diener, Ph.D., Professor
Richard C. Dorr, Ph.D., Professor (Electrical Engineering and Computer Science Management)
Kamilio Fekhr, Ph.D., Professor
Harman J. Fink, Ph.D., Professor
Gary E. Ford, Ph.D., Associate Professor
Benjamin Ronchetti, Ph.D., Associate Professor
William A. Gardner, Ph.D., Professor
Mohammed S. Ghausi, Ph.D., Professor
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Stephen B. Hagen, Ph.D., Professor
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I. Horowitz, Ph.D., Professor
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Charles E. Hunt, Ph.D., Assistant Professor
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Andre Knoesen, Ph.D., Assistant Professor
Bernard C. Levy, Ph.D., Professor
Wen C. Lin, Ph.D., Professor
David G. Mayne, Ph.D., Acting Professor
John B. Powers, Ph.D., Professor Emeritus
G.R. Redinbo, Ph.D., Professor
Todd R. Redinbo, Ph.D., Professor
Rosemary Reit, Ph.D., Associate Professor
M. A. Soderstrand, Ph.D., Professor
Ronald F. Soochoo, Ph.D., Professor
Richard R. Spencer, Ph.D., Assistant Professor
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Kenneth J. Hoyt, Ph.D., Associate Professor
Robert M. Keller, Ph.D., Professor
Lawrence T. Kau, Ph.D., Professor
Karl Lewitt, Ph.D., Professor
Peter Lind, Ph.D., Professor
Charles U. Martel, Ph.D., Associate Professor
Norman S. Mattock, Ph.D., Professor
Srinivasan Mukherjee, Ph.D., Assistant Professor

Ronald A. Olson, Ph.D., Assistant Professor
Arvin Park, Ph.D., Assistant Professor
Armand E. Pradat, Ph.D., Assistant Professor
Arnold Raghunathan, Ph.D., Assistant Professor
Manfred G. Ruchitzka, Ph.D., Professor
Richard F. Walters, Ph.D., Professor

Courses in Engineering: Electrical and Computer Science

(Courses in Electrical and Computer Science Engineering are listed below; courses in Computer Science Engineering are listed immediately following.)

Lower Division Courses

1. Introduction to Electrical and Computer Engineering (3) I. The Staff (Chairperson in charge)
Lecture—1 hour. Electrical and computer engineering as a professional activity. What electrical engineers know and how they use their knowledge. Problems they are concerned with and how they go about solving them. Presentation of basic ideas and their applications. Examination of some case studies. (P/N grading only.)

70. Computer Structure and Assembly Language (4) I, II, III. Math, Redinbo
Lecture—4 hours; computer workshop—3 hours. Prerequisites: Computer Science Engineering 30 or 35. Introduction to computer architecture; machine language; assembly language; macros and conditional macros; subroutine parameter passing; input/output programming, interrupt system; device drivers; assembly code; absolute and relocatable code; re-entrant code; program development in an operating system.

89A-U. Special Topics in Electrical Engineering and Computer Science (1-5) I, II, III. The Staff (Chairperson in charge)

92. Internship in Electrical and Computer Engineering (1-5) I, II. The Staff (Chairperson in charge) Internship—3-15 hours. Prerequisites: lower division standing; must meet all time period of internship. Supervised work experience in Electrical and Computer Science Engineering. May be repeated for credit. (P/N grading only.)

98. Directed Group Study (1-5) I, II, III. The Staff (Chairperson in charge)
Prerequisite: consent of Instructor. (P/N grading only.)

99. Special Study for Lower Division Students (1-5) I, II, III. The Staff (Chairperson in charge) (P/N grading only)

Upper Division Courses

110A. Electronic Circuits (3) III. Spencer, Haley, Hurst
Lecture—3 hours. Prerequisite: courses 70, 114A, 140A, Engineering 100; course 111A concurrently; course 208B concurrently recommended. Large and small signal device models; analysis and design of bias and gain stages; analysis and design of op amplifiers.

110B. Electronic Circuits (3) III. Spencer, Haley, Hurst
Lecture—3 hours. Prerequisite: courses 110A, 111A, 112; course 111B concurrently; course 140B recommended. Analysis and design of multi-stage and feedback amplifiers; effects of limitations and applications; active filters; oscillators; digital switches.

111A. Electronic Circuits Laboratory (4) I, II. Spencer, Hurst

*Course not offered this academic year.
192. Internship in Electrical and Computer Engineering (1–5) I, II, III. The Staff (Chairperson in charge). Internship—3–15 hours. Prerequisite: completion of a minimum of 84 units; project approval prior to period of internship. Supervised work experience in electrical and computer engineering. May be repeated for credit. (P/NP grading only)

199. Special Study for Advanced Undergraduates (1–5) I, II, III. The Staff (Chairperson in charge) (P/NP grading only)

Graduate Courses

201. Digital Processing of Signals (4) I. Algazi, Friedlander, Ford Lecture—4 hours. Prerequisite: course 151. Theory and applications of digital processing of signals. Z-transform analysis of discrete-time systems, filter design techniques, structures for discrete-time systems, discrete Fourier transform and Hilbert transforms. (Former course 204)

205. Introduction to Optical Information Processing (3) III. Knoesen Lecture—3 hours. Prerequisite: courses 230 and 250 recommended. Review of the scalar theory of diffraction and of two-dimensional Fourier transforms, from which the applications of the frequency analysis of optical imaging systems will be developed. Image processing techniques will be examined, including the theory and application of holography. Introduction to optical computing. Offered alternate years.

206. Digital Image Processing (4) II. Algazi, Ford, Reed Lecture—3 hours. Laboratory—3 hours. Prerequisite: course 151. Two-dimensional systems theory. Image perception: sampling and quantization, transfer functions, and applications, enhancement, filtering and restoration, image analysis, and image processing systems.

207. Pattern Recognition and Classification (3) III. Ford, Reed Lecture—3 hours. Prerequisite: Statistics 120. Topics in statistical pattern recognition and classification: linear decision functions and minimum distance classification, Bayes decision theory, clustering algorithms, the generalized perceptron, multi-layer neural networks, and feature extraction.


211. Advanced Analog Circuit Design (3) I, II. Spencer, Current, Hurst Lecture—3 hours. Prerequisite: course 210; Statistics 131A or the equivalent is recommended. Noise in electronic circuits and systems. Distortion analysis; the translinear principle and its application to circuit analysis and synthesis; phase-locked loops and their applications.

212. Analog MOS IC Design (3) II. Hurst, Spencer, Current Lecture—3 hours. Prerequisite: course 210. Analysis and design of analog MOS Integrated circuits. CMOS processes, MOS device modeling, passive components, single stage amplifiers, current sources, op-amps, compensation, comparators, switched-capacitor filters, and analog-to-digital converters.

214A. Computer-Aided Circuit Analysis and Design (3) I, II. Haley, Current Lecture—3 hours. Prerequisite: courses 110A–110B, 111A–111B; knowledge of FORTRAN or C. Network equation formulations; nonlinear dc and linear ac circuit analysis; calculation of dc and ac network sensitivities. Extensive computer project.

214B. Computer-Aided Circuit Analysis and Design (3) II. Current, Haley Lecture—3 hours. Prerequisite: course 214A. Transistor and pseudomorphic analysis; harmonic analysis; steady-state analysis; time-domain network sensitivities, ac, dc, transient gradient calculations, design optimization. Extensive computer project.

215A. Introduction to VLSI Circuits (3) I. Hurst, Spencer Lecture—3 hours. Prerequisite: courses 110A–110B, 111A–111B. Theory and practice of VLSI circuit and system design. Extensive use of VLSI computer-aided design tools allows students to undertake a VLSI design example.

218B. Multiprocessor Chip Design (1) I. Current, Hurst, Spencer Laboratory—3 hours. Prerequisite: course 218A. CMOS and NMOS microprocessor chip layout projects begun in courses 218A, 212, and 219 are assembled and submitted to the DARPA NSF MOSIS program for fabrication.

218C. IC Testing and Evaluation (1) III. Current, Hurst, Spencer Laboratory—3 hours. Prerequisite: course 218A and 218B. Chips submitted in course 218B are tested and evaluated. Issues involving design of ICs for testability are discussed.


220. Semiconductor Devices (3) II. Churchill, Bower, Hunt Lecture—3 hours. Prerequisite: course 140B. Covers the physical principles, characteristics and models of various semiconductor devices including P-N Junction and metal-insulator-semiconductor diodes, junction and insulated gated field effect transistors.

221. Passive Filter Design (3) I. Soderstrom, Current, Haley Lecture—3 hours. Prerequisite: Engineering 100 and course 112 or the equivalent. Introduction to the design of passive filters with lumped and distributed elements. Filter specifications and design procedures, approximation theory, modern doubly terminated reactance, two-port syntheses, passive filters with lumped elements, crystal and ceramic filters, mechanical filters.

222. Active Filter Design (3) II. Soderstrom, 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 elements, active-R networks, and switched capacitor filters.

225. RF Amplifiers, Oscillators, Mixers, and Antennas (3) I, II. Banner Lecture—3 hours; laboratory—3 hours. Prerequisite: course 132B and consent of Instructor. Microwave amplifier theory and design (including transistor circuit models, stability considerations, noise models and low noise design. Theory and design of microwave transistor oscillators and mixers. Analysis and design of linear, loop, waveguide, and horn radiators.

228A. Quantum Electrodynamics (3) I. Diener Lecture—3 hours. Prerequisite: courses 130B and 140B. Some basic concepts of quantum theory, density operator, Hamiltonian, and parity. Electric dipole transition; auration of motion of magnetic dipole; resonant processes, absorption, dispersion and sat-
226. Quantum Electronics (3) II. Diines
Lecture—3 hours. Prerequisite: course 225A. Lasers, masers: population inversion, threshold requirement, steady-state and transient behavior, Q-switching, interaction between radiation and phonons. Offered in alternate years.

227A. Microwave Electronics (3) I. Soochoo
Lecture—3 hours. Prerequisite: courses 130B and 140B. Theory of microwaves, 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. Soochoo
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 tubes. Planar and microstrip filters, tunnel and IMPATT diodes, Gunn oscillators. Offered in alternate years.

228. Advanced Microwave and Antenna Design Techniques (3) II. Chang, Lin

230. Electromagnetics (3) I. Diines, Fink
Lecture—3 hours. Prerequisite: course 130B. Maxwell's equations, plane waves, reflection and refraction, waveguides, waves in anisotropic media, propagation in dispersive media, laser beams and resonators.

231. Electromagnetic Theory (3) II. Diines, Fink
Lecture—3 hours. Prerequisite: course 131B; Applied Science Engineering 234A. Advanced topics in electromagnetic theory, including propagation in anisotropic and nonlinear media.

232. Advanced Applied Electromagnetics (3) II. Branner
Lecture—3 hours. Prerequisite: course 131B or 131A. Solutions of advanced electromagnetic problems by using Green's functions. Applications of these techniques to transmission circuits. Offered in alternate years.

240. Quantum Mechanics (3) I. Churchill, Fink, Helay
Lecture—3 hours. Quantum dynamics of particles and waves. Schrodinger's equation, tunneling, angular momentum, atomic structure and bonding, perturbation theory, one-dimensional band-theory of solids, interaction of matter with radiation, photons.

245A. Applied Solid-State Physics (3) II. Fink, Soochoo, Churchill, Helay, Hunt
Lecture—3 hours. Prerequisite: course 140B. Physical properties of solids relevant to solid-state applications. Topics include conduction mechanisms in semiconductors and transport phenomena in semiconductors, and polarization and magnetism in solids.

245B. Applied Solid-State Physics (3) III. Churchill, Soochoo, Helay, Hunt
Lecture—3 hours. Prerequisite: course 245A or the equivalent. Theory of semiconductors with applications to transistors. Topics include transport and rectification of excess carriers and semiconductor devices.

245C. Applied Solid-State Physics (3) II. Soochoo
Lecture—3 hours. Prerequisite: course 245A. Theory of magnetism in solids, with application to ferromagnetic devices and circuits. Topics include paramagnetic and ferromagnetic materials, magnetic resonance, and switching properties of individual magnetic elements and magnetic materials.

246. Advanced Projects in IC Fabrication (3) III. Current, Hunt, Spencer, Smith
Discussion—1 hour; laboratory—6 hours. Prerequisite: course 146B. Individualized projects in the fabrication of active and passive integrated circuits. (Former course 215.)

247. Advanced Semiconductor Devices (3) I. Churchill, Bower, Hunt
Lecture—3 hours. Prerequisite: course 220. Physics of various semiconductor devices, including metal-semiconductor contact, field-effect transistors (MOS-FETs), impurity and related transit-time diodes, transistors, integrated amplifiers, light-emitting diodes, semiconductor lasers, photodetectors, and solar cells. Offered in alternate years.

248. Microsensor Design and Fabrication (3) III. Smith, Bower
Lecture—3 hours. Prerequisite: graduate standing in Engineering. Design and fabrication of sensors using microfabrication techniques. Topics include transduction principles, fabrication technologies specific to microsensors, and design of microsensors 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 circuit, optical, and microelectromechanical systems. Major topics include sputtering, chemical vapor deposition, plasma processing, micromachining, and ion implantation. Offered in alternate years.

250. Linear Systems and Signals (4) I. Chang, Gunders, Levy

251. Nonlinear Control Systems (3) II. Gunders
Lecture—3 hours. Prerequisite: course 152. Feedback systems with uncertain nonlinear plants; techniques for achieving performance tolerances; single input-single output (SISO) and multiple input-multiple output (MIMO): cost of feedback; dithered adaptive systems.

252. Multivariable Control System Design (3) II. Mayne, Wang

Lecture—3 hours. Prerequisite: courses 151, 250 or the equivalent. Theory and practice of adaptive systems. Concepts of learning and adaptation. Structure of adaptive systems and the related adaptive algorithms. Applications of adaptive filters design, system identification, and adaptive control.

254. Digital and Sampled-Data Control System (3) III. Hsieh, Chang
Lecture—3 hours. Prerequisite: courses 157A, 250 or the equivalent. Major topics in digital and sampled data control theory with applications to computer control system analysis and design. Frequency domain (z-transform) methods, state space methods and statistical design methods. Offered in alternate years.

Lecture—3 hours. Prerequisite: courses 112 and 157A. Introduction to robotic systems. Mechanical manipulators, kinematics, manipulator positioning and path planning. Dynamics of manipulators and optimization. Alternative control strategies: visual feedback, robot motion programming, and control algorithm design.

257. Topics In Optimization (3) III. The Staff
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, and constrained optimization theory. Emphasis on optimization, advanced topics in numerical implementation of algorithms, shape optimization, large scale optimization, semi-infinite and non-differentiable optimization with applications to engineering design, global optimizations. (Same course as Mathematics 257.)

258A. Optimization I (3) II. The Staff
Lecture—3 hours. Prerequisite: knowledge of FORTRAN or C. Modeling constrained optimization problems existing in engineering design and other applications, optimality conditions, linear programming and unconstrained optimization, gradient, Newton, conjugate directions and minimization algorithms, convergence and rate of convergence, selected topics. (Same course as Mathematics 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, linear and nonlinearly constrained optimization problems, projection, feasible directions and reduced gradient algorithms, interior point methods, Lagrangean duality theory, augmented Lagrangians, sequential quadratic programming, selected topics. (Same course as Mathematics 258B.)

259. Optimal Control, Theory and Algorithms (3) III. Chang, Mayne
Lecture—3 hours. Prerequisite: graduate standing. Optimal control and calculus of variations; existence of solutions to optimal control problems; necessary conditions of optimality; Pontragin maximum principle, Euler's equation; sufficient conditions of optimality; Hamilton-Jacobi-Bellman equation, linear quadratic regulator problem; algorithms for unconstrained and constrained optimal control problems. (Same course as Mathematics 259.)

260. Random Signals and Noise (4) II. Gardner
Lecture—3 hours; discussion—1 hour. Prerequisite: Statistics 120, course 160; course 250 recommended. Random processes as probabilistic models for signals and noise. Review of probability, random variables, and expectation. Study of correlation function and spectral density, ergodicity and duality between time averages and expected values, filters and dynamical systems. Applications.

262. Spectral Analysis (4) III. Gardner
Lecture—3 hours; discussion—1 hour. Prerequisite: undergraduate course on linear systems and Fourier analysis (e.g., courses 112 and/or 180). Theory and methodology of empirical spectral analysis. Fundamentals of resolution, leakage, and reliability. Analog and digital methods. Parametric modeling and nonparametric methods. Cross-spectral analysis. Applications to detection and estimation.

263. Optimal and Adaptive Filtering (3) III. Friedlander, Gardner, Levy

264. Estimation and Detection of Signals (4) III. Friedlander, Gardner, Levy
Lecture—3 hours; discussion—1 hour. Prerequisite: course 260. Introduction to parameter estimation and detection of signals. Maximum-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) III. Alaghi, Abdel-Ghaffar
Lecture—3 hours. Prerequisite: Statistics 120. Information theory and coding. Measure of information. Redundancy reduction encoding of an information source. Capacity of a communication channel, error-correcting codes. Linear block and convolutional codes.

268. Advanced Digital Modulation Techniques (3) II. Feher Lecture—3 hours. Prerequisites: courses 260 and 267. MDEEM (modulator-demodulator) and signal-processing subsystem analysis, design and application for digital satellite, microwave, radio and cable systems. Study of co-channel and co-band interference, coding methods and hardware design of advanced communications and synchronization systems.

270. Computer Architecture (3) I. Redinbo Lecture—3 hours. Prerequisite: course 171 and Statistics 131A. Emphasis on quantitative analysis of design tradeoffs, optimization of resource usage, formal descriptive models, and interactions between architecture and software.

271. Advanced Digital System Design (4) I. Lin Lecture—4 hours. Prerequisites: courses 177 and 176. Topics in advanced design of arithmetic processors. High-speed addition, multiplication, and division. Floating point processors. Pipeline processors. Interleaved instruction set design and construction of several example systems.

273. Bit-Slice Microprocessor Systems (3) I. Lin Lecture—2 hours; laboratory—3 hours. Prerequisites: courses 172 and 177. Literature search and comparison of the most popular bit-slice microprocessors. Microprogramming techniques for the design of control unit of CPUs; micropseudocode control technique and state machine concepts for digital logic design; hardware emulation of microprocessor/microcomputer. Offered in alternate years.

274. Parallel Computer Architecture (3) I. Redinbo Lecture—3 hours. Prerequisite: course 270. Use of parallelism to achieve high performance levels. Within-CPU parallelism, through pipelining. Multiple-CPU parallelism, through array processors and multiprocessors, and through novel structures such as dataflow machines. Current research.

276A. Introduction to Fault-Tolerant Computing (3) I. Wilken Lecture—3 hours. Prerequisite: course 171, 176. Introduces fault-tolerant computing theory and practice. Covers redundant and classic fault-tolerant techniques based on hardware redundancy, time redundancy, information redundancy, and software redundancy. Examines hardware and software reliability analysis, and example fault-tolerant architectures.

276B. Introduction to Digital Fault Diagnosis (3) I. Redinbo Lecture—3 hours. Prerequisite: course 176, Statistics 120. A review of several current techniques used to diagnose faults in both combinational and sequential circuits. Topics include path sensitization procedures, Boolean difference, D-algorithm random test generation, TC testing and an analysis of the effects of intermittent faults. Offered in alternate years.

277. Real-Time Multiprocessor/Multitasking System Design (5) III. Lin Lecture—2 hours; laboratory—9 hours. Prerequisites: courses 172, 177, Computer Science Engineering 120. Real-time system design using multiple 16-bit microprocessors. System development and emulation through IBM/AT driven SBD-bus system, and Intel's i80680 development system. Bus arbitration, bus drivers, basic real-time executive, and system design with IRMX289 real-time multitasking operating system. Offered in alternate years.

278. Computer Arithmetic for Digital Implementation (3) III. Redinbo Lecture—3 hours. Prerequisite: course 171, 176. The design and implementation of computer arithmetic logic units are studied with particular emphasis on high-speed performance requirements. Addition (subtraction), multiplication and division operations are covered, and fixed and floating-point representations are introduced. Offered in alternate years.

279. Artificial Neurons and Applications (4) I. Lin Lecture—1.5 hours; discussion—1.5 hours; laboratory—3 hours. Prerequisites: courses 172, 177, 207. Biological neuron, artificial neuron modelling and implementation, adaptive feedforward algorithms, applications to pattern recognition. Offered in alternate years.

282. Operating System Models (3) III. Ruchatzke Lecture—3 hours. Prerequisite: course 1262B. Introduction to computer operating systems. Study of formal models that are used in study of operating systems. Modeling of parallel processes and their synchronization in terms of partial orderings and Petri nets. Deterministic and probabilistic models for the evaluation of system performance measures.


290. Seminar (1-1.5) I. The Staff (Chairperson in charge) Seminar—2 hours. Study and presentation of current research and development. (SU grading only)

290C. Graduate Research Group Conference In Electrical and Computer Engineering (1) I, II, III. The Staff Seminar—1 hour. Discussion—1 hour. Prerequisite: consent of instructor. Research problems, progress, and techniques in electrical and computer engineering. May be repeated for credit. (SU grading only)

291. Solid-State Circuit Research Laboratory Seminar (1) I. The Staff (Spencer in charge) Seminar—1 hour. Prerequisite: graduate standing. Lectures on solid-state circuit and system design by various visiting experts in the field. (SU grading only)

292. Seminar in Solid-State Technology (1) I. The Staff (Churchill in charge) Seminar—1 hour. Prerequisite: graduate standing. Lectures on solid-state technology by various visiting experts in the field. (SU grading only)

295A. Robotics Research Seminar (1) I. The Staff (Higa in charge) Seminar—1 hour. Prerequisite: graduate standing. Technical presentations and lectures on current topics of robotics research and robotics technology. (SU grading only)

295B. Systems and Control Seminar (1) I, II, III. The Staff (Gunders in charge) Seminar—1 hour. Prerequisite: graduate standing. Seminars on current research in systems and control by faculty and visiting experts. (SU grading only)

296. 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

309. The Teaching of Electrical Engineering (1) I, II, III. The Staff Seminar—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 laboratories, and grading laboratory reports. May be repeated for credit. (SU grading only)

Courses in Engineering: Computer Science

Lower Division Courses

10. Basic Concepts of Computing (4) I, II, III. 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 with physics, engineering, or mathematics education. Not open for credit to students who have completed course 30 or 35, Engineering 5, or former course 30H.


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, debugging, and testing of well-structured programs. Programming language Pascal will be used to solve problems. Not open to students who have completed course 10, 35 or former course 30H. Only two units of credit allowed for students who have completed Engineering 5.

35. Structure and Interpretation of Computer Programs (4) I. The Staff Lecture—3 hours; discussion—1 hour. Prerequisite: Mathematics 16A or 21A (may be taken concurrently). Computer Science or Electrical Engineering major, Math 16A or 21A (may be taken concurrently). Knowledge of Pascal or C. Mathematical foundations of computer science. Practical and data abstraction. Design and analysis of algorithms. The Scheme programming language. Credit for this course is based on students who have completed course 10, 30, Engineering 5, or former course 30H. Intended for students who have been introduced to a high-level programming language in high school.

40. Introduction to Software Development (4) I, II, III. 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.

89A-L. Special Topics in Computer Science (1-5) I, II, III. The Staff (Chairperson in charge) Lecture, laboratory, or combination. Prerequisite: consent of instructor. Special topics in (A) Computer Science Theory; (B) Architecture; (C) Programming Languages and Compilers; (D) Operating Systems; (E) Software Engineering; (F) Data Bases; (G) Artificial Intelligence; (H) Computer Graphics; (I) Networks; (J) Computer-Aided Design; (K) Scientific Computing; (L) Computer Science. May be repeated for credit when the topic is different.

92. Internship in Computer Science (1-5) I, II, III. The Staff Internship. Prerequisite: lower division standing; project approval prior to period of internship. Supervised work experience in computer science. May be repeated for credit. (P/NP grading only)

98. Directed Group Study (1-5) I, II, III. The Staff (Chairperson in charge) (P/NP grading only)

*Course not offered this academic year.
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98. Special Study for Lower Division Students (1-5) I, II, III. The Staff (Chairperson in charge) (P/NP grading only)

Upper Division Courses

100. Discrete Structures (3) I, II, III. Archer, Kou Lecture—3 hours. Prerequisite: Mathematics 21C. Discrete structures and applications to various areas of computer science; mathematical models and mathematical proofs, sets, relations, functions, methods of counting. (Not open to students who have had either Electrical and Computer Science Engineering 191J.)

110. Data Structures and Programming (4) I, II, III. Martel Lecture—3 hours; discussion—1 hour. Prerequisite: course 40 or 40H or consent of instructor; Electrical and Computer Science Engineering 70 or former Electrical and Computer Science Engineering 170. Concept of data-type, arrays, records, set structures and their representation. Sequential file structures. Dynamic information structures, linear lists, tree structures, hash techniques, recursive algorithms, sorting and searching. (Not open to credit for students who have completed former Electrical and Computer Science Engineering 180 or former Mathematics 129A.)

120. Automata Theory and Formal Languages (3) I, II. Archer, Kou Lecture—3 hours. Prerequisite: course 100. Finite automata and regular expressions, deterministic and nondeterministic automata, finite-state transducers, context-free grammars, pumping lemma, closure properties, minimization. Context-free grammars, derivatives, normal forms, ambiguity. Pushdown automata, pumping lemma and their relation to context-free languages. (Not open for credit for students who have completed former course 128 or former Mathematics 171.)

122. Algorithm Design and Analysis (3) I, II. Gusfield, Martel 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 completed former course 128 or former Mathematics 128B.)

140. Programming Languages (4) I, II. Archer Lecture—3 hours; discussion—1 hour. Prerequisite: course 110. Syntactic definition of programming languages. Introduction to programming language features including variables, data types, data abstraction, scope, parameter disciplines, exception handling, data types, and computer-level languages. (Not open for credit to students who have completed former course 124 or former Mathematics 128C.)

142. Compilers (4) I, II. Archer Lecture—3 hours; discussion—1 hour. Prerequisite: courses 120 and 140; course 110 recommended. Principles and techniques of lexical analysis, parsing, semantic analysis, and code generation. Implementation of compilers. (Not open for credit to students who have completed former Electrical and Computer Science Engineering 181.)

150. Operating Systems and System Programming (4) I, II. Levitt, Matloff, Olsson Lecture—3 hours; homework—1 hour. Prerequisite: Electrical and Computer Science Engineering 70; Electrical and Computer Science Engineering 171 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. (Not open for credit to students who have completed Electrical and Computer Science Engineering 182A.)


160. Introduction to Software Engineering (4) I, II. Levitt Lecture—3 hours; discussion—1 hour. Prerequisite: course 110. Software development process, specification, design, implementation, testing, and verification of large software systems. Study and use of software engineering methodologies. Team programming. (Not open for credit to students who have completed former course 128 or former Mathematics 176.)

165. Database Systems (4) I, II. Walters Lecture—3 hours; discussion—1 hour. Prerequisite: course 110. Database hardware, input techniques: file types; database models: reliability, integrity and security, operating system interfaces with databases.

168. Information Systems (3) I, II. Walters Lecture—3 hours. Prerequisite: course 40 or the equivalent; upper division standing. Design, creation, implementation, and case study evaluation of information systems. Project-oriented, self-paced implementation of actual information including survey collection of data, input design, and development of components to edit, sort, and retrieve data. Case study of typical information systems problems. Offered in alternate years.

170. Introduction to Artificial Intelligence (4) I, II. Levitt, Pridal Lecture—3 hours; discussion—1 hour. Prerequisite: course 110 or course 140 or experience with LISP recommended. Design and implementation of intelligent computer systems. LISP as a programming language for building symbolic processing systems. Knowledge representation and organization. Memory and inference. Problem solving. Natural language processing. (Not open for credit to students who have completed former course 128 or former Mathematics 174.)

172. Natural Language Processing (4) I. Alvarado Lecture—3 hours; discussion—1 hour. Prerequisite: course 110. Introduction to computational modeling. Study of knowledge structures and processes required for computer comprehension of human languages. Conceptual analysis based on Conceptual Dependency Theory, scripts, goals, and plans. Techniques for designing and implementing natural language parsers and interpreters.

175. Computer Graphics (4) I, II. Joy Lecture—3 hours; discussion—1 hour. Prerequisite: course 110, Mathematics 22A. Principles of computer graphics. Current state of computer graphics hardware, elementary operations in two- and three-dimensional space, transformational geometry, clipping, graphics system design, standard graphics systems. Individual projects. (Not open for credit to students who have completed former course 127 or former Mathematics 172.)

189A-L. Special Topics in Computer Science (1-5) I, II. The Staff (Chairperson in charge) Lecture, laboratory or combination. Prerequisite: consent of instructor. Special topics in (A) Computer Science Theory; (B) Architecture; (C) Programming Languages and Compilers; (D) Operating Systems; (E) Software Engineering; (F) Data Bases; (G) Artificial Intelligence; (H) Computer Graphics; (I) Networks, (J) Computer-Aided Design; (K) Scientific Computing; (L) Computer Science. May be repeated for credit when the topic is different.

190C. Research Group Conferences in Computer Science (1) I, II, III. The Staff Discussion of research projects: upper-division standing in Computer Science and Engineering; consent of instructor, Research group conferences. May be repeated for credit. (P/NP grading only)

192. Internship in Computer Science (1-5) I, II, III. The Staff (Chairperson in charge) Internship. Prerequisite: completion of a minimum of 84 units; project approval prior to period of Internship. Supervised work experience in computer science. May be repeated for credit. (P/NP grading only)

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 Course

220. Theory of Computation (3) I. Linz Lecture—3 hours. Prerequisite: courses 120 and 122. Theory of computation: the notion of effective procedure, complexity of algorithms, computational and centralized models, Post machine model, simulation systems, models similar to digital computers, computational complexity and intractable problems. (Not open for credit to students who have completed the same topic under Electrical and Computer Science Engineering 289A.)

221. Formal Language Theory (3) I. Archer, Linz 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.

222A. Design and Analysis of Algorithms (3) I. Gusfield, Martel Lecture—3 hours. Prerequisite: course 122; Statistics 131A recommended. Techniques for designing efficient algorithms and analyzing their complexity. Use of data structures. Counting and estimating, Search techniques, Graph algorithms. (Not open for credit to students who have completed former Electrical and Computer Science Engineering 277A.)

222B. Advanced Design and Analysis of Algorithms (3) I. Gusfield, Martel Lecture—3 hours. Prerequisite: course 222A. Advanced topics in complexity theory. Problem classification, the classes P, NP, P-space, co-NP, Matching and network flow algorithms. Matrix multiplication. Approximation algorithms. Selected advanced topics. Not open for credit to students who have completed former Electrical and Computer Science Engineering 277B.)

223. Parallel Algorithms (3) I. Martel Lecture—3 hours. Prerequisite: course 222A. Models of parallel computer systems including PRAMs, loosely coupled systems and interconnection networks. Parallel algorithms for classical computational problems are studied as well as general techniques for their design and analysis. Lower-bound results on parallel computation are proved in several settings.

225. Graph Theory (3) I. Hakimi Lecture—3 hours. Prerequisite: graduate standing in electrical engineering or computer science; consent of instructor. Fundamental concepts, vector spaces and graphs, planar graphs, Whitney's and Kuratowski's theorems, topological parameters, packings and colorings, Connectivity, Menger's theorem, Hamilton graphs, Posa's and Chvatal's theorems, Graph factorization, Tutte's theorem, Graph coloring, Brooks' and Vizing's theorem.

226. Computational Algorithms in VLSI (3) I. Kou Lecture—3 hours. Prerequisite: course 222; Electrical and Computer Science Engineering 176. Application and inherent limitations of using VLSI to implement computational algorithms, design and analysis of algorithms for the design of VLSI circuits. VLSI test set generation and simulation.

240. Programming Languages (3) I, II. Archer Lecture—3 hours. Prerequisite: courses 140, 142. Advanced topics in programming languages including formal syntax and semantics, Principals of verification, modularization, data flow languages, object-oriented languages, concurrent processing. Principles of programming language design.

242. Translation of Programming Languages (3) III. Armstrong Lecture—3 hours. Prerequisite: course 240. Lexical analysis, parsing, storage management, symbol table design, semantic analysis and code generation of the design for the VLSI circuits. VLSI test set generation and simulation.
243. Code Generation and Optimization (3) L, U. Lecture—3 hours. Prerequisite: course 242. Advanced code generation techniques. Representation of intermediate code. Data flow analysis, code optimization, loop optimization, common subexpression elimination, and peephole optimization. Optimization by program transformation. (Not open for credit to students who have completed former Electrical and Computer Science Engineering 278C.)

244. Principles of Concurrent Programming (3) L, U. Olson Lecture—3 hours. Prerequisite: course 100, 150 or Electrical and Computer Science Engineering 128A. 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) L, U. Keller Lecture—3 hours. Prerequisite: course 240. Language constructs for parallel computation in functional-procedural, logic programming, and related languages. Representation and implementation of task spawning and synchronization. Forms of parallelism, including explicit vs. implicit, AND vs. OR, and All-Solutions vs. Committed-Choice. Techniques of data flow, directed acyclic graphs, backtracking, difference lists, etc. Mapping to architectures.

250A. Advanced Computer Architecture (3) L, U. Matloff Lecture—3 hours. Prerequisite: course 150, Electrical and Computer Science Engineering 171. Processor complexity; the relationship between processor and memory speeds; opportunities for parallelism.

250B. High-Performance Uniprocessing (3) L, U. Farenears Lecture—3 hours. Prerequisite: course 250A. Maximizing uniprocessor performance. Barriers to high performance; solutions to the problems; historical and current processor designs.

250C. Parallel Computing (3) L, U. Park Lecture—3 hours. Prerequisite: course 250A. Using parallelism to increase computational speed, interconnection topologies; parallel programming paradigms; architecture-specific algorithms; synchronization; parallel operating systems.

252. Local Area Networks (3) L, U. Mukherjee Lecture—3 hours. Prerequisite: course 152. Local area networks and their functions, structures, and access methods. Emphasis on performance modeling and analysis of multiaccess techniques in polling, ring, and random access networks. Also discussed are standards, example products, and recent directions in research.

253. Cryptography and Data Security (3) L, U. Levitt Lecture—3 hours. Prerequisite: course 150B; consent of instructor. Methods of protecting data in computer and communication systems from unauthorized disclosure and modification. Introduction to mathematical principles of security with applications to operating systems, database systems, and computer networks.

255A. Analytic Methods for Computer Systems Design (3) L, U. Matloff Lecture—3 hours. Prerequisite: course 100, Electrical and Computer Science Engineering 171. Statistics 131A or equivalent. Mathematical models of computer systems and computer science engineering 182A and 182B recommended. Use of simulation and queueing theory in computer design. Applications to memory hierarchies; file storage; computer networks; fault-tolerance; scheduling. Only one course may be counted to satisfy the requirements of students who have completed former Electrical and Computer Science Engineering 186.

256B. Modeling and Analysis of Computer Networks (3) L, U. Matloff Lecture—3 hours. Prerequisite: course 256A. Use of simulation and queueing theory in the design of wide-area and local computer networks, with particular emphasis on optimization. Multiple access protocols, flow control, congestion control, routing.

260. Software Engineering (3) L, U. Lecture—3 hours. Prerequisite: courses 140, 142, 160. Advanced techniques for program specification, design, implementation, testing, and documentation. Application of techniques to large-scale software systems. Not open for credit to students who have completed the same topic under Electrical and Computer Science Engineering 279L.

261. Program Verification (3) L, U. Archer Lecture—3 hours. Prerequisite: Mathematics 125 or Philosophy 112 or familiarity with first-order logic. Knowledge of an iterative and a functional programming language. Techniques for verifying programs with respect to formal specifications, with attention to those suited for employing automatic deduction. Logic background, symbolic execution, techniques suited to imperative programming, methods from denotational semantics, termination, dynamic logic and proofs of concurrent programs.


265. Database Systems (3) L, U. Walters Lecture—3 hours. Prerequisite: course 165. Data models (especially relational and entity relation), processing languages and optimizers, data base security and integrity, and distributed systems. (Not open for credit to students who have completed former Electrical and Computer Science Engineering 280C.)


270. Artificial Intelligence (3) L, U. Alvarado Lecture—3 hours. Prerequisite: course 140; course 170 recommended. Concepts and techniques underlying the design and implementation of models of human performance on intelligent tasks. Representation of high-level knowledge structures. Models of memory and inference. Natural language and story understanding. Common sense planning and problem solving. (Not open for credit to students who have completed former Electrical and Computer Science Engineering 278C.)


274. Automated Deduction (3) L, U. Archer Lecture—3 hours. Prerequisite: Mathematics 125 or Philosophy 112 or familiarity with first-order logic. Techniques of mechanical theorem-proving. Methods based on resolution, term-rewriting, decision procedures. Induction. Applications to program verification, question/answering and plan generation. Offered in alternate years.


278. Computer-Aided Geometric Design (3) L, U. Joy Lecture—3 hours. Prerequisite: course 175; Applied Science Engineering 115 or Mathematics 128A. Mathematical techniques for the definition and manipulation of curves and surfaces. Coons' patches, Bezier curves and surfaces, B-spline curves and surfaces, box-splines. Integration into various computer graphics rendering models, and computer-aided design systems.

289A-L. Special Topics in Computer Science (1-5) I, II, III. The Staff Seminar—1 hour. Participating seminar; discussion and presentation of current research and development in computer science. (SU grading only.)

290C. Graduate Research Group Conference (1) I, II, III. The Staff (Chairperson in charge) Discussion—1 hour. Problems, progress and techniques in computer science. May be repeated for credit. (SU grading only.)

298. Group Study (1-5) I, II, III. The Staff Lecture, laboratory, or combination. Prerequisite: consent of instructor. (SU grading only.)

299. Research (1-12) I, II, III. The Staff (SU grading only.)

Professional Course

300. The Teaching of Computer Science (1) I, II, III. The Staff Discussion—1 hour. Prerequisite: most qualifications for teaching assistant or associate-in in Computer Science. Participation as a teaching assistant or associate-in in a designated engineering course. Methods of leading discussion groups or laboratory sections, writing and grading quizzes, use of laboratory equipment, and grading laboratory reports. May be repeated for credit. (SU grading only.)

Faculty

James W. Beaghi, Ph.D., Professor (Aeronautical and Astronautical Engineering)
Charles W. Beadles, Ph.D., Professor Emeritus
Harry Brandt, Ph.D., Professor
John W. Brewer, Ph.D., Professor
Jean-Jacques Chatell, Ph.D., Professor
Harry A. Deyo, Ph.D., Professor (Aeronautical and Astronautical Engineering)
Fidelia O. Elie, Ph.D., Assistant Professor
Andrew A. Frank, Ph.D., Professor
Clyna F. Garland, M.S., Professor Emeritus
Wrenn H. Gleed, Ph.D., Professor Emeritus
Jeffery C. Gibeling, Ph.D., Associate Professor (Materials Science and Engineering)
John F. Gile, J.D., Lecturer
Joanne R. Groza, Ph.D., Associate Professor (Materials Science and Engineering)
Mohamed M. Hafiez, Ph.D., Professor (Aeronautical and Astronautical Engineering)
Courses in Engineering: Mechanical
(Courses in Mechanical Engineering are listed below; courses in Aeronautical Science and Engineering and Materials Science and Engineering are listed immediately following.)

Lower Division Courses

1. Mechanical Engineering (1) I. The Staff (Chairperson in charge)
   Lecture—1 hour. Description of the field of mechanical engineering with examples taken from industrial applications; discussion of the practice with respect to engineering principles, ethics, and responsibilities. (P(NP grading only)

2. Internship in Mechanical Engineering (1-5) I, II, III. The Staff (Chairperson in charge)
   Internship. Prerequisite: lower division standing; approval of project prior to period of internship. Supervised work experience in engineering. May be repeated for credit (P(NP grading only)

29. Special Study for Undergraduates (1-5) I, II, III. The Staff (Chairperson in charge)
   Prerequisite: consent of Instructor; lower division standing. (P(NP grading only)

Upper Division Courses

134. Vehicle Stability (4) III. Hubbard
   Lecture—3 hours; laboratory—3 hours. Prerequisite: course 171 and Engineering 102B. Introduction to static and dynamic stability characteristics of ground transportation vehicles. Examples drawn from automobiles, trains, articulated vehicles, motorcycles, bicycles and others. Lateral handling characteristics, oversteer, understeer. Laboratory experiments illustrate effects of vehicle parameters on dynamic vehicle response.

150A. Mechanical Design (3) I, II, III. Frank, Vellayapu
   Lecture—2 hours; discussion—1 hour. Prerequisite: course 140B, course 150L, may be taken concurrently. Restricted to Aeronautical and Mechanical Engineering students. Major topics include design for loads, materials and structure and selection of mechanical components. Design projects which concentrate on design, engineering analysis, methods of manufacture, materials selection and cost. Introduction to computer-aided design.

150B. Mechanical Design (4) I, II, III. Frank
   Lecture—3 hours; discussion—1 hour. Prerequisite: course 150A, course 150L, may be taken concurrently. Restricted to Aeronautical and Mechanical Engineering and Materials Science majors. Primary topics include mechanical design, classic design theories and fatigue theory applied to design and selection of mechanical components. Introduction to computer-aided design.

152L. Manufacturing Processes (2) I, II, III. Henderson
   Discussion—1 hour; laboratory—3 hours. Restricted to junior and senior Mechanical, Aeronautical, and Materials Science Engineering majors. Introduction to and experience with modern manufacturing methods and computer-aided manufacturing and their role in engineering design and development process.

151. Statistical Methods in Design (3) III. Frank
   Lecture—3 hours. Prerequisite: course 150A. Methods of statistical analysis with emphasis on applications in mechanical design. Applications include product evaluation and decision making, stress-strength interference, probabilistic design, systems reliability, and fatigue under random loading.

152. Mechanism Design (3) I. Ravani
   Lecture—3 hours. Prerequisite: Engineering 102A. Application of complex-number methods to kinematic, static, and dynamic analysis of mechanisms and dynamic balancing of mechanisms. Design of epicyclic gear trains and intermittent mechanisms. Introduction to kinematic synthesis of mechanisms for function generation, curve tracing, and body guidance.

161. Combustion and the Environment (4) III. Kennedy
   Lecture—3 hours; discussion—1 hour. Prerequisite: Engineering 103B, 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 cogeneration. Thermodynamic analysis of different powerplant concepts using fossil fuels, nuclear fuels, solar energy, etc. Design studies of some specific powerplants.

165. Fundamentals of Heat Transfer (4) I, II. McKillop, Dwyer
   Lecture—3 hours; laboratory—3 hours. Prerequisite: Engineering 5, 103B and 105B; restricted to Aeronautical and Mechanical Engineering and Materials Science majors. Fundamentals of conduction, convection and radiation; heat transfer; applications to engineering equipment with use of digital computers.

171. Analysis, Simulation, and Design of Dynamic Systems (4) I. Karnopp
   Lecture—3 hours; discussion—1 hour. Prerequisite: Mathematics 22A, Engineering 120B and 180; restricted to Aeronautical and Mechanical Engineering and Materials Science students. Theory of modeling and simulation of dynamic engineering systems in various energy domains. Analysis of response of linear system models. Digital computer simulation.

172. Automatic Control of Engineering Systems (4) II. Brewer
   Lecture—3 hours; discussion—1 hour. Prerequisite: course 171. Classical feedback control for engineering systems. Control system design using time and frequency domain methods. State space techniques.

176. Measurement Systems (3) I, II. Velinsky
   Lecture—2 hours; discussion—1 hour; laboratory—1 hour. Prerequisite: Engineering 100 and 102A; restricted to Aeronautical and Mechanical Engineering and Materials Science students. Theory of measurements; measurement techniques for mechanical systems; transducers; data manipulation and processing; data digitization.

184A. Mechanical Engineering Design Project (2) I, II, III. The Staff
   Laboratory—6 hours. Prerequisite: senior standing in Mechanical Engineering; consent of Instructor. Performance of a major design project which includes design and possible development and evaluation of mechanical engineering system.

184B Mechanical Engineering Design Project (2) I, II, III. The Staff
   Laboratory—6 hours. Prerequisite: course 184A; 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) III. Henderson
   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. Engineering case studies will help to illustrate 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. The Staff
   Lecture—3 hours; discussion—1 hour. Prerequisite: course 165 (senior standing in Mechanical Engineering or Physics; enrollment preference to students who have not taken any of course series, 184-188). Design of a thermal system such as a power plant or engine, including consideration of engineering and
economic factors. Grading based on individual contributions to project. Limited enrollment.

187. Control Systems Design Project (4) 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, 184-188). Design of dynamic engineering systems. Formulation of mathematical models of plant, consideration of passive, open loop, and closed loop active solutions. Hardware and cost/performance considerations. Grading based on individual contributions to project. 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 for complete vehicles for groups or individuals. Students will design, analyze, construct and evaluate a vehicle-related component. Grading based on individual contributions to projects. Limited enrollment.

192. Internship in Engineering (1-5) I, II, III. The Staff (Chairperson in charge) Internship. Prerequisite: upper division standing; approved by major and subject of internship to period of internship. Supervised work experience in mechanical engineering. May be repeated for credit. (P/NP grading only.)

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

199. Special Study for Advanced Undergraduates (1-5) I, II, III. The Staff (Chairperson in charge) Prerequisite: consent of instructor. (P/NP grading only.)

Graduate Courses

205. Thermal Radiation (3) II. Brandt Lecture—3 hours. Prerequisite: course 165 or consent of instructor. Lecture—3 hours. Prerequisite: consent of instructor. Geometrical and spectral characteristics of systems involving thermal radiation. Gaseous radiation. Applications to solar energy systems.


208C. Experimental Methods in Fluid Mechanics and Heat- and-Wire Anemometry (3) III. White Lecture—1 hour; discussion—1 hour; laboratory—3 hours. Prerequisite: course 103B. Measurements in fluid mechanics using experimental techniques to determine the flow, turbulence, and boundary layer characteristics quantities, etc. Introduction to hot-wire anemometry and its application to the measurement of turbulent flows. Introduction to data acquisition of fluid mechanics measurements. Offered in alternate years.

210A. Advanced Fluid Mechanics and Heat Transfer (4) I. Dwyer Lecture—3 hours; discussion—1 hour. Prerequisite: course 103B, 105B, course 115. Development of differential equations of fluid flow, energy, and 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 (3) III. Hess Lecture—3 hours; discussion—1 hour. Prerequisite: course 210A. Study of stability and transition to turbulence. Introduction to the physics of turbulence. Modeling of turbulence for numerical determination of momentum and heat transfer.

211. Fluid Flow and Heat Transfer Design (4) I. Hoffman Lecture—3 hours; discussion—1 hour. Prerequisite: course 210A (may be taken concurrently) or consent of instructor. Design aspects of selected topics such as heat conduction, thermal stresses, fins, heat transport in ducts, boundary layers and separated flows; impingement and film cooling; heat exchange; flow in diffusers, flow over airfoils and blades. Offered in alternate years.

212. Advanced Heat Transfer with Phase Change (4) III. Hoffman Lecture—3 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. Kolm Two lectures—4 hours. Prerequisite: course 210B. Methods for prediction of turbulence and dynamics of homogeneous turbulence; Reynolds stress and heat flux equations; second order closures and their simplification; numerical methods; application to boundary layer flows and two-dimensional and three-dimensional hydraulic and environmental flows. Offered in alternate years.

214. Numerical Calculation of Flows with Heat Transfer, Mass Transfer, and Chemical Reactions (4) I. Dwyer Lecture—3 hours; discussion—1 hour. Prerequisite: course 210A and Aeronautical Science Engineering 233, or consent of instructor. Application of numerical methods of fluid flows involving heat and mass transfer and chemical reactions. Applications to pipe flows; high Peclet number heat transfer; laminar and turbulent combustion; and solution of the Navier-Stokes equations. Offered in alternate years.

216. Advanced Thermodynamics (4) I. The Staff Lecture—3 hours; discussion—1 hour. Prerequisite: course 103B. Study of topics important to energy conversion systems, propulsion and other systems using high temperature, thermal, and chemical energy. Thermodynamics and quantum statistical mechanics of non-reaction and chemically reacting gases, gas mixtures, and other substances. Offered in alternate years.

217. Compressible Fluid Dynamics (4) II. Kennedy Lecture—3 hours; discussion—1 hour. Prerequisite: course 103B and 105B. Application of chemical thermodynamics and chemical kinetics. Analysis of reacting flows, governing equations and transport phenomena; detonations; laminar flame structure and turbulent combustion.

218. Advanced Energy Systems (4) I. Hoffman Lecture—3 hours; discussion—1 hour. Prerequisite: course 103B, 105B, or consent of instructor. Review of options available for advanced power generation. Detailed study of basic power balances, component efficiencies, and overall plant performance power for one or more advanced power systems. Dynamic, hydraulic, or solar electric power plant. Offered in alternate years.

220A-220B. Mechanical Vibrations (3-3-3) I-II. Eke Lecture—3 hours. Prerequisite: course 122. Lecture—3 hours. Prerequisite: course 122. Lecture—3 hours. Application of vibration theory to systems with many degrees of freedom and continuous systems. Introduction to random vibrations.

222. Advanced Dynamics (3) J. Mergolis Lecture—3 hours. Prerequisite: course 102B. Dynamics of rigid bodies and of rigid bodies with advanced engineering applications; stabilization of rigid bodies; manipulation of rigid bodies; Hamilton's Principles; Lagrange's Equations; Hamilton-Jacobi theory.

224. Kinematic Design of Mechanisms (3) I. The Staff Lecture—3 hours. Prerequisite: course 152 or consent of Instructor. Introduction to Bernoulli theory of the rational design of link mechanisms. Geometric concept of two- and three-dimensional rigid-body displacements, instantaneous invariants, higher order path curve analysis, circle- and center-point curves. Graphical and computer methods for kinematic design. Offered in alternate years.

225. Spatial Kinematics and Robotics (3) I. The Staff Lecture—3 hours. Prerequisite: course 222 or consent of instructor. Spatial kinematics; point and line coordinates and their transformations; concept of screw systems and instantaneous invariants for rigid body motion. Robotics: solving for kinematic equations; differential relationships; motion trajectories. Application of dual-number matrices, screw calculus, and associated analytical methods. Offered in alternate years.

226. Acoustics and Noise Control (3) J. Hubbard Lecture—3 hours. Prerequisite: Engineering 122. Description of sound using normal modes and waves; interaction between vibrating solids and sound fields; sound absorption in enclosed spaces; sound transmission through barriers; applications in design of mufflers, acoustic enclosures, room acoustics, design of quiet machinery. Offered in alternate years.

255. Computer-Aided Design and Manufacturing (3) III. Revani Lecture—2 hours; discussion—1 hour. Prerequisite: Engineering 180B or consent of instructor. Proficiency in a high-level programming language such as FORTRAN, Pascal, or C. Studies of computational and computer graphic techniques in design and manufacturing. Use of numeric and non-numeric computations and geometric tools in design and manufacturing.

270. Modeling and Simulation of Engineering Systems (3) I. Karnopp Lecture—3 hours. Prerequisite: course 172 or consent of instructor. Multiport models of mechanical, electrical, hydraulic and thermal systems; 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 dynamic feedback. Stress on practical application of theory to engineering systems in various applications.


272B. Multivariable Feedback Control and Estimation Theory (4) II. Brewer Lecture—4 hours. Prerequisite: course 272A. Emphasis on multivariable control and estimation. Digital and continuous time control and estimation. Introduction to singular value methods and quantitative feedback theory. Optimum Wiener-Hopf design and other frequency domain designs.


274. Analysis and Design of Digital Control Sys- tems (3) III. J. Hass Lecture—3 hours; discussion—1 hour. Prerequisite: course 172. Discrete systems analysis; digital filter-
ing; sample data systems; state space and transform design techniques; quantization effects.

276A. Digital Data Acquisition and Analysis (3) I. Gibeling
Lecture—2 hours; discussion—1 hour. Prerequisite: course 176. Application of microcomputers and minicomputers to data acquisition and control. Topics include computer organization, hardware for laboratory applications of computers, fundamental aspects of interfaces between computers and experimental equipment, programming techniques for data acquisition and control, and basic data analysis.

276B. Digital Data Acquisition and Analysis (3) II. Hull
Lecture—2 hours; discussion—1 hour. Prerequisite: Engineering 5, 118, and 195; course 176. Theory and application of modern techniques in digital data analysis. Topics include statistical description of data, convolution and correlation, and frequency analysis using the discrete Fourier transform. Emphasis on applying these techniques in the experimental characteristics of linear systems.

Lecture—2 hours; discussion—1 hour. Prerequisite: courses 270, 271. Application of bond graph modeling and control system design principles. The bond graph program packages ENPHTCH and CAMP are used with advanced continuous system modeling programs to simulate the dynamic response of engineering systems.

280. Advanced Engineering Analysis (3) I. Brandt
Lecture—3 hours. Prerequisite: Engineering 180 or the equivalent. Applications in mechanical engineering of advanced analytical and numerical techniques. Topics include probability theory, calculus of variations, classification of differential equations, and advanced numerical methods.

289B. Special Topics in Mechanical Engineering (1-5) I, II, III. Hull
Lecture—1 hour. Prerequisite: consent of instructor. Special topics in (289B) muscle-fiberskeletal system biomechanics; (289B) orthopedic biomechanics.

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.)

296. Design Seminar (1) I, II, III. The Staff (Chairperson in charge)
Seminar—1 hour. Prerequisite: consent of instructor. Review and discussion of current literature and design projects with presentations by students and faculty. (SU grading only.)

296D. Fluids and Thermal Sciences Seminar (1) I, II, III. The Staff (Chairperson in charge)
Seminar—1 hour. Prerequisite: consent of instructor. Review and discussion of the current literature and trends in fluid mechanics and thermal sciences. (SU grading only.)

297. Dynamic Systems and Control Theory Seminar (1) I, II, III. The Staff (Chairperson in charge)
Seminar—1 hour. Prerequisite: consent of instructor. Review and discussion of current literature and developments in system theory and automatic control 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

350. The Teaching of Mechanical Engineering (1) I, II, III. The Staff (Chairperson in charge)
Discussion—1 hour. Prerequisite: meet qualifications for teaching assistant and/or associate-in-charge in mechanical engineering. Participation as a teaching assistant or associate-in-charge 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)

Courses in Aeronautical Science and Engineering

Lower Division Course

299. Special Study for Undergraduates (1-5) I, II, III. The Staff (Chairperson in charge)
Prerequisite: consent of instructor and lower division standing. (PNP grading only.)

Upper Division Courses

125. Aeronautical Engineering Fundamentals (3) I, II. Sarigul-Kilic
Lecture—3 hours. Prerequisite: Engineering 103A (may be taken concurrently). Aircraft subsystems and nomenclature. History and structure of the aviation industry. Design, development cycle. Fundamentals of aircraft aerodynamics, performance, stability and control, propulsion, structures, wind tunnel testing, flight simulators, and flight testing.

126. Theoretical Aerodynamics (4) I. Hafez
Lecture—4 hours; discussion—1 hour. Prerequisite: Engineering 103B. Study of flow field kinematics and dynamics. Flow about a body. Thin airfoil theory. Finite wing theory. Application of numerical methods to wing design.

127. Applied Aerodynamics (4) I. van Dam

128. Aircraft Performance (4) I. van Dam
Lecture—4 hours; discussion—1 hour. Prerequisite: course 127. Aircraft propulsion systems and their performance characteristics. Method for computing and presenting aircraft performance data. Modern techniques of numerical analysis and energy methods. Application of techniques to aircraft design.

129. Aircraft Stability and Control (4) I. Hafiz

130. Aircraft Preliminary Design (4) I. Hafiz
Lecture—2 hours; discussion—1 hour. Prerequisite: courses 125 and 126. Measurement and analysis of aircraft characteristics and performance, in flight and with flight simulator.

134. Aircraft Structures (3) I. Sarigul-Kilic
Lecture—3 hours. Prerequisite: Engineering 104B (may be taken concurrently). Introduction to methods used in the analysis and design of aircraft structures. Shear flow in open, closed, and rectangular box beams, buckling of flat and curved sheets, tension field beams, local buckling.

137. Structural Composites (4) I. Rehfisch
Lecture—3 hours; laboratory—1 hour. Prerequisite: Engineering 104C. Fundamentals of materials and technology for constructing structures from fiber reinforced resin matrix composite materials. Elementary design analysis and case studies emphasizing aeronautical applications.

138A. Aircraft Propulsion (4) I. Hofman
Lecture—3 hours; discussion—1 hour. Prerequisite: Engineering 45, 103B, 103B. Analysis and design of modern aircraft gas turbine engines. Development and application of cycle performance prediction techniques for important engine configurations. Introduction to the operation and design of inlets, compressors, turbines, and nozzles. Cycle design studies for specific applications.

139. Introduction to Aerodynamics (4) I. Sarigul-Kilic
Lecture—4 hours. Prerequisite: course 127, 135. Fundamentals of fluid mechanics and an introduction to aerodynamics. Categorization of aerodynamic problems. Static aeroelastic and flutter instabilities of simple structures. Offered in alternate years.

161. Gas Dynamics (4) I. Steger
Lecture—3 hours; laboratory—3 hours. Prerequisite: Engineering 103B. Development of the governing equations, analysis of one-dimensional steady and unsteady compressible flow, shock waves, and heat addition; special forms of the governing equations, steady supersonic flow, shock and disturbance theory, numerical demonstration of steady and unsteady flow effects.

188. 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 (Chairperson in charge)
Prerequisite: consent of instructor. (PNP grading only)

Graduate Courses

230. Advanced Aerodynamics—Inviscid Flow (4) I. Hafiz
Lecture—4 hours. Prerequisite: courses 126, 127. Inviscid theory. Nonlinear effects in subsonic and supersonic flows. Transonic aerodynamics. Offered in alternate years.

232. Advanced Aerodynamics—Viscous Flow (4) I. van Dam
Lecture—4 hours. Prerequisite: Engineering 103B. Introduction to boundary-layer theory, laminar and turbulent boundary layers, transition, separation, viscous-inviscid interaction, three-dimensional flows and computational methods and their application. Offered in alternate years.

233. Introduction to Computational Aerodynamics and Fluid Dynamics (4) I. Chatto, Hafiz, Steger, Dryer
Lecture—4 hours. Prerequisite: course 234. Linear methods for solution of fluid flow problems. Discretization techniques and solution algorithms. Finite difference solutions to classical model equations pertinent to viscous flows. Prerequisites: linear and numerical methods. Application to the incompressible Navier-Stokes equations.

234. Computational Aerodynamics (4) I. Hafiz

235. Computational Fluid Dynamics, Euler and Navier-Stokes Equations (4) I. Steger
Lecture—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, computational complications, Euler, and Navier-Stokes equations, generalized coordinates, grid generation, applications.

236. Aerodynamics in Nature and Technology (4) I. White
Lecture—3 hours; discussion—1 hour. Prerequisite: Engineering 103B. Introduction to aerodynamics in nature, fundamentals of turbulence in atmospheric flows, planetary boundary layers, wind effects on man-made objects, pedestrian-level winds in urban areas. Criteria for laboratory modeling of atmospheric flows, wind-tunnel testing, extra-terrestrial aerodynamics. Offered in alternate years.

*Course not offered this academic year.
237. Analysis and Design of Composite Structures (4) III. Rahfield
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-lecture and minimum aerodynamic shapes. Both analytic solutions and solutions obtained with numerical optimization techniques will be examined. Includes introduction to the calculus of variations and non-composition optimization techniques. Offered in alternate years.

*257. Advanced Topics in Aircraft Stability and Control (5) III. Hess
Lecture—3 hours. Prerequisite: course 129 or Mechanical Engineering 134; and Mechanical Engineering 172: Analysis of aircraft modes of motion; response to control actuation; time and frequency domain descriptions; response to random inputs—turbulence, gusts; aircraft autopilot and stability augmentation system design; lift/vehicle analysis; handling qualities.

290C. Graduate Research Conference (1) I, II, III. The Staff (Chairperson in charge)
Discussion—1 hour. Prerequisite: consent of instructor. Individual and group conference on problems, progress and techniques in mechanical engineering research. May be repeated for credit. (SU/grad only)

298. Group Study (1-5) I, II, III. The Staff (Chairperson in charge)
Prerequisite: consent of instructor. (SU/grad only)

Professional Course

390. The Teaching of Aeronautical Science and Engineering (1) I, II, III. The Staff
Discussion—1 hour. Prerequisite: meet qualifications for teaching assistant and/or associate in 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/grad only)

Courses in Materials Science and Engineering

Upper Division Courses

130. Thermodynamics of Materials Processes (3) I. Rashed
Lecture—3 hours. Prerequisite: Engineering 45 and 105A (or the equivalent); upper division standing in Engineering. Application of the principles of thermodynamics to solid engineering materials with emphasis on solving problems associated with materials processes, e.g., alloying, phase stability, surface properties, and materials processing, thermoelectric power and thermionic energy conversion.

132. Structure of Engineering Materials (3) I. Shackelford
Lecture—3 hours. Prerequisite: Engineering 45; upper division standing. Structure of engineering materials on the atomic scale will be described by exploring the fundamentals of crystallography. The importance of this structure to materials properties will be emphasized. Experimental determination of structure will be described using x-ray diffraction techniques.

132L. Structure of Materials Laboratory (1) I. Shackelford
Laboratory—3 hours. Prerequisite: course 132 concurrently. Experimental investigation of the structure of solid materials. Laboratory exercises emphasize methods used to study structure of solids at atomic and microstructural levels.

134. Rate Processes in Materials Science (3) III. Groza
Lecture—3 hours. Prerequisite: Engineering 45 and 105A or course 130. Basic kinetic laws. Theory of Absolute Reaction Rates. Applications in diffusion, nucleation, solidification, evaporation, and sintering processes.

134L. Rate Processes in Materials Laboratory (1) III. Groza
Laboratory—3 hours. Prerequisite: course 134 concurrently. Laboratory experiments to illustrate fundamental principles of chemical reaction rates including reaction mechanisms, rate laws, and reaction orders. Emphasis will be made on the use of rate processes to predict the behavior of materials systems at different temperatures and pressures.

138. Mechanical Behavior of Materials (3) II. 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. Stress analysis and fracture mechanics.

138L. Mechanical Properties Laboratory (1) II Mukherjee
Laboratory—3 hours. Prerequisite: course 138 concurrently. Experimental investigations of mechanical behavior of metals and alloys using laboratory equipment and techniques. Fundamental relationships between microstructure and mechanical properties.

140. Materials in Engineering Design (3) III. Groza
Lecture—3 hours. Prerequisite: senior standing in Engineering or consent of Instructor. Design and application of common engineering materials. Discussion of design parameters of typical materials including metals, ceramics, glasses, polymers, and composites. Principles of heat treatment and fabrication as they affect design parameters and applications in engineering will be emphasized.

140L. Materials Science Laboratory (1) III. Groza
Laboratory—3 hours. Prerequisite: course 140 concurrently. Experimental investigations of processing and properties of materials used in structural applications. Laboratory exercises emphasize fundamental relationships between microstructure and properties. Consideration given to the role of property control in materials selection.

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.

142L. Nondestructive Testing Laboratory (1) II. Shackelford
Laboratory—3 hours. Prerequisite: course 142 concurrently. Laboratory experience in non-destructive testing techniques with emphasis on X-ray radiography, X-ray diffraction, and ultrasonics.

144. Corrosion and Oxidation of Engineering Materials (3) I. Höft
Lecture—3 hours. Prerequisite: upper division standing in Engineering. Principles governing the interaction between engineering materials and their environment; corrosion in aqueous media, soils and biological systems. Oxidation of structural materials in high temperature applications; design and selection criteria for the prevention and control of corrosion.

144L. Corrosion Laboratory (1) I. Höft
Laboratory—3 hours. Prerequisite: course 144 concurrently. Laboratory experiments to demonstrate corrosion behavior of materials in aqueous and high temperature environments. Relationship between corrosion behavior and fundamental principles and theories emphasized.

147. Principles of Polymer Materials Science (3) II. The Staff
Lecture—3 hours. Prerequisite: chemistry through organic or Engineering 45; introductory physics sequence. Basic principles of polymer science presented including polymer structure and synthesis; polymer mechanical properties, properties and reactions; polymer morphology, rheology, and characterization; polymer processing. (Same course as Fiber and Polymer Science 100.)

148. Failure Analysis (4) III. Gibling
Lecture—3 hours; laboratory—3 hours. Prerequisite: Engineering 45, 104A; course 138 and Mechanical Engineering 150A recommended. Fracture mechanics and failure mechanisms in metals, ceramics, and composites. Effects of environment, fabrication, and service environment on failure. Methodology for investigating failure including optical microscopy, scanning electron microscopy and destructive testing.

149. Materials Engineering Design Project (3) I, II, III. The Staff
Discussion—1 hour; laboratory—6 hours. Prerequisite: course 140 may be taken concurrently. A capstone engineering design experience involving analysis of real materials processes or engineering materials problems. The various principles of materials science introduced in other courses in the curriculum are integrated into the design project.

158. Directed Group Study (1-5) I, II, III. The Staff (Chairperson in charge)
Prerequisite: Group study of selected topics. (PIN grading only)

199. Special Study for Advanced Undergraduates (1-5) I, II, III. The Staff (Chairperson in charge)
Prerequisite: consent of instructor. (PIN grading only)

Graduate Courses

230. Fundamentals of Electron Microscopy (3) III. Howitt
Lecture—2 hours; discussion—1 hour. Prerequisite: Engineering 132. Principles and techniques of scanning and transmission of electron microscopy used in the study of materials. Emphasis upon practical applications. Offered in alternate years.

230L. Laboratory for Electron Microscopy (2) III. 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.

232. Advanced Topics in Transmission Electron Microscopy (3) III. 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) III. Howitt
Discussion—1 hour; laboratory—3 hours. Prerequisite: course 232 concurrently. Laboratory in advanced transmission electron microscopy techniques relevant to specific graduate research projects in materials science. Offered in alternate years.

240. Transport Phenomena: Materials Processes (4) II. The Staff
Lecture—3 hours; discussion—1 hour. Prerequisite: adequate standing in Engineering, Phenomenological and atomic mechanisms in transport processes in condensed and noncondensed phases. Applications to heat transfer, chemical and physical vapor deposition, crystal growth, binding, sintering and joining of materials. Offered in alternate years.

241. Principles and Applications of Dislocation Mechanics (4) I. The Staff
Lecture—3 hours; discussion—1 hour. Prerequisite: adequate standing in Engineering; consent of instructor. Concepts in dislocation theory are applied to explain plasticity of crystalline solids. Glide and climb of dislocations, strain hardening, recrystallization, theories of creep processes and interaction of dislocation with solute atoms, precipitates and impurity clouds are discussed. Offered in alternate years.

*Course not offered this academic year.
The English study develops skills in reading analytically and perceptively and in writing clearly and with effect.

The Program. The English department offers three kinds of courses: composition courses, undergraduate courses, and graduate courses. Composition courses develop skills in reading analytically and in writing persuasively. Undergraduate and graduate courses cover the entire range of English and American literature, as well as creative writing. Students majoring in English may elect a teaching emphasis, a creative writing emphasis, or a general literature emphasis. The teaching emphasis focuses on the study of composition and of language; the writing emphasis focuses on fiction, poetry, article writing, and magazine editing. Creative writing majors have an opportunity to work with distinguished professional writers of fiction and poetry, and to be involved in a national literary magazine, California Quarterly, published by the English department. The general literature emphasis focuses on a series of related courses in various historical, critical, and cultural anthologies of English and American literature. A Senior Honors Program is available to an invited group of English majors, who prepare and write a Senior Thesis (either a research paper or creative writing) in their final year. Graduate courses lead to the M.A. and Ph.D. degrees.

Career Alternatives. Graduates have found the major excellent preparation for graduate study in English, as well as for careers in teaching, law, medicine, and library work. Many graduates are employed in journalism, publishing, advertising, and public information. Others have worked in local, state, and federal government agencies, as well as in industry and agriculture. Some have even established their own businesses.

A.B. Degree Requirements:

Preparatory Subject Matter... 24
English 45... 4
English 30A, 30B, 46A, 46B, 46C... 20
Depth Subject Matter (for each emphasis, see below)... 44
Core requirement... 38

A. Historical Periods... 10
One course each in four of the following five areas:
1) British literature, beginning to 1500: English 111, 150A
2) British literature, 1500-1800: English 116, 120, 150B
3) British literature, 1800-1860 or American literature, 1620-1800: English 125, 127, 140, 141, 155A
4) Nineteenth-century British or American literature: English 130, 132, 133, 134, 143, 144, 155B, 155C, 155A, 155A
5) Twentieth-century British or American literature: English 150, 153, 158, 159, 159, 159, 159, 160, 170, 181, 185B

Major Authors... 8
Two courses in different authors selected from English 134A, 134B, 117A, 117B, 117C, 122. Courses used to meet this requirement may not duplicate courses chosen to meet the historical periods requirement.

Senior Seminar... 4
One course selected from English 187, 189, 194H.

Major is the beginning of their first quarter in residence; all English majors must see their advisers. Individually, in the spring quarters of their sophomore and junior years.

Undergraduate Adviser: A.E. McGuinness


Foreign Language. Students who contemplate advanced study in English should prepare for foreign language requirements for higher degrees, and should consult with the graduate adviser.

Honors and Honors Program. The honors program consists of four units of essay and four units of English, normally taken during the fall and winter quarters of the senior year. Completion of the program is a prerequisite for High or Highest Honors at graduation. Eligibility criteria and application materials may be obtained at the Undergraduate Office, 117/133 Sproul Hall. Refer to the Academic Information section and the College section for Dean's Honors List requirements.

Teaching Credential Subject Representative, R.A. Levin. 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.

Graduate Advisor, D.A. Robertson.

Courses in English

Lower Division Courses

A. Language Skills (2) I, II, III. The Chairperson in charge

Lecture/discussion—4 hours. Introductory course to help students gain writing proficiency required for successful University-level work. Focus on critical thinking, writing, and reading; on the fundamentals of essay writing; and on the relationship between writing mechanics and coherent thought. This course must be taken for a letter grade. Minimum passing grade is C. Students receiving a C- or below must repeat course. Satisfies Subject A requirement. (Counts as 4 units toward minimum progress.)

R. Communications Skills Workshop (3) I, II, III. The Staff (Chairperson in charge)

Lecture—4 hours; workshop—2 hours. Reading, laboratory, and writing activities for students from non-native background who need to strengthen basic skills before taking English A. Course worth 6 units toward minimum study in this requirement. (P/NP grade only).

1. Expository Writing (4) I, II, III. The Staff (Chairperson in charge)

Lecture/discussion—4 hours. Prerequisite: completion of Subject A requirement. Composition, the essay, paragraph structure, diction, and related topics. Frequent writing assignments will be made. (DAN Eng I 2)

3. Introduction to Literature (4) I, II, III. The Staff (Chairperson in charge)

Lecture—2 hours; discussion—2 hours. Prerequisite: completion of Subject A requirement. Introduction to 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/Introductory.

4. Creative Writing 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 literature, class discussion, and the writing of several papers or a longer seminar paper. General Education credit: Civilization and Culture/Introductory.

5. Introduction to Creative Writing: Fiction (4) I, II, III. The Staff (Chairperson in charge)

Lecture—discussion—4 hours. Prerequisite: completion of Subject A requirement. The elementary principles of writing fiction. Students will write both in prescribed forms and in experimental forms of their own choosing. No final examination.

6. Introduction to Creative Writing: Poetry (4) I, II, III. The Staff (Chairperson in charge)

Lecture—discussion—4 hours. Prerequisite: completion of Subject A requirement. The elementary principles of writing poetry. Students will write both in prescribed forms and in experimental forms of their own choosing. No final examination.

10. Intermediate Composition (4) I, II, III. The Staff (Chairperson in charge)

Lecture—discussion—4 hours. Prerequisite: course 1, 2, or 3. Emphasis on the grammatical patterns of standard English; sentence revision techniques, development of coherent paragraphs, and the formal properties of the expository essay.

21. Introduction to Reading and Composition in ESL (5) I, II. The Staff (Chairperson in charge)

Lecture/discussion—5 hours. Prerequisite: enrollment in placement examination. Course provides under-graduate students whose native language is not English with intensive work in reading for factual information and in writing organized, coherent, and grammatically correct essays. Students also study the conventions of the academic essay. (P/NP grade only.)

22. Reading and Composition in ESL (4) I, II, III. The Staff (Chairperson in charge)

Lecture/discussion—4 hours. Prerequisite: enrollment in placement examination. Course provides under-graduate students whose native language is not English with intensive work in reading for factual information and in writing organized, coherent, and grammatically correct essays. Students also study the conventions of the academic essay. (P/NP grade only.)

23. Advanced Reading and Writing in ESL (4) I, II, III. The Staff (Chairperson in charge)

Lecture—discussion—4 hours. Prerequisite: enrollment in placement examination or by successful completion of course 21. Course provides under-graduate students whose native language is not English with intensive work in reading and writing strategies, and with writing persuasive essays. Students also read to test their stylistic, conceptual, and argumentative abilities. (P/NP grade only.)

25. English for Foreign Students (5) I, II, III.

Lecture—3 hours; laboratory—4 hours. Prerequisite: enrollment by examination in English placement; open to international graduate students only. Course develops skills needed by the graduate student: note-taking on lectures and on written academic discourse, writing logically developed essays accurately under time pressure, using writing strategies implicitly in objective testing, systematically extending vocabulary, and writing a research paper.


Lecture—3 hours; laboratory—4 hours. Prerequisite: satisfactory completion of course 25; open to international graduate students only. Continuation of work in course 25, with additional focus on oral skills.

28. Introduction to Library Research (2) I, II. The Staff (Chairperson in charge)

Lecture—1 hour, tutorial—3 hours. Emphasis on the planned use of library resources in research. Course is project-oriented. It is recommended for students who plan to undertake a senior honors project and as a prerequisite for English 110, 111, and 112. General Education credit: Civilization and Culture/Introductory.

30A. Survey of American Literature (4) I, II, III.

Lecture—discussion—4 hours. Prerequisite: completion of course 1 or 3. American literature from the seventeenth century to 1865. General Education credit:

30B. Survey of American Literature (4). I. Hayes. II. Barish
Lecture—3 hours; discussion—1 hour. Prerequisite: course 1 or 3. American literature from 1865 to the present. Emphasis on critical interpretation of social history, and related art forms. General Education credit: Civilization and Culture/Non-Introductory. Recommended GE preparation: any course from the GE Literature Preparation List (CAN Eng 16).

45. Close Reading of Poetry (4). I, II, III. The Staff
Chairperson in charge.
Lecture/discussion—4 hours. Prerequisite: course 1 or 3. Close reading of selections from English and American poetry. Frequent written exercises.

45A. Masterpieces of English Literature (4). I. Schieffer; II. Hayden
Lecture—3 hours; discussion—1 hour. Prerequisite: course 1 or 3. Selected works of principal writers of 1640. History of literary conventions and backgrounds in religious thought, intellectual and social history, and related art forms. General Education credit: Civilization and Culture/Non-Introductory. Recommended GE preparation: any course from the GE Literature Preparation List (CAN Eng Seq B).

46B. Masterpieces of English Literature (4) II. Byrd
Lecture—3 hours; discussion—1 hour. Prerequisite: course 1 or 3. Selected works of principal writers from 1840-1940. History of literary conventions and backgrounds in religious thought, intellectual and social history, and related art forms. General Education credit: Civilization and Culture/Non-Introductory. Recommended GE preparation: any course from the GE Literature Preparation List (CAN Eng Seq B).

54C. Masterpieces of English Literature (4) I. I. Moran
Lecture—3 hours; discussion—1 hour. Prerequisite: course 1 or 3. Selected works of principal writers from 1832 to present. History of literary conventions and backgrounds in religious thought, intellectual and social history, and related art forms. General Education credit: Civilization and Culture/Non-Introductory. Recommended GE preparation: any course from the GE Literature Preparation List (CAN Eng Seq B).

92. Internship In English (1-2). I, II, III. The Staff
Chairperson in charge.
Internships in fields where students can practice their skills. May be repeated for credit for a total of 12 units. (P/NP grading only.

98. Directed Group Study (1-5). I, II, III. The Staff
Chairperson in charge.
Prerequisite: one course from 1 or 3. (P/NP grading only.)

99. Special Study for Undergraduates (1-5). I, II, III. The Staff (Chairperson in charge)
(P/NP grading only.)

Upper Division Courses
100F. Creative Writing: Fiction (4). I, II, III. The Staff
Chairperson in charge.
Discussion—4 hours; development and evaluation of written materials, and conferences with individual students. Prerequisite: course 5 or 5P or consent of instructor; prior training in English (Creative Writing) majors. Writing of fiction. May be repeated for credit with consent of instructor. No final examination.

100H. Creative Writing: Non-Fiction (4). I, II. Hickman
Discussion—4 hours; development and evaluation of written materials, and conferences with individual students. Prerequisite: course 1 or 3, or consent of instructor. Prior training in 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 5 or 5P, or consent of instructor; prior training in English (Creative Writing) majors. Writing of poetry. May be repeated for credit with consent of instructor. No final examination.

102. Adjunct Writing (3) I, II, III. The Staff
Chairperson in charge.
Discussion—3 hours. Prerequisite: course 1 or 3; concurrent enrollment in specified course in a subject-matter discipline. Instruction in the elements of expository writing, with special emphasis on the application to writing projects in a specified academic discipline. May be repeated once for credit if taken in conjunction with a different subject-matter course.

103A-F. Advanced Composition (4). I, II, III. The Staff
Chairperson in charge.
Lecture/discussion—3 hours; individual evaluations and conferences. Prerequisite: course 1 or 3; course 20 recommended. Instruction and practice in a variety of modes of composition. Frequent written assignments. One area of required teaching credential candidates (section 1P strongly recommended). Study areas are: (A) General; (B) Legal Writing; (C) Article Writing; (D) Report Writing; (E) Technical Writing; (F) Composition for Elementary and Secondary Teachers. May be repeated once for credit in different area of emphasis.

104. Scientific Writing (1-3). I, II, III. The Staff
Chairperson in charge.
Lecture—2 hours; discussion—1 hour. Prerequisite: upper division enrollment in a science curriculum. Analysis and practice of scientific writing; research methods; organization, proper style and format, oral presentation of written work. Lecture and workshop discussions by English and science department staff. May be repeated for a total of 4 units of credit. (P/NP grading only.

105A, 105C. Language and Culture (3). Term paper. Prerequisite: course 1 or 3. Present-day English grammar and pronunciation according to the perspectives of traditional grammar and contemporary linguistics. Preparation for stylistic analysis and historical study of English language and literature. Required of teaching credential candidates.

105B. Language (3). Term paper. Prerequisite: course 1 or 3. 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). Hayden
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). I. McGuinness
Lecture/discussion—3 hours; term paper. Prerequisite: course 1 or 3. History of literary criticism in the modern era, with emphasis on the bib of the past and the special problems presented by modern literary theory.

111. Medieval Literature (4). II. Cioffi
Lecture/discussion—3 hours; term paper. Prerequisite: course 1 or 3. Development of the poet's craft in the eleventh and twelfth centuries in the time of Beowulf to the late medieval romances, with special emphasis on the heroic strain, courtly love and its impact, and the development of Arthurian literature. Mostly in translation.

113A. Chaucer: Troilus and the "Minor" Poems (4). I. Osborn; II. Cioffi
Lecture—3 hours; term paper. Prerequisite: course 1 or 3. Development of the poet's artistry and the evolution of the poet's style from his first work to his culminating masterpiece, Troilus and Criseyde. Courses 113A and 113B need not be taken in sequence.

113B. Chaucer: The Canterbury Tales (4). II. Osborn
Lecture—3 hours; term paper. Prerequisite: course 1 or 3. The Canterbury Tales complete as a work of art.
site; course 1 or 3. Ruskin, Herdy, Hopkins, and others. The Oxford movement; the Pre-Raphaelites: art and sociology; aestheticism and decadence; pessimism. Tendencies continuing into the Edwardian period.

*183. British literature from 1890 to 1918 (4).
Lecture/discussion—3 hours; term paper. Prerequisite: course 1 or 3. Yeats, Conrad, Joyce, aestheticism, naturalism, symbolism, and impressionism. Transition from Victorian to twentieth-century styles and attitudes.

137. British literature from 1819 to 1840 (4).
ll. Williamsson
Lecture/discussion—3 hours; term paper. Prerequisite: course 1 or 3. Lawrence, Eliot, Forster, and others: Modern prose and poetry.

138. British literature from 1840 to the Present (4).
III. Moran
Lecture/discussion—3 hours; term paper. Prerequisite: course 1 or 3. Literature of England and Ireland from World War II to the present. Major themes in the novel, poetry, and short story.

139. Modern Anglo-Irish Writers (4).
ll. McGuinness
Lecture/discussion—3 hours; term paper. Prerequisite: course 1 or 3. Seventeenth-century American literature: special attention to European literary-intellectual traditions, dominant American forms (poems, sermons, history), and major writers (Anne Bradstreet, Edward Taylor, and others).

141. The American Enlightenment and its Reaction (4).
II. Barrish
Lecture/discussion—3 hours; term paper. Prerequisite: course 1 or 3. Eighteenth-century American literature: Puritanism, liberalism, popular literature, scientific thought, satiric tempests; decline of Puritan traditions; major writers, including Franklin, Edwards, Friez, and Braddock.

II. Van Leer
Lecture/discussion—3 hours; term paper. Prerequisite: course 1 or 3. Flowering of American romanticism: the metaphysical tradition; Oriental and European antecedents; philosophical idealism; and literary achievement of transcendentalism (Emerson, Thoreau, Whitman); the critical temper of Hawthorne and Melville; Emily Dickinson.

144. American literature from 1865 to 1914 (4).
III. Barrish
Lecture/discussion—3 hours; term paper. Prerequisite: course 1 or 3. Religion, local color, social criticism, naturalism, fin de siecle aestheticism; Twain, James, Crane, Dreiser, Holmes.

146. Modern American literature: 1914-1940 (4).
I. Hoffman
Lecture/discussion—3 hours; term paper. Prerequisite: course 1 or 3. The Modernist movement, disillusionment, art experimentalism, classical revival, New Criticism, proletarian literature, romantic nationalism, European currents; Pound, Fitzgerald, Eliot, Hemingway, Crane, Faulkner, and Stevens.

147. Modern American literature: 1940 to the Present (4).
II. Hics
Lecture/discussion—3 hours; term paper. Prerequisite: course 1 or 3. Contemporary fiction, poetry, and drama. The impact of World War II on the younger writers; experimentation and formalism in poetry and the drama.

150A. English Drama to Marlowe (4).
Lecture/discussion—3 hours; term paper. Prerequisite: course 1 or 3. Development of the drama from its beginnings to the Renaissance. Miracle and mystery plays; the morality tradition. Early comedy, tragedy, and chronicle plays.

150B. English Drama from Marlowe to 1662 (4).
II. Levis
Lecture/discussion—3 hours; term paper. Prerequisite: course 1 or 3. Shakespeare's contemporaries in the drama, including Webster, Jonson, Beaumont and Fletcher, and others. The revenge play and tragicomedy; post-Shakespearean development of dramatic action and blank verse.

150C. English Drama from 1890 to the Present (4).
III. McGuinness
Lecture/discussion—3 hours; term paper. Prerequisite: course 1 or 3. The rise of dramatic realism; the chief reactions against it. Emphasis on Shaw, O'Casey, Odd. Others.

152. American Drama from Its Beginnings to the Present (4).
II. Hayes
Lecture/discussion—3 hours; term paper. Prerequisite: course 1 or 3. Theatrical and historical development of American drama. American in America from its eighteenth-century origins with emphasis on O'Neill, Williams, Miller, and others.

Lecture/discussion—3 hours; term paper. Prerequisite: course 1 or 3. Realism and the rise of the modern novel. Defoe, Richardson, Fielding, Sterne, and Smollett.

II. 0. Lecture/discussion—3 hours; term paper. Prerequisite: course 1 or 3. Major Victorian novelists: their theory and practice. Dickens, Thackeray, Trollope, Eliot, Meredith, and Hardy.

155D. The English Novel: 1900 to the Present (4).
II. Baker
Lecture/discussion—3 hours; term paper. Prerequisite: course 1 or 3. Major figures including Conrad, Joyce, and Lawrence. Impressionism, the revolt against naturalism; the experimental novel, the anti-modemist reaction.

156. The Short Story (4).
II. Moran; III. Zender
Lecture/discussion—3 hours; term paper. Prerequisite: course 1 or 3. The short story as a genre; its historical development, techniques, and formal character. The short story as a form. The short story as a novel. American short story writers. General Education credit: Civilization and Culture/Non-Introductory. Recommended GE preparation: any course from the GE Literature Preparation List.

158A. The American Novel to 1900 (4).
Lecture/discussion—3 hours; term paper. Prerequisite: course 1 or 3. Rise and development of the American novel. Its beginnings. Hawthorne, Melville, Twain, and others.

158B. The American Novel from 1900 to the Present (4).
II. Hayes
Lecture/discussion—3 hours; term paper. Prerequisite: course 1 or 3. Major American novelists of the twentieth century. Faulkner, Hemingway, Fitzgerald, and others.

160. Film As Narrative (4).
Discussion—2 hours; film study—3 hours; term paper. Prerequisite: course 1 or 3. Study of modern film (1930 to the present) as a storytelling medium.

162. Film Theory and Criticism (4).
Discussion—1 hour; discussion—2 hours; laboratory—3 hours. Prerequisite: course 1 or 3. Film theory and criticism, with study of ten major works of international film art. Offered in alternate years. General Education credit: Civilization and Culture/Non-Introductory. Recommended GE preparation: any course from the GE Literature Preparation List.

171A. The Bible as Literature: The Old Testament (4).
II. Robertson
Lecture/discussion—3 hours; term paper. Prerequisite: course 1 or 3. May be taken independently of course 171B. Selected readings from the Old Testament illustrating various literary forms. Emphasis on the Pentateuch, the Historical Books, and the Wisdom Books. Offered in alternate years. General Education credit: Civilization and Culture/Non-Introductory. Recommended GE preparation: History 4A, 4B, 4C, Philosophy 1, 10B, Religious Studies 21, 40, or any course from the GE Literature Preparation List.

II. Robertson
Lecture/discussion—3 hours; term paper. Prerequisite: course 1 or 3. May be taken independently of course 171A. Selected readings from the Old Testament prophets and the New Testament. Offered in alternate years. General Education credit: Civilization and Culture/Non-Introductory. Recommended GE preparation: History 4A, 4B, 4C, Philosophy 1, 10B, Religious Studies 21, 40, or any course from the GE Literature Preparation List.

173. The Literature of Science Fiction (4).
Lecture/discussion—3 hours; term paper. Prerequisite: course 1 or 3. Study of the literary modes and methods of science fiction. The course will analyze representative novels and short stories which exemplify major themes and styles in this genre--e.g., time travel; alternative universes; utopian, anthropological, sociological science fiction.

175. American Literary Humor (4).
II. Morris
Lecture/discussion—3 hours; term paper. Prerequisite: course 1 or 3, standing above freshman level. American humorous writers; the humorous spirit; the supernormal. Includes one or more of the following: colonial humor; southwestern and New England humor; pre- and post-Civil War masters; local colorists; journalistic wit; sociopolitical; modernist poets and prose writers; black humor.

177. Study of an Individual Author (4).
III. Morris
Lecture/discussion—3 hours; term paper. Prerequisite: course 1 or 3. Survey of the work of an individual author other than Chaucer, Shakespeare, or Milton. May be repeated for credit when a different author is studied.

178. Special Topics In Ethnic Literature (4).
II. Kramer
Lecture/discussion—3 hours; term paper. Prerequisite: course 1 or 3, or sophomore standing or above. Extended study of a topic drawn from the multi-ethnic literature of the United States. Course may focus on particular ethnic groups, historical periods, writers, genres, and/or themes. May be repeated for credit when subject matter differs.

179. Multi-Ethnic Literature (4):
Stange
Lecture/discussion—3 hours; papers. Prerequisite: course 1 or 3, standing above freshman level. Fiction, poetry, and other writings by Americans of ethnic minority background (Native, Black, Hispanic, Jewish, Italian, etc.) which reveal their immigrant experience, cultural diversity, and contributions to American literature.

180. Children's Literature (4).
Lecture/discussion—3 hours; term paper. Prerequisite: course 1 or 3. Historical backgrounds and development of types of children's literature, folklore and oral tradition, levels of interest, criticism and evaluation, illustration and bibliography.

181. Black Literature (4).
II. Major
Lecture/discussion—3 hours; term paper. Prerequisite: course 1 or 3. A study of the writings of black Americans, including Chesnutt and Dunbar in the nineteenth century, the writings of the Harlem Renaissance in the 1920's, and the more important contemporary black writers, such as Wright, Ellison, Baldwin, Hrab, Jones, and others.

182. Literature of California (4).
Lecture/discussion—3 hours; term paper. Prerequisite: course 1 or 3. California literature in the context of California's social, political, and intellectual history, Reading of poetry, fiction, and essays. Emphasis on nineteenth- and twentieth-century naturalists, turn of the century novelists and short story writers, and writers of the last two decades. Offered in alternate years. General Education credit: Civilization and Culture/Non-Introductory. Recommended GE preparation: English 3, Comparative Literature 1, 2, or 3.
184. Literature of the Wilderness (4)

185A. Literature by Women I (4) I, II, IV
Lecture/discussion—3 hours; term paper. Prerequisite: course 1 or 3. English language literature by women from Bradstreet and Behn to the Brontës, Eliot, and专业化. The effects of social constraints upon women's art; the rise of feminism; new trends in literary criticism.

185B. Literature by Women II (4) III, II, IV
Lecture/discussion—3 hours; term paper. Prerequisite: course 1 or 3. English language literature by women from Chopin and Woolf to Plath, Rich, and Morrison. The effects of social constraints upon women's art; the rise of feminism; new trends in literary criticism.

187. Literature of the American Novel (4) I, II, IV
Seminar—3 hours; term paper. Prerequisite: junior or senior standing with a major in English or consent of instructor. Group study of the relationship between the forms of literature and the forms of the other arts, with particular emphasis on one of the crucial periods of artistic development in western culture.

188. Special Topics in Literary Studies (4) I, II, III
The Staff (Chairperson in charge)
Seminar—3 hours; term paper. Prerequisite: junior or senior standing with a major in English or consent of instructor. Group study of a special topic drawn from English or American literature. Course will be offered in sections according to the topic studied, and papers will be assigned. Limited enrollment. May be repeated for credit with consent of instructor.

189. Seminar in a Major Writer (4) I, II, III, IV
The Staff (Chairperson in charge)
Seminar—3 hours; term paper. Prerequisite: junior or senior standing; a major in English or consent of instructor. One major writer's artistic development with attention to intellectual and literary milieu. Limited enrollment. May be repeated for credit with consent of instructor.

192. Internship in English (1-12) I, II, III, IV
The Staff (Chairperson in charge)
Internship—3-36 hours. Prerequisite: course 1 or 3. Internships in fields where students can practice their skills in a major area, 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) III, IV, I, II, III, IV
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, and preparation for writing an honors thesis in course 195H.

195H. Honors Thesis (4) I, II
The Staff (Chairperson in charge)
Independent study—12 hours. Prerequisite: course 194H. Preparation of an honors thesis, under the supervision of an instructor. Students satisfying requirements for the general major or the teaching emphasis write on a scholarly or critical subject; creative writing students submit a volume of poems or fiction.

197TC, Community Tutoring in English (4-1) I, II, III, IV
The Staff (Chairperson in charge)
Tutorial—1-4 hours. Prerequisite: upper-division standing and a major in English; consent of Chairperson.

204 English
Breadth Subject Matter 24
Satisfaction of General Education requirements 6-24
Depth Subject Matter 32-36
Cell and microbiology (Microbiology 102, Botany 114, 199, Plant Pathology 120, Veterinary Microbiology and Immunology 132) 4-5
Genetics 100 4
Ecology (Environmental Studies 130 or Zoology 155) 3-4
Evolution (Genetics 103, Zoology 131) 3-4
Physiological chemistry (Physiological Sciences 110A-110B or Biochemistry 101A-101B) 8-10
Entomology 100, 100L 8-7
At least 7 units from Entomology 101, 102, 103, 107, 109, or 116 7
Restricted Electives 34
Upper division entomology courses 14
Upper division electives related to student's interest with approval of adviser 14
Note: No more than a total of 6 units from Entomology 192, 197, and 199 may count toward fulfilling depth subject matter or restricted elective units.
Unrestricted Electives 35-55
Total Units for the Major 185

Major Adviser: C.Y.S. Peng.

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.

Upper Division Courses 100. General Entomology (3) L. Granett Lecture—3 hours. Prerequisite: Biological Sciences 10. Biology, anatomy, physiology, development, classification, ecology and relation of insects to human welfare. 100L. General Entomology Laboratory (2) L. Granett Laboratory—6 hours. Prerequisite: course 100 (may be taken concurrently). Anatomy, development, population ecology, methods of collecting, classification and identification of insects of all orders and of major families. 101. Functional Insect Morphology (3) L. Peng. Lecture—2 hours; laboratory—3 hours. Prerequisite: course 100. Study of external and internal structures, organs and tissues of insects, with emphasis on functional systems. Functional anatomy, histology and fine structures of important organ systems and tissues will be discussed. 102. Insect Physiology (4) L. Duffey, Hemmcock. Lecture—3 hours; discussion—1 hour. Prerequisite: course 100 or course in physiology or invertebrate zoology. Processes by which insects maintain themselves, reproduce, and adapt to environment. Insects as models for behavioral research through detailed analysis of metabolic, physiological, and behavioral processes. Emphasis on analysis of methodology, fact, and theory. 103. Insect Systematics (3) L. Ward. Lecture—2 hours; discussion—1 hour. Prerequisite: introductory course in zoology or entomology. Principles and methods of systematic study, with particular reference to insects. Emphasis on different theories of classification, and nomenclature. 104. Behavioral Ecology of Insects (3) L. 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. 105. California Insect Diversity (5) L. Thorn, Kinsey. Lecture—1 hour. Laboratory—6 hours; fieldwork—6 hours. Prerequisite: introductory course in entomology. Survey of the diversity of insects from selected ecocological zones in California with emphasis on identification, identification, and natural history. Offered in alternate years. 106. Field Taxonomy and Ecology (7) Extra-semester. Ward Lecture—2 hours; laboratory—3 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. Economic Entomology (4) L. Panella. Lecture—2 hours; laboratory—6 hours. Introductory course dealing with the identification, biology, and control of insects and mites that cause economic losses. Emphasis is placed on the management of agricultural pests, but also covers structural, household, storage, and ornamental pest problems. 111. Insects and Human Affairs (4) L. T. McCleland. Lecture—2 hours; discussion—1 hour; film/lecture demonstration—1 hour; one required evening meeting. Prerequisite: Biological Sciences 10 recommended. Diversity, structure and function of insects. Their role as beneficials, competitors, and destroyers of human resources and health. Their contribution to human culture and agriculture. Approaches to insect pest control and its environmental, social and political correlates. General Education credit: Nature and Environment/Non-Introductory. Recommended GE preparation: Biological Sciences 10. 115. Arthropod Management in Agriculture (4) L. Granett Lecture—3 hours; laboratory—3 hours. Prerequisite: courses 100 or 110. Principles of pest management with emphasis on arthropod pests in California crop systems. Definition of pest status, measurement of pest damage, and interactions between pests and plants. Introduction of control tactics. Uses of insecticides within the IPM framework. 116. Biology of Aquatic Insects (3-5) L. Staff. Lecture—2 hours and laboratory (Saturday field trip); optional laboratory on identification and/or aquatic insect collection. Prerequisite: course 100 or consent of instructor. A study of the life history, ecology, and identification of insects associated with streams, ponds, and lakes. 119. Apiculture (3) L. Gary. Lecture—3 hours; laboratory—3 hours. Prerequisite: Biological Sciences 10 recommended. Biology and behavior of honeybees; communication, orientation, social organization, foraging activities, honey production, pollination activities. General Education credit: Nature and Environment/Non-Introductory. Recommended GE preparation: Biological Sciences 10 or Botany 10. 119L. Apiculture Laboratory (2) L. Gary. Lecture—1 hour; laboratory—3 hours. Prerequisite: course 119. Biology and behavior of honeybees; fundamentals of culture, management, and uses of colonies for agriculture, recreational, teaching, and research purposes. 120. Insect-Host Plant Interactions (4) L. Duffey. Lecture—3 hours; discussion—1 hour. Prerequisite: courses 101, 102; Biochemistry 101A-101B or the equivalent; general introductory course in botany and/or plant physiology will be helpful. Morphological, physiological, and biochemical bases of host-plant selection by insects; consideration of bases of host-plant resistance to insects, emphasis on comparative defensive and biochemical interaction between various organisms, particularly plants and insects. 135. Introduction to Biological Control (4) L. Kars. Lecture—3 hours; laboratory—3 hours. Prerequisite: courses 100 or 110. Principles of host-plant selection and 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. Historical Biogeography and Evolution of Biodiversity (4) L. Kinsey. Lecture—3 hours; discussion—1 hour. Prerequisite: Botany 10 or Biological Sciences 10. Designed for non-majors. Exploring the relationships between physical changes in the continents and the evolution and diversification of plants and animals, particularly insects, over the past 400 million years. General Education credit: Nature and Environment/Non-Introductory. Recommended GE preparation: Botany 10 (or Botany 2), or Biological Sciences 10 (or Zoology 2). 153. Medical Entomology (4) L. McClennan. Lecture—3 hours; discussion—1 hour. Prerequisite: upper division standing in one of the biological sciences or consent of instructor. The worldwide relationships of insects and other arthropods to human health. The biology and basic classification of medically important arthropods with special emphasis on the ecology of arthropod-borne human diseases and principles of their control. General Education credit: Nature and Environment/Non-Introductory. Recommended GE preparation: Entomology 111 or any
225. Terrestrial Flied Ecology (4) III, Karban Seminar—1 hour, laboratory—12 hours. Prerequisite: Introductory ecology and Introductory statistics. Field course conducted over spring break and four weekends at Bohgea Bay emphasizing student projects. Ecological analysis of data gathering, analysis, and written and oral presentation of results stressed.

230. Advanced Biological Control (3) Ii, McClaflan Lecture—2 hours; discussion—1 hour. Prerequisite: course 153. Advanced treatment of current topics in biological control of arthropod pests and weeds. Offered in alternate years.

253. Advanced Medical Entomology (3) III, McClaflan Lecture—2 hours; discussion—1 hour. Prerequisite: one upper division course in entomology (other than course 153) and one course in microbiology; course 153 strongly recommended. An analysis of several arthropod-borne human diseases with emphasis on the relationships of the hosts to the vector and the roles of the environment.

260. Special Topics in Entomology—(1-4) I, II, III. The Staff (Chairperson in charge) Seminar—1 hour. Prerequisite: consent of instructor.

261. Seminar in Medical Entomology (2) I, McClaflan, Washino, Ehrlich Seminar—2 hours. Prerequisite: course 153. Discussions of parasitology, ecology and epidemiology related to vectors of pathogens causing disease in man and animals.

262. Seminar in Insect Physiology (2) I, Duffey, Hammock, Maeda Seminar—2 hours. Prerequisite: course 102. Critical examination of current interest to insect physiology and biochemistry.

263. Seminar in Systematic Entomology (3) II, Ward, Thorp, Kimsey Seminar—2 hours. Prerequisite: course 103. Selected topics in systematic and evolucionary processes discussed. Some topics may be illustrated by laboratory sessions.

264. Seminar in Insect Ecology (3) II, Carey, Ehler, Karban Seminar—2 hours. Prerequisite: a general biology course. Discussions of advanced topics in ecology with emphasis on analysis of factors influencing the dispersion and abundance of insects. Includes consideration of application of basic theory as in biological control and integrated management.

265. Seminar in Agricultural Entomology (2) II, Granett, Perelle, Rosenheim Seminar—2 hours. Prerequisite: course 110. Discussion of advances in research relating to the principles of pest insect population management.

266. Seminar in Bee Biology (2) I, Karvan, Thorp, 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.

267. Seminar Insect Behavior (2) III, Dingle Seminar—2 hours. Prerequisite: a course in animal behavior. Review of critical analysis of contemporary advances in insect behavior, especially interpretation and description of observations, physiological mechanisms, functional kinds of behavior, and the application of general principles to the solution of problems in the laboratory and field.

268. Group Study (1-5) I, II, III. The Staff (Chairperson in charge) (SU grading only)

269. Research (1-12) I, II, summer. The Staff (Chairperson in charge) (SU grading only)

Professional Courses

403. Oral Presentation of Scientific Information (1) I. Granett, Duffey

Lecture-discussion 2 hours every other week. Prerequisite: graduate standing. Approved for graduate degree credit. Helps students in preparing a research proposal for (1) 1-10 minute talks at scientific meetings, (2) research seminars, (3) class lectures, and (4) informal colloquia.

404. Graduate Seminar (2) I. Granett, Duffey Lecture—1 hour; 15-20 page research proposal required. Prerequisite: graduate standing; research experience accepted. For graduate degree credit.

406. Analysis of Natural Products (2) I, Duffey Lecture—1/2 hour; discussion—1/2 hour, laboratory—2 hours. Prerequisite: Biochemistry 101B. Approved for graduate degree credit.

Environmental and Resource Sciences

See Atmospheric Science; Range and Wildlands Science; Resource Sciences; Soil Science; Water Science; and Wildlife and Fisheries Biology

Environmental and Resource Sciences

See Atmospheric Science; Range and Wildlands Science; Resource Sciences; Soil Science; Water Science; and Wildlife and Fisheries Biology

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 giving the student basic quantitative research skills. Economics, political science, and critical techniques of quantitative management offerings dominate the management and public policy requirements.

A moderate degree of specialization is permitted in both the upper and middle division options. Students in the Environmental Biology option take courses in population ecology, economics, and other specialized biology, as well as quantitative analysis. Students in the Environmental Management option take courses in recreation, resource economics, planning and public policy, and, especially, quantitative management techniques. The option emphasizes the management of public lands and natural resources in wildland and rural areas. Practical courses in field level planning and management are featured. Students interested in urban problems and/or legislative approaches should examine the Environmental Policy Analysis and Planning major.

*Course not offered this academic year.
Areas of Specialization

Environmental Biology Option
Population and community ecology (Environmental Studies 121, Zoology 141, Wildlife and Fisheries Biology 122), Behavioral ecology (Environmental Studies 425), Evolution (Genetics 107, Zoology 148), Quantitative analysis (Mathematics 22A-22B, upper division mathematics, statistics), Ecology, including laboratory experience (Botany 102, 106, 116, Environmental Studies 103, Wildlife and Fisheries Biology 10, 111, 111L, 120, 122, 133), Phylogeny, including laboratory experience (Environmental Studies 120, 120B, 128), Biological systems, two courses from one of the following two groups, Aquatic biology: Environmental Studies 151, 151L, Water Science 122, 122L, Environmental Studies 1508-150C, Wildlife and Fisheries Biology 120, 122, Terrestrial ecology: Wildlife and Fisheries Biology 103, 130, Avian Sciences 130, Botany 101, 102, 116, 141, Geography 173.

Environmental Management Option
Recreation, Environmental Studies 162, Microeconomics, Economics 100, Policy evaluation, Environmental Studies 168A, Bureaucratic Policy Making, Environmental Studies 160, 168, or Political Science 168, Quantitative Resource Management, Agricultural Economics 159, 157, or Environmental Studies 164, Environmental Management, Environmental Studies 117 or 119, Engineering Planning, Civil Engineering 152, 160, or 160A, Statistical Analysis, Sociology 106, Statistics 108, or Agricultural Economics 106, Management of a natural resource, two courses from one of the following three groups, Animal Resources: Range Science 135, or Wildlife and Fisheries Biology 111, 122, 151, or Resource Science 101, or Environmental Studies 123, Forest and Rangeland Resources: Resource Science 41, 103, 122, 141, or Geography 162, or Soil Science 118, or Environmental Studies 151L.

Unrestricted Electives
Total Units for the Degree

Major Adviser: J.F. Cullum (Environmental Studies).

Minor Program Requirements: The faculty for Environmental Biology and Management offers a minor in Recreation for students in Landscape Architecture desiring to specialize in recreation area design; Physical Education, Psychology, Sociology, Human Development, and Applied Behavioral Sciences students wishing to work in educational and therapeutic recreation; Environmental Policy Analysis and Planning students seeking careers in recreation policy analysis and management; Agricultural and Managerial Economics students wishing to go into the administration of commercial recreation enterprises; and those students in Plant Science interested in park landscape construction and maintenance.

Environmental Design

Course in Environmental Biology and Management

Courses in Environmental Biology and Management
Questions pertaining to courses in Environmental Biology and Management should be directed to the Environmental Biology and Management advising office, 212 Edgerton Hall.

Environmental Geology
(College of Letters and Science)
The minor in Environmental Geology examines the multidisciplinary focus of geology and related earth sciences fields, and planning and resources oriented programs. Students in the minor are encouraged to participate and internships in a variety of programs that assist them in solidifying the Environmental Geology minor with their career goals.
Environmental Horticulture

(College of Agricultrual and Environmental Sciences)

James A. Harding, Ph.D., Chairperson of the Department
Department Office, 140 Environmental Horticulture Building (515-765-0130)

Faculty
Allison M. Berry, Ph.D., Assistant Professor
David W. Burger, Ph.D., Assistant Professor
Thomas A. Byrne, M.S., Lecturer
Don J. Duran, Ph.D., Professor
Richard Y. Evans, Ph.D., Lecturer
Seymour M. Gold, Ph.D., Professor
James A. Harding, Ph.D., Professor
Richard W. Harris, Ph.D., Professor Emeritus
Charles E. Hess, Ph.D., Professor
Anton M. Kolplan, Ph.D., Professor Emeritus
Harry C. Kohl, Jr., Ph.D., Professor Emeritus
Andrew T. Leiser, Ph.D., Professor Emeritus
J. Helmut Lieb, Ph.D., Assistant Professor
James D. MacDonald, Ph.D., Associate Professor
(Plant Pathology)
John H. Madison, Jr., Ph.D., Professor Emeritus
Carollynn Napier, Ph.D., Assistant Professor
Jack L. Paul, Ph.D., Professor Emeritus
Michael S. Reid, Ph.D., Professor
Roy M. Sachs, Ph.D., Professor
Lin L. Wu, Ph.D., Associate Professor

Related Undergraduate Programs and Graduate Study
See the Undergraduate majors in Environmental Biology and Management, and Plant Science; and for graduate study, refer to the Graduate Division section.

Related Courses. See Plant Science.

Courses in Environmental Horticulture

Lower Division Courses
6. Introduction to Environmental Plants (3) III, summer, Harding.
Lecture—1 hour; discussion—1 hour; laboratory—3 hours. Classification, nomenclature, and identification of common trees, shrubs, ground covers, turfgrass, bedding plants, and house plants. Characteristics of important plant families are discussed.

10. Landscape Horticulture for the Home and Community (3) III, Burger.
Lecture—2 hours; discussion—1 hour. Recommended for non-majors. Influences of climate, soil, and cultural practices on the growing of turf, flowers, and herbaceous plants in the landscape.

199. Special Study for Advanced Undergraduates (1-5) I, II, III. The Staff (Chairperson in charge).
Prerequisite: 3 units of upper division work in environmental horticulture; consent of instructor. (P/NP grading only)

Graduate Courses
220. Trees in Biotechnology (2) II, Duran.
Lecture—2 hours. Prerequisite: Students must be senior or graduate majors in a plant science discipline (botany, plant pathology, genetics, horticulture, related fields). Develop understanding of basic principles of biotechnology of woody perennial. Cell and tissue culture methods and current progress in process control problems are emphasized. Recombinant DNA methods covered where appropriate. Develop analytical evaluation skills. Review trends in commercialization.

226. Tissue Culture of Horticultural Crops (2) II, Burger.
Lecture—1 hour; laboratory—3 hours. Prerequisite: A B.S. degree (or the equivalent) in Plant Science or consent of instructor. In-depth analysis of tissue culture techniques used in horticulture for basic cellular physiology and biochemistry, propagation and breeding. Offered in alternate years.

Lecture—2 hours; laboratory—3 hours. Prerequisite: A B.S. degree (or the equivalent) in Plant Science or consent of instructor. Diagnosis of ornamental plant disorders. Emphasis on distinguishing among disorders caused by soil, water, insects, pathogens, chemical agents, climatic conditions, and cultural practices using visual symptoms and circumstances for determining probable cause and laboratory methods for confirmation. Offered in alternate years.

280. Seminar (1) I, II, III. The Staff (Chairperson in charge).
Seminar—1 hour. Research conference conducted by departmental faculty to discuss design, philosophy, and interpretation of ongoing specific research areas which include plant morphogenesis, floriculture, greenhouse production and modeling, landscape plant ecology, arboriculture, turf culture, post harvest, plant breeding, etc. (SU grading only)

290C. Research Conference (1) I, II, III, Lieth, Napier, Reid, Sachs, Wu.
Discussion—1 hour. Prerequisite: Students in a plant science graduate program. Research conference conducted by departmental faculty to discuss design, philosophy, and interpretation of ongoing specific research areas which includes plant morphogenesis, floriculture, greenhouse production, landscape plant ecology, arboriculture, turf culture, post harvest, and plant breeding. (SU grading only)

297T. Tutoring in Environmental Horticulture (1-4) I, II, III. The Staff (Chairperson in charge).
Tutoring—4 to 6 hours; discussion—1 hour. Prerequisite: graduate student standing; completion of course to be tutored (or the equivalent) and/or consent of instructor. Leading discussion sessions, conducting laboratory exercises, and lecturing in Environmental Horticulture classes under faculty guidance. Weekly conferences on subject matter and instructional techniques. May be repeated for credit by tutoring in different courses.

298. Group Study (1-9) I, II, III. The Staff (Chairperson in charge).

299. Research (1-12) I, II, III. The Staff (Chairperson in charge).
Prerequisite: graduate standing. (SU grading only)

Courses in Environmental Planning and Management

Questions pertaining to the following courses should be directed to the instructor or to the Environmental Biology and Management advising office, 2132 Wollon Hall.

Upper Division Courses
110. Urban and Regional Planning (4) II, Gold (Environmental Horticulture)
Lecture—3 hours; discussion—1 hour; one Saturday
field trip. Prerequisite: upper division standing. The history, nature, scope, and significance of planning in agriculture and urban planning. Principles of the planning and comprehensive planning, significant problems and potentials, design alternatives, the future, innovation, and the profession.

134. Recreation Planning (4) Lec, Lab, Field trip. 3 hours per week, 1 hour, one Saturday field trip. Prerequisite: courses 110, 116. Description of basic concepts, techniques and methods used to prepare park, recreation, and open space plans for urban environments.

Environmental Planning and Management
See Environmental Biology and Management; and Environmental Horticulture

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.

The Program. This major provides students with a general background in the natural sciences relevant to environmental policy. It also provides sufficient training in mathematics, statistics, and research methodology to quantitatively analyze environmental problems and policy options. A strong background in policy analysis, including the evaluation of policy alternatives and the study of factors affecting policy formulation and implementation is included. In addition, students are encouraged to develop substantive knowledge in a specific field of environmental policy, such as urban and regional planning, water pollution control, or energy.

Career Alternatives. Environmental policy analysis and planning graduates are prepared for employment in public agencies, consulting firms, and businesses concerned with environmental affairs. The major is also excellent preparation for students who want to go on to graduate work in law, planning, public policy, or management.

B.S. Major Requirements:
(Courses in parentheses are those normally taken. Very similar or more difficult courses may be taken with the approval of your adviser. Courses shown without parentheses are required.)

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<tr>
<th>UNITS</th>
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<tr>
<td>English Composition Requirement</td>
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<td>See College requirement</td>
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<tr>
<td>Additional English (English 102, concurrent with Environmental Studies 1)</td>
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<tr>
<td>Preparatory Subject Matter</td>
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<tr>
<td>Biological sciences (Biological Sciences A)</td>
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<td>Chemistry (Chemistry 1A, 1B)</td>
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<tr>
<td>Computer science (Agricultural Science and Management 21, Engineering 5, Computer Science Engineering 10, 40)</td>
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<td>Economic principles (Economics 1A, 1B)</td>
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<td>Environmental science (Environmental Science 1, Biological Sciences 1A, Geography 1, Geology 1, Plant Science 10, Soil Science 100, Water Science 104, 105)</td>
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<tr>
<td>Environmental studies (Environmental Studies 1)</td>
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<tr>
<td>Mathematics (Mathematics 1A-1B or 2A-2B)</td>
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<td>Physics (Physics 1A)</td>
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<td>Political science (Political Science 1)</td>
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<tr>
<td>Statistics (Statistics 13, 32)</td>
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<tr>
<td>Breadth/General Education</td>
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<tr>
<td>Satisfaction of General Education requirement</td>
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<tr>
<td>Depth Subject Matter</td>
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| (Students must take these units on a letter grade basis, and must attain an overall grade-point average of 2.000 or higher in the Depth Subject Matter courses.)

Core Courses

| Environmental Studies 100 | 4 |
| Environmental Studies 111, 117, 118 | 3-4 |
| Environmental studies 120 | 3-4 |
| Environmental studies 164 | 4 |
| Environmental studies 168A | 4 |
| Environmental studies 171 | 4 |
| Environmental studies 176 | 4 |
| Environmental studies 184 | 4 |
| Research Methods | 10 |
| Environmental studies 178; or Sociology 103 | 4 |
| Sociology 106 or Agricultural Economics 105 or Statistics 106 | 4 |
| Economic Analysis | 10 |
| Economics 100 | 5 |
| Agricultural Economics 106 | 3 |
| Areas of Specialization (choose one) | 17-23 |

Advanced Policy Analysis Option

| Political institutions (Political Science 102, 105, 108, 155, Environmental Studies 160) | 4 |
| Political behavior (Political Science 164, 165, 170) | 4 |
| Science policy (Environmental studies 165) | 4 |
| Policy evaluation research (Environmental Studies 168B) | 4 |
| Policy evaluation (Civil Engineering 153, 160, Agricultural Economics 153, Economics 125) | 4 |
| City and Regional Planning Option | 12 |
| Urban design (Art 166, Environmental Biology and Management 110, Landscape Architecture 40, recommended) | 4 |
| Urban geography (Geography 158, 159) | 4 |
| Transportation planning (Civil Engineering 160) | 4 |
| Environmental impact assessment (Soil Science 116, Environmental Studies 179) | 3-4 |
| Urban economics (Economics 125) | 4 |
| Urban politics (Political Science 102, 105, 108) | 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 110) | 3 |
| Energy technology (Environmental Studies 151) | 4 |
| Solar energy (Resource Sciences 103) | 3 |
| Economics of energy (Environmental Studies 168) | 4 |
| Energy policy (Environmental Studies 167) | 4 |
| Environmental Science Option | 4 |
| Environmental health (Environmental Studies 126, Environmental Toxicology 101) | 4 |

Sols and land use (Soil Science 118, Geology 134) | 3-4 |
Aquatic systems (Environmental Studies 118, 151, Water Science 41, 103, 141, 160) | 3-4 |
Meteorology and air pollution (Resource Sciences 131, Atmospheric Sciences 149A, 149B, Civil Engineering 149) | 3-4 |
Science policy (Environmental Studies 165) | 4 |
Recreation Policy Option

| Internship in Recreation Management, Environmental Studies 192 | 4 |
| Public Land Management, Environmental Studies 172 | 4 |
| Urban recreation (Environmental Studies 134, Physical Education 150) | 4 |
Recreation policy analysis, Environmental Studies 162 | 4 |
Recreation administration (Agricultural Economics 112, Applied Behavioral Science 163, 170, Political Science 183, 189) | 4 |
Transportation Planning

| Urban structure (Geography 155, 156, Economics 125) | 4 |
| Transportation planning (Civil Engineering 160) | 4 |
| Transportation and analysis (Civil Engineering 161, Environmental Studies 169B) | 4 |
| Energy policy (Environmental Studies 167, Engineering 190) | 4 |
| Air quality (Resource Sciences 131) | 3 |
| Energy and environmental aspects of transportation (Environmental Studies 165) | 3 |

Water Quality Option

| Water resource management (Environmental Studies 126, Environmental Toxicology 101, Geography 140) | 4 |
| Water pollution (Water Science 41, Soil Science 120) | 4 |
| Freshwater systems (Water Science 122, Environmental Studies 151) | 4 |
| Field and laboratory methods (Water Science 122L, Environmental Studies 151L) | 4 |
| Water chemistry (Water Science 103, 105, 108) | 4 |
| Hydrology (Water Science 141) | 3 |
| (Enroll for Water Science 150 for law requirement under Depth Subject Matter above) |

Unrestricted Electives | 24-59 |
Total Units for the Degree | 180 |

Major Adviser. S. I. Schwartz (Environmental Studies).

Minor Program Requirements

The faculty for environmental policy analysis and planning offers the following two minors. The Energy Policy minor is for students from any major seeking basic training in energy technology, impacts and policy analysis methods applied to energy systems. The second minor is intended for natural and social science students desiring basic training in policy analysis theory and methods.

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<th>UNITS</th>
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<tr>
<td>Energy Policy</td>
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<tr>
<td>Preparation: Economics 1A; basic course in political science</td>
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<tr>
<td>Resource Sciences 3 or Engineering 160</td>
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<tr>
<td>Environmental Studies 126 or Environmental Toxicology 101</td>
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<tr>
<td>Resource Sciences 103 or Environmental Studies 115</td>
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<td>Environmental Studies 169</td>
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<td>Environmental Studies 151, 171</td>
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</table>
Environmental Policy Analysis 23-24
Preparation: Economics 1A; basic course in political science.
Environmental Studies 110, 160, 161, 166, 168A 20
Environmental Studies 171 or 179 3.4

Minor Adviser: S. I. Schwartz (Environmental Studies)

Environmental Studies
c(Intercollege Division)
Charles R. Goldman, Ph.D., Chairperson of the Division
Division Office, 2132 Wickson Hall (916-752-3026)

Faculty
Theodore C. Folin, Jr., Ph.D., Professor
Charles R. Goldman, Ph.D., Professor
William J. Hamilton III, Ph.D., Professor
Susan Harrison, Ph.D., Assistant Professor
Alan M. Hastings, Ph.D., Professor
Robert A. Johnson, M.S., Professor
John B. Loomis, Ph.D., Associate Professor (Environmental Studies, Agricultural Economics)
Benjamin S. Orlove, Ph.D., Professor
Mark R. Peterson, Ph.D., Assistant Professor
Thomas M. Powell, Ph.D., Professor
James F. Quinn, Ph.D., Associate Professor
Elena Rejmanova, Ph.D., Assistant Professor
Peter J. Richardson, Ph.D., Professor
Paul A. Steinberg, Ph.D., Professor
Thomas W. Schneer, Ph.D., Professor (Zoology)
Christine Schonewald-Cox, Ph.D., Assistant Adjunct Professor
Sepp N. Schwartz, Ph.D., Professor
Daniel Spirling, Ph.D., Associate Professor (Environmental Studies, Civil Engineering)
Geoffrey A. Wandersdorfs-Smith, Ph.D., Associate Professor (Environmental Studies, Political Science)

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 major 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 Majors in the Program of Undergraduate Studies 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, in which they are associated, such as agricultural economics, zoology, sociology, political science, civil engineering, and anthropology. Further information about graduate programs in ecology should be obtained from the Chairperson of the Graduate Group in Ecology.

Graduate Adviser. T.C. Folin (Ecology).

Courses in Environmental Studies

Lower Division Courses

1. Environmental Analysis (4) III. Loomis, Quinn Lecture—3 hours; discussion—1 hour. Prerequisite: English 1; English 2; Economics 1A, 1B, Biological Sciences 1A, and Political Science 1 recommended. Analysis of the biological, physical, and social interactions which constitute environmental problems, such as food production and population, land use, energy supplies and technology, and other resources. Emphasis on analysis of problems and the consequences of proposed solutions.

10. Introduction to Environmental Studies (4) I. Wandersdorfs-Smith Lecture—3 hours; discussion—1 hour. Prerequisite: elementary biology recommended. Survey of the importance of ecology and systems behavior for man-environment relationships and management problems. Resources, environmental quality, urban dynamics, environmental perception, and conservation are covered. Includes several integrative case studies, and features individual reading in environmental problems. Not open for credit to those who have had course 1. General Education credit: Interdisciplinary.

30. The Global Ecosystem (3) III. Richerson Lecture—3 hours; 1 one-day field trip. Prerequisite: Biological Sciences 10 or Geography 1 or Anthropology 2. The interaction of climate and biotic adaptation and the production of ecological systems. The limits and opportunities for human use of different natural environments, and human utilization of the earth's biotic resources. General Education credit with concurrent enrollment in course 30G: Nature and Environment/Non-Introductory. Recommended GE preparation: Biological Sciences 10.


12. Internship (1-12) I, II. The Staff (Department Chairperson in charge). Internship—3 credit hours. Prerequisite: lower division standing and consent of instructor. Work experience off and on campus in all subject areas offered in the College of Agricultural and Environmental Sciences. Internship supervised by member of the faculty. (P/NP grading only)

36. Directed Group Study (1-5). I, II, III. The Staff (Chairperson in charge). Prerequisite: consent of instructor. Primarily for lower division students. (P/NP grading only)

Upper Division Courses

100. General Ecology (4) I. Harrison Lecture—3 hours; discussion—1 hour. Prerequisite: elementary biology (including botanical and zoological elements); elementary calculus. Ecological principles of biological systems, emphasizing populations and ecosystems. Principles of growth, regulation, distribution, structure, energies, and mineral cycles related to the evolution of biological systems and applications to ecological problems.

101. Human Ecology (4) II. Richerson, Mulder Lecture—3 hours; discussion—1 hour. Prerequisite: one course from course 30, Anthropology 1, 2, Genetics 10, or the equivalent. Critical variables in the process of human population growth and their environment. Emphasis on the biological, cultural, social, and psychological forces which encourage stability or change in human ecological relationships. (Same course as Anthropology 101.) General Education credit: Contemporary Societies/Non-Introductory. Recommended GE preparation: Environmental Studies 1, 30, Anthropology 1, 2, Biological Sciences 10, Geography 2, or Sociology 2.

(a) Environmental Science

110. Principles of Environmental Science (4) II. Powell Lecture—3 hours; discussion—1 hour. Prerequisite: Physics 1A or SA, Mathematics 166 or 218, and Biological Sciences 1A, 1B. Application of physical and chemical principles, ecological concepts, and systems approach to policy analysis of atmospheric environments, freshwater and marine environments, land use, energy supplies and technology, and other resources.

115. Bioenvironmental Consequences of Nuclear Technology (3) III. M. Goldman Lecture—3 hours; field trip to nuclear power station. Prerequisite: a course in biology. Biologic implications of radio-nuclear and thermal effluents generated by nuclear technology. Hazards evaluation based on predictions of the most sensitive physiological responses. Offered in alternate years. (Same course as Radiological Sciences 115.)


(b) Ecological Analysis

121. Population Ecology (4) II. Hastings Lecture—3 hours; discussion—1 hour. Prerequisite: Biological Sciences 15, 1C, Mathematics 16A-16B. Development of exponential and logistic growth models for plant and animal populations, analysis of age structure and growth rates, analysis of competition and predator-prey systems. Emphasis is on modeling and using them to make predictions and solve problems. Offered in alternate years.

123. Introduction to Field and Laboratory Methods in Ecology (4) III. Hamilton Lecture—2 hours; laboratory—8 hours; two weekend field trips. Prerequisite: Statistics 13, course 100 (may be taken concurrently), or the equivalent. Course will introduce students to methods used for collecting ecological data in field and laboratory situations. Methods used by population ecologists and community ecologists are included and emphasis will be placed on experimental design, scientific writing, and data analysis.

124. Marine and Coastal Field Ecology (10) Extra-Session Summer, Chow Lecture—6 hours; discussion—4 hours; seminar—1 hour; laboratory—18 hours (Summer Session I). Prerequisite: Biological Sciences 1A; Statistics 13; course 100. Full-time study at Bodega Marine Laboratory. Intensive lecture-laboratory-field study of current theoretical techniques with emphasis on marine populations and communities; techniques and evaluation of quantitative field research.

125. Social Systems of Animals and Humans (4) II. Wilson Lecture—3 hours; discussion—1 hour. Prerequisite: course 100 or the equivalent recommended. The

*Course not offered this academic year.
128. Analysis and Simulation of Complex Systems (3) I. Fain Lecture—3 hours. Prerequisite: Mathematics 16B or 21B; Statistics 102; upper division standing in the biological or social sciences. Analysis of systems and construction of simulation models of ecological and socioeconomic systems using DYNAMO; evaluation of models. Logical and scientific reasoning is stressed.

129. Physiological Ecology (4) I. Patterson Lecture—3 hours; discussion—1 hour. Prerequisite: Chemistry 3B, Physics 10B, and Biological Sciences 18 or 1 or 1C. Comparative and evolutionary study of organisms, emphasizing adaptations to the physical and chemical environment. Body size, metabolism, growth and nutrient exchange, thermoregulation, biomechanics, locomotion, and selected topics in current research.

129L. Physiological Ecology Laboratory (3) III. Patterson Laboratory—6 hours. Prerequisite: course 129 may be taken concurrently or be equivalent. Methods for monitoring physical variables in aquatic and terrestrial environments and animal responses to them. Water balance, respiration, and thermoregulation are demonstrated and a broadly comparative approach is employed. Enrolled limited.

131. Cultural Ecology (4) III. Orlove Lecture—3 hours; discussion—1 hour. Comparative survey of the interaction between diverse human cultural systems and the environment. Primary emphases given to people in rural and relatively undeveloped environments as a basis for interpreting more complex environments. (Same course as Anthropology 130; General Education credit: Contemporary Societies/Non-Introductory. Recommended GE preparation: Anthropology 2.)

132. Aquatic Ecosystems Analysis 150A. Physical and Chemical Oceanography (4) I. Powell Lecture—3 hours; discussion—1 hour. Prerequisite: Environmental Studies/Geology 116, Physics 98, Mathematics 22C, Chemistry 1C; or upper division standing in a natural science and consent of instructor. Physical and chemical properties of seawater, fluid dynamics, circulation, currents, waves, tides, mixing, major oceanic geo-chemical cycles. (Same course as Geology 150A.)

150B. Geological Oceanography (3) II. McClain (Geology) Lecture—3 hours. Prerequisite: Geology 50 or 116. Introduction to the origin and geologic evolution of ocean basins. Composition and structure of ocean crust; marine sediments; chemical characteristics of deposition of sea-floor spreading theory. (Same course as Geology 150B.)

150C. Biological Oceanography (3) III. The Staff Lecture—3 hours. Prerequisite: Biological Sciences 1A and a course in general ecology, or consent of Instructor. Survey of the ecology of major marine habitats including intertidal, shelf, benthic, deep-sea, and pelagic. Study and interpretation of marine life and the relationships among organisms and their environment. (Same course as Geology 150C.)

151. Limnology (4) I. C. Goldman Lecture—3 hours; discussion—1 hour; special project. Prerequisite: Biological Sciences 1A and Junior standing. The biology and productivity of inland waters with emphasis on the physical and chemical environments and their influence on aquatic life. (Same course as Geology 151.)

151L. Limnology Laboratory (3) III. C. Goldman Laboratory—6 hours; two weekend field trips. Prerequisite: course 151 (may be taken concurrently); junior, senior, or graduate standing. Limnological studies of lakes, streams, and reservoirs with interpretation of aquatic ecology.

(e) Environmental Policy Analysis

160. Environmental Decision Making 150A. I. Sabatier Lecture—3 hours; discussion—1 hour. Prerequisite: Political Science 1; Economics 1A; introductory statistics, one course in environmental science. Alternative models of environmental policy-making, and application to case studies of decision-making in the U.S. and California.

161. Environmental Law (4) I. Wandesforde-Smith Lecture—4 hours. Prerequisite: upper division standing and one course in environmental science (course 1, 10, 110, Biological Sciences 1A, Environmental Toxicology 10, or Resource Science and Policy 100). Environmental policy 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/Non-Introductory. Recommended GE preparation: Political Science 1.

162. Recreation Policy Analysis (4) III. Loomis Lecture—4 hours; discussion—1 hour. Prerequisite: course 1; Agriculture 147 or 176; Environmental Biology and Management 127. Introduction to major issues and evaluative techniques in the analysis of outdoor recreation policy. Principles of political science and economics are applied to the analysis of recreation demand and provision, and the resolution of conflicts between recreation and other uses.

163. Energy and Environmental Aspects of Transportation (3) III. Spelling Lecture—3 hours. Prerequisite: Civil Engineering 160 recommended. Application of engineering, economics, and system planning concepts. Analysis of energy, air quality, and other 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 (3) III. Sabatier Lecture—2 hours; discussion—1 hour. Prerequisite: courses 160, 168A recommended. 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) I. Craig Lecture—4 hours. Prerequisite: upper division standing in the social or biological sciences; course 160 or Political Science 128 recommended. Analysis of factors affecting the influence of scientists, experts, and other experts in policy-making. Several cases and controversies will be examined. General Education credit: Contemporary Societies/Non-Introductory. Recommended GE preparation: Political Science 128.

166. Policy-Making in Natural Resource Agencies (4) II. Sabatier Lecture—3 hours; discussion—1 hour. Prerequisite: Political Science 1 or course 160. Analysis of factors affecting decision-making within administrative agencies responsible for managing natural resources, such as the Forest Service and EPA. Emphasis on decision-making processes of federal agencies, conflicts of interest, and policy issues. (Same course as Geology 166.)

167. Energy Policy (4) III. Johnson Lecture—4 hours. Prerequisite: Resource Sciences 3 or Engineering 160; course 120 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. non-renewable; and implications of potential, utilization, and state policy options. Offered in alternate years.

168A. Methods of Environmental Policy Evaluation (4) I. Schwartz Lecture—4 hours; discussion—1 hour. Prerequisite: Statistics 13; Economics 100 (may be taken concurrently) or Mathematics 16B or 21B and course 1 recommended. Evaluation of alternatives for solving complex environmental problems; impact analysis, benefit-cost analysis, distributional analysis, decision-making under uncertainty, and multicriteria evaluation.

168B. Methods of Environmental Policy Analysis (4) III. Schwartz Lecture—4 hours; discussion—1 hour. Prerequisite: course 168A. Continuation of course 168A, with emphasis on examination of the literature for applications of research and evaluation techniques to problems of conservation of land and water, and energy policy. Students will apply the methods and concepts by means of a major project.

169. The Economics of Energy (4) I. Wilen Lecture—4 hours; discussion—1 hour. Prerequisite: Agricultural Economics 106 or the equivalent. Introduction to course in calculus recommended. Economic concepts necessary to study energy issues. Topics covered include: petroleum economics, cartels, behavior, exploration and development, economics of alternative energy sources, risk and uncertainty, transition to alternative sources, substitutability. Offered in alternate years. (Same course as Agricultural Economics 169.)

(f) Environmental Planning

174. Environmental Planning (4) I. Johnson Lecture—4 hours; discussion—1 hour. Prerequisite: course 1; a course in social science and a course in environmental science. Laws, institutions, design and analysis methods, and implementation of policies for land use, air and water quality, transportation, and energy are examined. Theoretical and practical readings are used. Political and technical problems common to all planning processes emphasized.

175. Public Lands Management (4) I. Loomis Lecture—4 hours; discussion—1 hour. Prerequisite: Economics 1A. Investigation of alternative approaches to public lands management by Federal and state agencies. The role each agency's legislative plays in determining the range of resource allocations.

176. Public Mechanisms for Controlling Land Use (4) I. Johnson Lecture—4 hours. Prerequisite: course 1, English 1, Political Science 1, and Economics 1A. Politics and administration of zoning, subdivision and building regulation and open space preservation, constitutional and legal issues for community and political factors influencing legislation and administration of controls; and the relative effectiveness of specific controls in channeling urban growth. Offered in alternate years.

177. Applied Research Methods (4) I. Loomis Lecture—4 hours. Prerequisite: Statistics 103 or Sociology 106. Research methods for analysis of urban and regional land use, transportation, and environmental problems. Survey research and other data collection techniques; descriptive analysis; basic forecasting, air quality, and transportation models. Collection, interpretation, and critical evaluation of data.
Environmental Toxicology

Environmental Toxicology
(College of Agricultural and Environmental Sciences)
Takayuki Shibamoto, Ph.D., Chairperson of the Department
Department Office, 4138 Meyer Hall (916-752-1142)
Faculty
Richard G. Bursa, Ph.D., Professor (Environmental Toxicology, Soil Science)
Arthur L. Craighill, Ph.D., Lecturer
Donald G. Crosby, Ph.D., Professor Emeritus
Bruce D. Hambrock, Ph.D., Professor
(Water Environmental Toxicology, Entomology)
Dennis P. H. Hisle, Sc.D., Professor
Theodore L. Muller, Ph.D., Professor
Wendall W. Kilgore, Ph.D., Professor Emeritus
Fumio Matsunaga, Ph.D., Professor
Marion G. Miller, Ph.D., Assistant Professor
Clayton A. Rees, M.S., Lecturer
Robert H. Riddle, Ph.D., Professor
James N. Selber, Ph.D., Professor
Takayuki Shibamoto, Ph.D., Professor
Michael W. Stimm, Ph.D., Lecturer
Beryl W. Wilson, Ph.D., Professor (Environmental Toxicology, Avian Sciences)
Way W. Wintern, M.S., Lecturer
Dorothy E. Woolley, Ph.D., Professor (Environmental Toxicology, Animal Physiology)

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 locating and analyzing these substances are the central focus of study. The Program. The study of environmental toxicology draws heavily from preparatory courses in biology, chemistry, mathematics, and physics. The major course offerings include 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 can specialize in any of several areas of environmental toxicology—example 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 nearby Sacramento, are examples of current internship openings for environmental toxicology majors. Approximately 50% of the undergraduate graduating class is completing the environmental toxicology program elect to go on to graduate degrees in toxicology, pharmacology, public health, or the medical sciences. Others with the S. S. degree often find good jobs with government agencies, universities, in industry, research and consulting firms, and with laboratories. Those students who emphasize the biological sciences in their study of toxicology are qualified 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 where possible; equivalent or more comprehensive courses may be substituted with advisor's approval. Courses shown without parentheses are required.)

UNITS

English Composition Requirement: 0-8
See College Requirement
Preparatory Subject Matter: 61-70
Biology sciences (Biology Sciences 1A, 1B, 1C): 15
Chemistry (Chemistry 1A-1B, 5, or Chemistry 4A-4B-4C and 128A-128B-128C): 24-28
Computer science (Agricultural Science and Management 43 Environmental sciences (Environmental Toxicology 10 or Environmental Studies 10): 3-4
Mathematics (Mathematics 16A-16B or 21A-21B): 6-8
Physics (Physics 1A-1B or 5A-B): 6-8
Statistics (Statistics 13): 4
Breadth/General Education: 36
Satisfaction of the General Education requirement to include courses selected with advisor's approval to complement the major (courses in agricultural economics, environmental studies, political science, psychology, and sociological studies are particularly recommended).
24
Additional breadth in humanities and social sciences: 12
Depth Subject Matter: 20
Biochemistry (Biochemistry 101A-101B): 7
Restricted/Other Electives: 24
Electives selected for area of specialization with advisor's approval
Unrestricted Electives: 12-29
Total Units for the Degree: 180
Major Advisor, R. H. Rice
Advising Center for the major, is in 4111 Meyer Hall (916-752-1042)

Minor Program Requirements:

UNITS

Environmental Toxicology: 16
Environmental Toxicology 101, 112A, 114A, 138: 12
Elective courses 6 units minimum, selected from Environmental Toxicology 128, 198 and 138 (4 units combined maximum), 10, 130A-E, 131, 132, 190: 6
Minor Advisor, M. G. Miller.
Graduate Study. Programs of study leading to M.S. and Ph.D. degrees are available in the areas of Pharmacology and Toxicology, Ecology, and Agricultural and Environmental Chemistry. For information on graduate study, contact the Advising Office or the appropriate graduate advisor. Refer also to the Graduate Division section in this catalog.
Graduate Advisers. B. W. Wilson (Pharmacology and Toxicology), T. Shibamoto and W. W. Winterlin (Agricultural and Environmental Chemistry).

Courses in Environmental Toxicology

Lower Division Courses
10. Introduction to Toxicology (3) III. The Staff
Lecture—3 hours. Prerequisite: open to science and non-science majors. Study of some natural and mammalian toxic substances in personal, occupational,
community, and global environments. Emphasis placed upon occurrence, properties, and effects of toxic substances. Biological and physical factors which alter fate of substances are described.

93. Internship (1-12) I, II, III. The Staff (Chairperson in charge) Interships—36 hours. Prerequisite: 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) Consent of instructor. (P/NP grading only)

Upper Division Courses

101. Principles of Environmental Toxicology (3) I. Matsunawa Lecture—3 hours. Prerequisite: Chemistry 6B, 126B, or the equivalent; Biochemistry 105A recommended. The fate, consequences, and assessment of toxicants in environmental and biological systems; classes of environmental toxicants discussed include pesticides, air and water pollutants, phytotoxins, mycotoxins, food-borne chemicals, and heavy metals.

112. Toxicants in the Environment (3) II. Crosby, Seiber Lecture—3 hours. Prerequisite: course 101 or consent of instructor. Properties of toxic chemicals which influence their distribution and transformation. Action of environmental forces which affect toxicant breakdown, movement, and accumulation; sources and occurrence of major classes of environmental toxicants.

112D. Toxicants in the Environment (4) III. Burau, Shibamoto Lecture—3 hours; laboratory—3 hours. Prerequisite: Chemistry 5; course 112A; consent of instructor. Continuation of chemical and environmental toxicants and 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 (3) II. Rice Lecture—3 hours. Prerequisite: Biochemistry 105A (may be taken concurrently); course 101 and Physiology 110 recommended. Course designed to illustrate the biological effects of toxic substances in living organisms. Topics to be covered: fate and mechanisms of chemical toxicants, effects on organisms, topics to be covered: fate and mechanisms of chemical toxicants, effects on organisms, and role of biotransformation processes. (P/NP grading only)

114B. Biological Effects of Toxicants: Comparative Aspects (2-4) III. Miller Lecture—1 hour; discussion—2 hours; laboratory—3 hours. Prerequisite: Biochemistry 105A, 101B. Chemistry and biochemistry of toxins occurring in foods, including plants and animals, intentional and unintentional food additives. Assessment and management of toxic hazards. (Same course as Food Science and Technology 128)

30A-E. Selected Topics in Environmental Toxicology (3) I, II. The Staff (Chairperson in charge) Lecture-discussion—3 hours. Prerequisite: consent of instructor. Course 101 recommended. Topics selected to give students an appreciation of the subject matter. Topics vary each time the course is offered, and will emphasize such areas as the microbiology of toxic substances, chemical and ecological toxicology, and the safety and handling of toxic substances.

131. Air Pollutants and Inhalation Toxicology (3) III. Hahn, Last (Internal Medicine) Lecture—3 hours. Prerequisite: Chemistry 8B may be taken concurrently. The effects of air pollutants in the ambient and occupational environments. Environmental factors, biological effects, air-quality criteria, and pulmonary responses to these pollutants. Offered in even numbered years.

132. Chromatographic and Spectral Toxicology (4) II. The Staff (Chairperson in charge) Discussion—1 hour; laboratory—8 hours; slide demonstrations and extensive library assignments. Prerequisite: Chemistry 8B or the equivalent may be taken concurrently; consent of instructor. Application and theory of basic chromatographic techniques such as thin-layer, gel-liquid, high-pressure liquid and column chromography useful for analytical toxicology; residue analysis comprises one-third of course.

136. Legal Aspects of Environmental Toxicology (3) II. The Staff Lecture—3 hours. Prerequisite: consent of instructor; courses 10 and 101 recommended. Federal and California legislation concerning air and water pollution, pesticide use, food and feed additives, consumer product protection, and exposure to toxic substances; roles of Federal regulatory agencies; alternatives to governmental control.

190. Seminar (1-3) I, II, III. The Staff (Chairperson in charge) Seminar—1 hour. Prerequisite: consent of instructor. Special topics of current interest to students, selected by department. Limited enrollment. Emphasis on discussion and presentations by outside speakers covering current research and instructional activities within environmental toxicology. Reports and discussion concerning oral and written presentations, literature sources, and career opportunities. (P/NP grading only)

190C. Research Group Conference (1-2) I, II, III. The Staff (Chairperson in charge) Discussion—1 hour. Prerequisite: consent of instructor. Weekly conference of advanced research methods and the interpretation of research results. (P/NP grading only)

192. Internship (1-12) I, II, III. The Staff (Chairperson in charge) Internship—36 hours. Prerequisite: completion of 84 units and consent of instructor. Work experience off and on campus in subject areas offered in the College of Agricultural and Environmental Sciences. Internships supervised by a member of the faculty. (P/NP grading only)

197T. Tutoring In Environmental Toxicology (1-5) I, II, III. The Staff (Chairperson in charge) Hours and duties will vary depending upon course being tutored. Professional standing in Environmental Toxicology, a related major, or the equivalent experience and consent of instructor. Teaching toxicology including conducting discussion groups for regular departmental courses under direct guidance of staff. May be repeated for credit up to a total of 5 units. (P/NP grading only)

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

199. Special Study for Advanced Undergraduates (1-5) I, II, III. The Staff (Chairperson in charge) (P/NP grading only)

Graduate Courses

203. Environmental Toxicology (4) II. Crosby Lecture—2 hours; discussion—1 hour. Prerequisite: Chemistry 120C or the equivalent; Chemistry 8B and consent of instructor. Toxicological subjects: selected topics illustrating their occurrence, structure, and the reactions underlying detection, toxicity, fate, and ecological impact of toxicants in alternate ecosystems. (P/NP grading only)


220. Analysis of Toxicants (3) I. Seiber Lecture—3 hours. Prerequisite: course 101 and consent of instructor; course 203 recommended. Principles of the microanalysis of toxicants. Theoretical considerations regarding separation, detection, and quantitative determination of toxicants using chemical and instrumental techniques.

220L. Laboratory Analysis of Toxicants (2) I. Seiber Lecture—4 hours. Prerequisite: course 220 (may be taken concurrently) and consent of instructor. Laboratory techniques for microanalysis of toxicants. Separation, detection, and quantitative determination of toxicants using chemical and instrumental methods.

226. Gas Chromatography/Mass Spectrometry of Toxic Chemicals (3) I. Reeco, Shibamoto Lecture—1 hour; discussion—1 hour; laboratory—3 hours. Prerequisite: course 220 and Chemistry 120C; consent of instructor. Application of GCMS techniques to investigate toxic chemicals. Mass spectral fragmentation and their application to the structural elucidation. Practical application of GCMS in current research. Preference given to students majoring in Environmental Toxicology.

234. Neuropharmacological Basis of Neurotoxicology (3) I. Woolley Lecture—3 hours. Prerequisite: Physiology 110 or the equivalent; basic understanding of neuropharmacology. Mechanisms of action at the cellular and systemic level of a number of different neurotoxins and toxicants. Examples of ways toxins may act on the nervous system and techniques for study of neurotoxicity. (Same course as Physiology 234)

240. Ecotoxicology (3) III. Crosby Lecture—3 hours. Prerequisite: elementary course in toxicology and ecology or the equivalent, consent of instructor. Principles of toxicology as applied to chemical action on natural populations, communities, and ecosystems. Physical, chemical, and biological characteristics which influence ecotoxic effects, modelling, and field research. Selected case histories are analyzed and presented in class.

290. Seminar (1-3) I, II, III. The Staff (Chairperson in charge) Seminar—1 hour. Current topics in environmental toxicology, (SU grading only).

290C. Advanced Research Conference (1-3) I, II, III. The Staff (Chairperson in charge) Lecture-discussion—1 hour. Prerequisite: consent of instructor. Presentation and critical discussion of advanced research methods and interpretation of research results. Designed primarily for graduate students. (SU grading only)

297T. Tutoring In Environmental Toxicology (1-5) I, II, III. The Staff (Chairperson in charge) Hours and duties will vary depending upon course being tutored. Professional standing in Environmental Toxicology, a related major, or the equivalent experience and consent of instructor. Teaching toxicology including conducting discussion groups for regular departmental courses under direct guidance of staff. May be repeated for credit up to a total of 5 units. (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)

Epidemiology and Preventive Medicine

(School of Veterinary Medicine)

Richard H. McCapes, D.V.M., Chairperson of the Department

Department Office, 112 Surge IV (916-752-1376/1377)
Faculty

Raymond A. Bankowski, D.V.M., Ph.D., Professor
Emeritus

Joana C. Boxman, M.S.L.S., Lecturer

Tim E. Carpenter, Ph.D., Associate Professor

James T. Case, D.V.M., Ph.D., Assistant Professor of

Clinical Diagnostic Medicine

Bruce C. Cheung, D.V.M., Ph.D., Assistant Professor

Thomas B. Ferwer, Ph.D., Professor

Charles E. Frant, Ph.D., Professor

Ira A. Gardner, B.V.Sc., Ph.D., Associate Professor

Constance H. Glenn, D.V.M., Ph.D., Professor

John S. Glenn, D.V.M., Ph.D., Lecturer

Lynette A. Hart, M.A., Ph.D., Assistant Adjunct

Professor

David W. Hird, D.V.M., Ph.D., Associate Professor

Jack A. Howarth, D.V.M., Ph.D., Professor Emeritus

David A. Jessup, D.V.M., M.P.V.M., Lecturer

Philip H. Kase, D.V.M., Ph.D., Assistant Professor

Carolyn S. Kopper, M.L.S., Lecturer

Kenneth M. Lam, Ph.D., Associate Professor

Richard H. McCapes, D.V.M., Ph.D., Lecturer

Duncan McMartin, D.V.M., Ph.D., Lecturer

Margaret E. Meyer, Ph.D., Professor Emeritus

Ben B. Norman, D.V.M., Ph.D., Lecturer

Hans P. Riemann, D.V.M., Ph.D., Professor Emeritus

Walter W. Sadler, D.V.M., M.P.H., Professor Emeritus

Galyn J. Schlabach, D.V.M., M.P.H., S.C.D., Professor

Emretun

Patterson Smith, D.V.M., M.P.V.M., Lecturer

Friedrich Steiner, D.V.M., M.S., Lecturer

Mark C. Thier, Ph.D., Professor

Patricia S. Wakenell, D.V.M., Ph.D., Assistant

Professor

George B. W. West, D.V.M., M.P.V.M., Lecturer

Richard Yanchuk, Ph.D., Professor

George K. York, Ph.D., Lecturer

Part-Time Clinical Faculty

Galestan Ghazizadeh, D.V.M., Ph.D., Associate

Clinical Professor

Courses in Epidemiology and Preventive Medicine

Upper Division Courses

104. History of Veterinary Medicine (3) Ill.

Lecture—2 hours; discussion—1 hour. Veterinary medicine’s role (since man’s domestication of animals to the decline of Rome) in building a foundation for rational healing; and its contributions during the eighteenth and nineteenth centuries to the creation of modern medicine.

106. Human-Animal Interactions: Benefits and Issues (2) Ill.

Lecture—2 hours. Prerequisite: upper-division standing of consent of instructor. The contributions of animals to human society, including historic, anthropologic, developmental, human health, and therapeutic perspectives, as well as effects of humans on animals.

111. Animal Hygiene (3) Ill. McCapes

Lecture—3 hours. Prerequisite: Biological Sciences 1A or consent of Instructor. Causes, prevention, and control of animal diseases important in economic agriculture and in public health, with emphasis upon animal management factors in disease.

150. Food-borne Infections and Intoxications (4) Ill.

Gangetic, York

Lecture—4 hours. Prerequisite: Microbiology 2. Prevalence and characteristics of those diseases of man which are derived from food or food sources; access of disease agents to and distribution in food and food sources; exposure of man to these agents; prevention of food-borne diseases.

159. Special Study for Advanced Undergraduates (1-5) Ill.

The Staff (Chairperson in charge) (PNP grading only)

Graduate Courses

202. Sampling in Health-Related Research (3) I.

Farver

Lecture—3 hours. Prerequisite: course 403 or the equivalent: consent of instructor. A thorough coverage of simple random sampling, stratified sampling,
Fermentation Science
(College of Agricultural and Environmental Sciences)

The Major Program
The Fermentation Science major is a program of study in 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 specialties 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, biochemistry, microbiology, genetics, and computer science. Electives often include advanced courses in sensory science, management and viticulture.

Career Alternatives. Graduates qualify for supervisory, technical, production, product development, quality control, research, sales, or executive positions in the food, beverage, and allied industries. Should the fermentation industries and also 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.

Fiber and Polymer Science
(College of Agricultural and Environmental Sciences)

Faculty
See Textiles and Clothing
### The Major Program
The fiber and polymer science major is concerned with the physical, chemical, and structural properties of fibers and polymers and how these relate to fiber and polymer performance and end-use. The Program. All students in this major are required to take a common core of course work in chemistry, physics, and mathematics, and at least 15 hours in polymer science and chemistry. The major is designed to allow students to select from a wide range of courses in areas such as polymer science, chemistry, and physics. The program is flexible and allows students to tailor their studies to their interests.

### Career Alternatives
The major prepares the student for a career in a range of industries in the areas of research and development, technical marketing and management, production, quality control, and science teaching. The degree can also be completed as an additional year in the teaching credential program. The companies employing Fiber and Polymer Science graduates are involved in the design and manufacture of fiber, materials, and products, leading to careers in industries such as automotive, aerospace, and consumer goods.

### 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 will be accepted.)

<table>
<thead>
<tr>
<th>Requirement</th>
<th>Units (Required)</th>
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<tr>
<td>English Composition Requirement</td>
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<td>Rhetoric</td>
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<td>Additional English (English 104)</td>
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<td>Preparatory Subject Matter</td>
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<tr>
<td>Chemistry (Chemistry 1A, 1B, 1C, 5)</td>
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<td>Mathematics (Mathematics 18A, 18B, 16C or 21A, 21B, 21C)</td>
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<td>Physics (Physics 5A, 5B, 5C or 9A, 9B, 9C)</td>
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<td>Statistics (Statistics 4C, 4S)</td>
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<td>Textiles (Textiles and Clothing 53 and 54)</td>
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<td>Chemistry (Chemistry 128A, 128B, 128C, 129A, 129B, 110A and 110C or 107A and 107B)</td>
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<td>Restricted Electives</td>
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</tbody>
</table>

### Courses in Fiber and Polymer Science

#### 100. Principles of Polymer Materials Science II
Lecture—3 hours. Prerequisite: Chemistry 1A-1B or 4A-4B. Chemistry of polymers; introduction to polymer science. 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; and polymer processing. (Same course as Engineering: Materials Science 147.)

#### 110. Synthetic Fibers and Plastics in Society I
Lecture—3 hours. Prerequisite: Chemistry 10 or a course in the physical sciences. Basic concepts and methodologies in the study of synthetic fibers and plastics. Fibers and plastic formation, structure, properties, processing, and applications. Impacts of fibers and plastics on society and the environment. General Education: Credit: Nature and Environment (Natural and Environmental Science). Recommended: GE preparation: Chemistry 10 or introductory course in physical sciences.

#### 150. Polymer Syntheses and Reactions II
Lecture—3 hours. Prerequisite: Chemistry 128B or 8B, and Chemistry 107A. Organic and physical chemistry aspects of polymer synthesis and reactions including polymerization mechanisms, kinetics, and thermodynamics for major types of organic high polymers.

#### 161. Structure and Properties of Fibers I
Lecture—3 hours. Prerequisite: Textiles 6 and Chemistry 6. The structure, properties, and reactions of natural- and man-made fibers; the relations between molecular structure and fibers and their physical properties; interactions of fibers and detergents.

#### 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.

### Fisheries
See Animal Science and Wildlife and Fisheries Biology.

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*Course not offered this academic year.*

### 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 food during processing and storage. Particular emphasis is placed on the role of enzymes in the breakdown of carbohydrates, lipids, proteins, and nucleic acids and their effect on the quality attributes of foods. A student who graduates with a major in food biochemistry will be well versed in the role of enzymes in the breakdown of carbohydrates, lipids, proteins, and nucleic acids and their effect on the quality attributes of foods.

#### Career Alternatives
The major employment options for a food biochemistry graduate are in research and development, food manufacturing, and food processing. Students may also pursue careers in the food industry, food technology, or food safety.

#### 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>Requirement</th>
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<td>Chemistry (Chemistry 1A, 1B, 1C, 5)</td>
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*Course not offered this academic year.*
Major Adviser: G.M. Smith (Food Science and Technology).
Graduate Study. Refer to the Graduate Division section in this catalog.

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Food Science
(College of Agricultural and Environmental Sciences)

The Major Program

Food science applies physical, biological, engineering, and social sciences to processing, preservation, packaging, storage, evaluation, and utilization of foods.

The Program. Students studying for the Bachelor of Science degree in food science must complete courses in biology and microbiology, general chemistry, organic chemistry, quantitative analysis, and biochemistry. Calculus, statistics, and physics are also required. These subjects help students understand courses in food science such as food composition and properties, food processing and engineering, food microbiology, food chemistry, and nutrition. Students may also choose courses in English and/or rhetoric (emphasizing writing and communication skills), and broaden their general education by taking courses in social sciences and humanities. The requirements are flexible so students can elect several courses in a related area of their interest.

Career Alternatives. Opportunities for employment include positions in the food and allied industries where graduates can engage in processing, sensory evaluation, quality assurance, product development, research, and management, and in education as teachers; and in research, extension, and administration. Local, state, and federal governments offer opportunities for employment as research supervisors, in regulatory agencies, in policy and management positions. Graduate study for the food science student may lead to the M.S. or Ph.D. degree in food science, or in related fields such as agricultural chemistry, biochemistry, microbiology, and nutrition.

B.S. Major Requirements:

(For convenience in program planning the usual courses taken to satisfy the requirements are shown in parentheses where possible. Equivalent or more comprehensive courses are acceptable. Courses shown without parentheses are required.)

<table>
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</table>

*Course not offered this academic year.*

Kathryn L. McCarthy, Ph.D., Assistant Professor (Food Science and Technology, Agricultural Engineering)
Michael J. McDermott, Ph.D., Assistant Professor (Food Science and Technology, Agricultural Engineering)
R. Larry Larson, Ph.D., Professor (Food Science and Technology, Agricultural Engineering)
Martin W. Miller, Ph.D., Professor Emeritus
David M. Ogrydziak, Ph.D., Professor
Michael A. O'Mahony, Ph.D., Professor
Herma J. Pfaff, Ph.D., Professor Emeritus
Chester W. Price, Ph.D., Associate Professor
Robert J. Price, Ph.D., Lecturer
David S. Reid, Ph.D., Professor
Thomas Richardson, Ph.D., Professor Emeritus
Gerald F. Russell, Ph.D., Professor
Barbara F. Schmeier, Ph.D., Professor (Food Science and Technology, Internal Medicine, Nutrition)
C.F. Shoenemaker, Ph.D., Associate Professor
Elizabeth O. Shuster, Ph.D., Assistant Professor
R. Paul Singh, Ph.D., Professor (Food Science and Technology, Agricultural Engineering)
Gary M. Smith, Ph.D., Associate Professor
Lloyd M. Smith, Ph.D., Professor Emeritus
Clarence Sterling, Ph.D., Professor Emeritus
Aloysius Tippett, Ph.D., Professor
John F. Witzke, Ph.D., Professor
Gideon Zolder, D.Sc., Lecturer

Major Program and Graduate Study. See the major in Food Science for graduate study, refer to the Graduate Division section in this catalog.

Relate Courses. See courses in Biochemistry and Biophysics, Consumer Science, Engineering, Nutrition, and Viticulture and Enology; Environmental Toxicology 101, Epidemiology and Preventive Medicine 130, Plant Science 112 and 112L.

**Courses in Food Science and Technology**

Lower Division Courses

1. Food Science and Society (3) L Bernhard
Lecture—2 hours; discussion—1 hour. Nature and scope of world food problem; food composition; scientific and technological aspects of converting animal and plant products into a variety of prepared foods; improvement and evaluation of acceptability and nutritional value of foods. Not open for credit to students who have received credit for course 100A, 100B, or 111.

2. Introductory Food Science (3) L Lewis
Lecture—3 hours; one industrial visit to a food factory (optional). Processes by which raw agricultural commodities are preserved and converted into edible foods; regulation of food manufacture and the chemistry and microbiology of food that control its quality and safety. Not open for credit to students who have received credit for any other Food Science and Technology course. General Education credit: Nature and Environment/Introductory.

49. Processing Plant Studies (1) III.
Discussion—1 hour, field trips—3 hours. Field trips to observe processing, distribution, quality control and regulatory control of foods and related materials.

93. Public Issues in Nutrition and Food Science (1) L 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 83.)

99. Special Study for Undergraduates (1-5) I, II, III.
The Staff (Merson in charge)
(P/NP grading only)

Upper Division Courses

100A. Principles of Food Composition and Properties (3) L Shoenemaker
Lecture—3 hours. Prerequisite: Chemistry 8A-8B. Fundamental chemical, physical, and sensory
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, statistical laboratories, or other 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

Questions pertaining to the following courses should be directed to the instructor or to the Nutrition Department Advising Office, 1151 keyer Hall (916-572-2512).

Upper Division Courses

120. Principles of Quantity Food Production (3). I. Prophet
Laboratory—3 hours. Prerequisite: Food Science and Technology 100B and 101BL. Fundamental principles of food service management including quantity food production, institutional equipment, receiving and storage, service, menu planning, merchandising, and safety.

120L. Theory of Quantity Food Production Laboratory (2). I, II. Prophet
Laboratory—6 hours. Prerequisite: course 120. Laboratory experience in quantity food production and service.

121. Institutional Food Purchasing and Sanitation (3). I. Schreman
Lecture—1 hour; discussion—2 hours. Prerequisite: Microbiology 2; course 120. Principles of quantity food purchasing and sanitation.

122. Food Service Systems Management (3). I. Prophet
Lecture—3 hours. Prerequisite: Agricultural Economics 112, courses 120, 120L, 121. Principles of quantity food production management: production schedules, portion control, financial management, layout and equipment planning, evaluation of alternative systems, and computer applications.

Personnel Management (3). I. Th. Staff
Laboratory—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.

Internship (1-12). I, II, III. Th. Staff
Internship—9-36 hours. Prerequisite: one upper division course in Food Service Management and consent of instructor. Work experience on or off campus in practical aspects of food service management, supervised by a faculty member. (P/NP grading only).

197T. Tutoring in Food Service Management (1-2)
I, II, III. Th. Staff (Prophet in charge)
Discussion-laboratory—3 or 6 hours. Prerequisite: Dietetics or related major; completion of the Food Service Management course in which tutoring is done. Tutoring of students in food service management, assistance with discussion groups or laboratory sections; weekly conference with instructor in charge of course; written evaluations. May be repeated if tutoring a different course. (P/NP grading only).

198. Directed Group Study (1-5) I, II, III. Th. Staff (Prophet in charge)
(P/NP grading only).

199. Special Study for Advanced Undergraduates (1-5) I, II, III. Th. Staff (Prophet in charge)

French

( College of Letters and Science)

Manfred Kuske, Ph.D., Chairperson of the Department
Department Office (French and Italian), 316 Sprout Hall (916-572-0680)

Faculty
Claude Abraham, Ph.D., Professor
Emily Aster, Ph.D., Associate Professor
Max Bacht, Ph.D., Professor Emeritus
French 101, 102, 103

Two elective courses in French language, literature, or civilization to be chosen in consultation with undergraduate advisor... 8

Prerequisite: Credit in French 101 or permission of the instructor.

2. Elementary French (5) I, II, III. The Staff Discussion—5 hours; laboratory—1 hour. Prerequisite: course 1. Continuation of course 1.

3. Elementary French (5) I, II, III. The Staff Discussion—5 hours; laboratory—1 hour. Prerequisite: course 2. Continuation of course 2.

5. Introduction to French Phonetics (2) I, II. The Staff Lecture—laboratory—3 hours. Prerequisite: course 3; otherwise credit normally is not given for the course if it is the prerequisite of a course already successfully completed. Exceptions can be made by the Department Chairperson only.

6. French Conversation (2) I, II. The Staff Discussion—2 hours; laboratory—1 hour. Prerequisite: course 3. Practice in speaking French; weekly quizzes and an oral and written final examination (oral only). The honors program project will be included.


10. Introduction to French Literature in Translation (3) I, II. The Staff Discussion—3 hours. Introductory study of outstanding works of French drama and prose. Topics include major authors, genres, literary periods, and movements. Study of literary techniques, structure, and meaning to foster better understanding of creative process in French cultural context. Initiation for the honors. General Education credit: Civilization and Culture/Introductory.

11. Exposition and Dissertation (2) I, II. The Staff Lecture-discussion—2 hours. Prerequisite: course 3. Practice in speaking French; weekly quizzes and an oral and written final examination. Not open to native speakers or to upper division students.

12. Introduction to French Literature (4) I, II, III. The Staff Lecture—3 hours; term paper. Prerequisite: course 22. Selected themes in French literature.

13. Directed Group Study (1-5) I, II, III. The Staff Prerequisite: consent of instructor. (P/NP grading only)

14. Special Study for Undergraduates (1-5) I, II, III. The Staff (Chairperson in charge) (P/NP grading only)

Upper Division Courses

100. Composition in French (4) I, II, III. The Staff Lecture—3 hours; term paper. Prerequisite: course 23. Instruction and practice in expository writing in French, with emphasis on organization, correct syntax, and vocabulary building.

101. Introduction to French Poetry (4) I, II, III. The Staff Lecture—3 hours; short papers. Prerequisite: course 100 or consent of instructor. Analysis and evaluation of works representing the main types of French poetry. Study of French poetic conventions and traditions.

102. Introduction to French Drama (4) I, II, III. Abraham
103. Introduction to French Prose (4) II, III. The Staff Lecture—3 hours; short paper. 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.

104. Translation (4) II. The Staff Lecture—3 hours; short translations. Prerequisite: course 100 or consent of instructor. Practice in translation into English of a variety of styles. Examination of differences in translation techniques and styles.

105. French in 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 government and world business.

107. Contemporary France (4) III, Prager Lecture—3 hours; term paper. Prerequisite: course 100 or consent of instructor. Introduction to aspects of French culture as derived from the contemporary period such as, architecture, music, literature. Provides a background in French contemporary history, sociology, and institutions.

108. Advanced French Conversation (2) II, III. The Staff Discussion—3 hours. Prerequisite: course 23 or consent of instructor. Advanced conversational practice stressing accurate pronunciation and spoken language fluency. Not open to native speakers. May not be counted toward French major. May be repeated once for credit.

110. Stylistics and Creative Composition (4) III. 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 Queneau’s *Dévolues de style*. Practice in such stylistic modifications as inversion, affirmation, changes in tense, mood, tone, etc. The writing of poetry.

112. Masterpieces of French Drama in Translation (3) II. The Staff Discussion—3 hours. Prerequisite: course 25 or consent of instructor. Plays in translation representing the main types of French drama with emphasis on dramatic techniques and structure. Consideration of the genre in modern French social and cultural context. Intended for the non-major. General Education credit: Civilization and Culture/Non-Introductory. Recommended GE preparation: French 25.


114. French Philosophical Literature in Translation (3) III. Blanchard Discussion—3 hours. Prerequisite: course 25 or consent of instructor. French philosophical literature, with works analyzed within broad philosophical, moral, and historical contexts. Focus on such topics as stoicism, existentialism, inquisition, materialism, and history. Prerequisite: course 100 or consent of instructor.

*140. Study of a Major Writer (4) II. The Staff Lecture—3 hours; term paper. Prerequisite: course 100 and courses 101, 102, or 103 as appropriate to selected topic, or consent of instructor. Concentrated study of works of a single author. May be repeated once for credit as authorization 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 selected topic or consent of instructor. Topics and themes such as satiric and didactic poetry of the Middle Ages, poetry of the troubadours, the history of the eighteenth century, the novel, romantic poetry, etc. May be repeated once for credit in a different subject area.

160. Structure of the French Language (4) II. Mansa-Manolu Lecture—3 hours; short papers. Prerequisite: course 23; Linguistics 1. Analysis of content and functions of the main grammatical categories of French in framework of recent structural approaches.

151. Modern French Syntax (4) III. Mansa-Manolu Lecture—3 hours; short papers. Prerequisite: course 100. Modern periods in development of the French language, from Latin to contemporary popular aspects, with emphasis on relationship between socio-cultural patterns and evolution of the language.

162. History of French Language (4) II. Mansa-Manolu Lecture—3 hours; term paper. Prerequisite: course 151. Major periods in development of the French language, from Latin to contemporary popular aspects, with emphasis on relationship between socio-cultural patterns and evolution of the language.

190. Internship (1-12) I, II, III. The Staff Internship—3-36 hours; term paper. Prerequisite: upper division standing and consent of instructor. Practical application of the French language through work experience in government and/or business, culminating in an analytical term paper on a topic approved by the sponsoring instructor. (PnP grading only.)

194H. Special Study for Honors Students (1-5) I, II, III. The Staff (Chairperson) Independent study—1-5 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. (PnP grading only.)

197T. Tutoring in the Community (2-4) I, II, III. Kaufman 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 including supervision by a departmental faculty member. May be repeated for credit for a total of 6 units. (PnP grading only.)

199. Directed Group Study (1-5) I, II, III. The Staff Prerequisite: consent of instructor. (PnP grading only.)

199. Special Study for Advanced Undergraduates (1-5) I, II, III. The Staff (Chairperson in charge) (PnP grading only.)

Graduate Courses

200. Literary Analysis (2) I. Blanchard Proseminar—1-2 hours; short papers. Prerequisite: graduate standing. Required of all graduate students in French. This proseminar is designed to acquaint students with basic principles of applied literary theory.

201. History of French: Phonology and Morphosyntax (4) III. Mansa-Manolu Lecture—3 hours; short papers. Prerequisite: course 100 or consent of instructor. Morphological, syntactical, and stylistic aspects of the English-French translation.

*Course not offered this academic year.
Seminar—3 hours; term paper. Prerequisite: courses 159, 160, 250A, or consent of Instructor. Presentation of the effects of changes in the phonetic 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 exposed. 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 when different topics are studied.

206C. Seventeenth-Century Literature: Poetry (4) III. Abraham Seminar—3 hours; term paper and/or exposed. Studies of works of one or more poets of the period. May be repeated for credit with consent of instructor.

207A. Eighteenth-Century Literature: Philosophes (4) I. Kuschn Seminar—3 hours; term paper and/or exposed. Not a course in the philosophy of the period, but an examination of the role of philosophy in the design and context of literary works. Study of one or more authors. May be repeated for credit.

207B. Eighteenth-Century Literature: Novel (4) III. The Staff Seminar—3 hours. Rise of the novel. Study of narrative experiments in the context of the philosophical climate and current literary values. Course may treat one or more novelists of the period. May be repeated for credit with consent of instructor when different topics are studied.

208A. Nineteenth-Century Literature: Fiction (4) I. Haninosh Seminar—3 hours. Study of the works of one or several novelists and/or short-story writers of the period. May be repeated for credit with consent of instructor when different topics are studied.

208B. Nineteenth-Century Literature: Poetry (4) III. Blanchard Seminar—3 hours. Study of the works of one or several poets of the period. May be repeated for credit with consent of instructor when different topics are studied.

209A. Twentieth-Century: Prose (4) II. The Staff Seminar—3 hours; term paper and/or exposed. Study of the works of one of several writers of the period.

209B. Twentieth-Century: Theater (4) II. Cohn Seminar—3 hours; term paper and/or exposed. Study of the works of one or several dramatists of the period. May be repeated for credit with consent of instructor.

209C. Twentieth-Century: Poetry (4) III. The Staff Seminar—3 hours; term paper and/or exposed. Study of the works of one or several poets of the period. May be repeated for credit with consent of instructor.

210. Studies in Narrative Fiction (4) I. Praeger Seminar—3 hours. May be repeated for credit with consent of instructor when different topic is studied.

211. Studies in Criticism (4) II. Blanchard Seminar—3 hours. May be repeated for credit with consent of instructor when different topic is studied.

212. Studies in the Theater (4) I. The Staff Seminar—3 hours. May be repeated for credit with consent of instructor when different topic is studied.

213. Studies in Poetry (4) II. The Staff Seminar—3 hours. May be repeated for credit with consent of instructor when different topic is studied.

214. Study of a Literary Movement (4) III. The Staff Seminar—3 hours. May be repeated for credit with consent of instructor when different topic is studied.

238. Advanced Literary Translation (4) III. Bloom berg Seminar—3 hours; significant amounts of translation of texts. Designed to acquaint students with the basic principles and techniques of translation. Translation of texts chosen for their theoretical interest. Open to native French speakers only with consent of instructor.

250A. French Linguistics: Morphemics (4) I. Mane-Baillou Seminar—4 hours. Prerequisite: courses 159, 160, or consent of Instructor. Theoretical approach to French morphology, with emphasis on morphemics, i.e., the semantic analysis of grammatical categories, as well as their paradigmatic and syntactic relations.

250B. French Linguistics: Transformational Syntax (4) I. Mane-Baillou 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, etc.) focusing on the most recent developments in the field (i.e., case frames, generates, semi-structural syntax, trace theory, etc.).

251. Trends in French Contemporary Linguistics (4) I. Mane-Baillou Seminar—3 hours; term paper. Prerequisite: course 250A or 250B or consent of instructor. Issues in contemporary French linguistic thought and their relationship to the development of theoretical linguistics. Topics such as pragmatics, semantics, symbolic logic, speech acts, etc. Intended for students in French linguistics or those interested in applying linguistic models to literature.

261. Current Issues in Modern French Syntax (4) II. Mane-Baillou Seminar—3 hours; term paper. Presentation of contemporary approaches to French syntax. Explanations of various less regular phenomena, with reference to ongoing changes in modern spoken French.

292. Research Methods (3) I. Abraham Seminar—3 hours. Prerequisite: graduate student standing. Required of all graduate students in French. Introduces students to tools of research and to the various critical methods. [SU grading only]

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)

300. Dissertation Research (1-12) I, II, III. The Staff (SU grading only)

Professional Courses

300. Teaching of a Modern Foreign Language (3) III. Kaufman Lecture/discussion—3 hours. Prerequisite: senior or graduate standing; a major or minor in a modern foreign language.

304A. The Teaching of French in College (2) I. Wagnild Lecture/discussion—2 hours. Prerequisite: graduate standing or consent of Instructor. Course designed for graduate teaching assistants with emphasis on problems and procedures encountered by instructors of lower division classes at the university. [SU grading only]

304B. The Teaching of French in College (2) II. Wagnild Lecture/discussion—2 hours. Prerequisite: graduate standing or consent of Instructor. Course designed for graduate teaching assistants with emphasis on problems and procedures encountered by instructors of lower division classes at the university. [SU grading only]

"Course not offered this academic year.

390C. The Teaching of French In College (2) III. Wagnild Lecture/discussion—2 hours. Prerequisite: graduate standing or consent of Instructor. Course designed for graduate teaching assistants with emphasis on problems and procedures encountered by teachers of lower division classes at the university. [SU grading only]

Freshman Seminar Program

Evelyn M. Silvia, Ph.D., Program Director Program Office, 17 Wellman (Teaching Resources Center) (916-752-8050)

Committee in Charge

Stephanie Beardsley, Ph.D. (Residence Life)
Kevin DeBrodie (Student Representative, ASUCD—Academic Affairs)
Louis Grivetti, Ph.D. (Previous FRS Instructor)
Karl Romstad, Ph.D. (College of Engineering)
Daniel Roberson, Ph.D. (Committee on Educational Policy)
Roger Romani, Ph.D. (College of Agricultural and Environmental Sciences)
Carolyn Weil, Ph.D. (College of Letters and Science)
Dennis Holden, Ph.D. (Teaching Resources Center)

Course in Freshman Seminar

(Classes pertaining to the following course should be directed to the Instructor or to the Teaching Resources Center.)

1. Freshman Seminar (2) I, II, III. The Staff Seminar—20 hours total (5 weeks). Prerequisite: open only to students who have completed less than 40 quarter units. Introduction 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

(College of Agricultural and Environmental Sciences)
John A. Kiger, Jr., Ph.D., Chairperson of the Department
Department Office, 357 Briggs Hall (916-752-0200)

Faculty

James B. Boyd, Ph.D., Professor
Kenneth Burtis, Ph.D., Assistant Professor
Gordon J. Edlin, Ph.D., Professor Emeritus
John H. Gillespie, Ph.D., Professor
Leslie D. Gould, Ph.D., Professor
Malvin M. Green, Ph.D., Professor Emeritus
R. Scott Hawley, Ph.D., Professor
John A. Kiger, Jr., Ph.D., Professor
Charles H. Langley, Ph.D., Professor
Timothy Prock, Ph.D., Professor Emeritus (Genetics, Entomology)
Raymond L. Rodriguez, Ph.D., Professor
Che-Kun J. Shen, Ph.D., Professor
Richard Snow, Ph.D., Professor Emeritus
G. Ledyard Stebbins, Ph.D., Professor Emeritus
Michael Turell, Ph.D., Professor

The Major Program

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 in improving domestic plants and animals.
B.S. Major Requirements:

(For convenience in program planning the usual course taken to satisfy the requirements are shown in parentheses where possible. Equivalent or more comprehensive courses are acceptable. Courses shown without parentheses are required.)


Courses in Genetics

Lower Division Courses

Lecture—4 hours; discussion—1 hour. Course intended for liberal arts students. Examines principles and recent developments in genetics and evolution in context of their social implications. General Education credit: Nature and Environment/Introducory.

58. 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. Principles of Genetics (4) I, II, III, Summer. The Staff
Lecture—4 hours. Prerequisite: Biological Sciences 184 or biology 2. Introduction to genetics, emphasizing DNA structure and function, gene regulation including transmission genetics, cytogenetics, and evolutionary genetics.

102. Principles of Genetics Laboratory (2) I, II, III. The Staff
Lecture—1 hour; laboratory—3 hours. Prerequisite: course 100; Microbiology 129L or Microbiology 3. Laboratory work in basic genetics including gene mapping and isolation.

102A. Molecular Genetics (3) I. The Staff
Lecture—3 hours. Prerequisite: course 100; Biochemistry 101B. Prokaryotic molecular genetics including DNA structure and replication, restriction analysis, sequencing, transcription, translation, and gene regulation.

102B. Molecular Genetics (3) III. The Staff
Lecture—3 hours. Prerequisite: course 102A. Continuation of course 102A, emphasizing fundamental discoveries in eukaryotic molecular genetics, transposable elements, and mechanisms of recombination.

102L. Advanced Molecular Genetics Laboratory (4) I, II, III. Bursy
Lecture—1 hour; laboratory—5 hours. Prerequisite: course 100L. Consent of instructor; Microbiology 129L recommended. Molecular analysis of gene structure and function, isolation, manipulation, and characterization of DNA, RNA, and proteins using recombinant DNA technology. Limited enrollment.

103. Organic Evolution (3) III. Gillespie
Lecture—3 hours. Prerequisite: course 100. Evolution in higher organisms including genetic structure in populations, speciation, macroevolution, and history of life.

104. Developmental Genetics (3) II. Kiger
Lecture—3 hours. Prerequisite: course 100; Biochemistry 101A and Zoology 100 recommended.

Current aspects of developmental genetics. Historical background and current genetic approaches to the study of development of higher animals.

105. Population Genetics (4) I. Langley
Lecture—4 hours. Prerequisite: course 100; a course in statistics and Mathematics 10B. Population genetics including the effects of natural selection, migration, mutation and genetic drift.

106. Evolutionary Quantitative Genetics (4) II. Turelli
Lecture—3 hours. Discussion—1 hour. Prerequisite: course 100. Mathematical Statistics 10A and 10B. Experimental and theoretical analysis of polygenic traits. Topics include classical experiments and methods of analysis as well as modern theoretical treatments with emphasis on applications to microevolution and macroevolution. Offered in alternate years.

107. Human Genetics (3) I. Sanders
Lecture—3 hours. Prerequisite: course 100 or the equivalent. Human molecular genetic variation, molecular basis of metabolic disorders, chromosome aberrations and consequences, diseases associated with the immune system, and statistical techniques for assessing genetic and environmental effects.

190C. Introduction to Genetics Research (1) I, II, III, Summer. The Staff (Chairperson in charge)
Discussion—1 hour. Prerequisite: upper division standing in Genetics or related biological sciences; consent of instructor. Discussion and critique of current genetics research by faculty, graduate, and undergraduate students. May be repeated for credit. (P/NP grading only)

197T. Tutoring in Genetics (1) I, II, III. The Staff (Chairperson in charge)
Tutoring—1-5 hours. Prerequisite: upper division standing and consent of instructor. Conducting of discussion groups affiliated with one of the department regular courses. (P/NP grading only)

199. 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. The Staff (Chairperson in charge)
Prerequisite: consent of instructor based on adequate preparation of the student in allied fields. (P/NP grading only)

Graduate Courses

202. Plasmids, Recombinant DNA, and Genetic Engineering (3) II. Irish
Lecture—3 hours. Prerequisite: course 102A or Microbiology 130A-130B, or consent of instructor. Presentation of recent experiments in recombinant DNA technology. Description of biochemical and genetic properties of bacterial plasmids, (SU grading only) offered in alternate years.

203. Advanced Evolution (3) III. Gottleib
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.

205. Theoretical Population Genetics (4) II. Gillespie
Lecture—4 hours. Prerequisite: course 105; Mathematics 22A, and Statistics 130A or 131A, and consent of Instructor; Mathematics 22B recommended. Mathematical theory of population genetics with emphasis on the assumptions of the standard models and the mathematical techniques used to derive conclusions. (SU grading only) offered in alternate years.

209. Molecular Evolution (3) II. Gillespie, Langley
Lecture—3 hours. Prerequisite: Biochemistry 101B; course 103 recommended. Evolution from the molecu-
ular standpoint, including the evolution of genome structure and the organization of single genes and gene clusters, evolution of enzymes and metabolic pathways, genetic clocks, transposons and other movable genetic elements, and molecular polymorphisms. Offered in alternate years. (SU grading only)

290C. Research Conference in Genetics (1) I, II, III. The Staff (Chairperson in charge)

Discussion—1 hour. Prerequisite: graduate standing in Genetics; consent of Instructor. Presentations and critical discussions of current research in genetics. Intended primarily for graduate students. 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
(SU grading only)

Professional Course

300. Methods in Teaching Genetics (1) I, II, III. The Staff (Chairperson in charge)

Lecture-discussion—1 hour. Prerequisite: graduate standing in Genetics and consent of instructor. Experience in methods and problems of teaching genetics, including analysis of teaching materials and other teaching techniques, preparing for and conducting lectures and learning sections, preparing examinations. May be repeated for credit. (SU grading only)

Genetics
(A Graduate Group)

Richard W. Michelmore, Ph.D., Acting Chair of the Group

Group Office, 1202B Meyer Hall (916-752-9091)

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 subdivided into three affinity groups: molecular, animal, and plant. Each of these affinity groups provides broad training in genetics, combined with an emphasis specific to its area. Both model genetic organisms and models of population genetics are studied using molecular and classical approaches. For detailed information regarding the program address the chairperson of the group.

Graduate Advisers. Consult Genetics Graduate Group Office.

Courses in Genetics

Graduate Courses

220. Advanced Genetics Laboratory (5) I, II, III

The Staff

Laboratory—15 hours. Prerequisites: Genetics 100 or the equivalent; enrollment in Genetics Graduate Group. Student is assigned to genetics research laboratory. Individual research problems with emphasis on methodological/procedural experience and experimental design. May be repeated twice for credit, in different laboratories. (SU grading only)

221. Transmission Genetics (3) I, Spring

Lecture—3 hours. Prerequisite: Genetics 100. Introductory statistics, and calculus. Study of segregation, linkage, and mapping and the modification of Mendel's original genetic model.

222. Cytogenetics (3) II, Dvorak, Murray

Lecture—3 hours. Prerequisite: course 221. Study of cytogenetics including meiosis, recombination, chromosome mutation, haploid, anaeploidy, trisomics, monosomics, autopolyploids, and interspecific manipulation.

223. Molecular Genetics (3) III, Burris, Williamson

Lecture—3 hours. Prerequisite: course 221 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.

224. Quantitative and Population Genetics (3) I, Touchberry

Lecture—3 hours. Prerequisite: course 221 or consent of Instructor. The basic concepts of quantitative and population genetics. Including gene and genotype frequencies, multiple factor hypothesis, phenotypic and genotypic values, heritability, selection, genetic variation and evolution in populations, and experimental methodologies.

225. Seminar in History of Genetics (2) III. Griesmer, Philosophy

Seminar—2 hours. Prerequisite: Genetics 100. The development of modern genetic theories beginning with Mendel.

226. Seminar in Molecular Genetics (1-3) I. The Staff

Seminar—1 hour. Prerequisite: consent of Instructor. Topics of current interest related to the structure, modification, and expression of genes and gene products.

233. Seminar in Cytogenetics (1-3) I, III. The Staff

Seminar—1 hour. Prerequisite: course 221. Topics related to the deletion, duplication, and rearrangement of chromosome regions.

234. Seminar in Quantitative Genetics (1-3) III. The Staff

Seminar—1 hour. Prerequisite: course 221. Topics of current interest related to the inheritance of continuous characters.

235. Seminar in Developmental Genetics (1-3) III. The Staff

Seminar—1 hour. Prerequisite: course 221. Topics in the area of cell-specific control of gene development.

236. Seminar in Population, Evolutionary, and Ecological Genetics (1-3) I. The Staff

Seminar—1 hour. Prerequisite: consent of Instructor. Topics related to the analysis and prediction of genetic change in populations.

238. Group Study (1-5) I, II, III. Members of the Group (Chairperson in charge)

Prerequisite: consent of instructor. Group Study of selected topics in Genetics. (SU grading only)

239. Research (1-12) I, II, III. Members of the Group (Chairperson in charge)
(SU grading only)

Geography

(College of Letters and Science)

Jack D. Ives, Ph.D., Chairperson of the Department

Department Office, 280 Kerr Hall (916-752-0790, or 50792)

Faculty

Nigel J. R. Allan, Ph.D., Associate Professor
Conrad J. Bahm, Ph.D., Professor
Dennis J. Dingman, Ph.D., Associate Professor
Deborah L. Elliott-Fleish, Ph.D., Associate Professor
Howard F. Gregory, Ph.D., Professor Emeritus
Louise E. Gravelle, Ph.D., Professor (Geography, Aridland)
Jack D. Ives, Ph.D., Professor
Stephen C. Jett, Ph.D., Professor
Janet D. Momsen, Ph.D., Professor
Marlyn L. Shetton, Ph.D., Professor
Frederick J. Simmons, Ph.D., Professor Emeritus
Kenneth Thompson, Ph.D., Professor Emeritus

The Major Program

Geography is a multifaceted discipline defined by its concern with place. Geographers strive to answer spatial questions regarding the earth's surface and adjacent atmosphere and to describe and explain the character of regions, to ascertain the ways in which humans, historical and contemporary, have used and shaped the earth's surface; and to understand the physical, biotic, and human systems of our global environment and the interactions.

The Program. Both Bachelor of Arts and Bachelor of Science degrees are offered in geography. A.B. students choose one of five possible emphases: 1) general geography, encompassing the whole spectrum of the field; 2) cultural geography, which stresses traditional human uses of the earth and the search of explanations of the different customs, beliefs, and lifeways characteristic of different parts of the world; 3) economic geography, which focuses on the locational factors affecting contemporary agriculture, industrial, and commercial activities, as well as on the characteristics and problems of urban centers; 4) physical geography, whose concern is the natural world, including climate, vegetation types, and the many physical features of the land's surface; and 5) regional planning and analysis, which emphasizes how geographic principles are applicable to contemporary urban and environmental concerns. These areas of emphasis will be closely integrated into the department's new specialization in mountain geography. This program emphasizes physical geography courses with training in other physical and biological sciences and mathematics. A geography minor is also available.

Career Alternatives. The study of geography provides background for students interested in careers in education, business, industry, and government. In business and industry, opportunities for employment include positions in locational analysis, international trade, environmental consulting, transportation planning, remote sensing, environmental-impact analysis, market planning, and aerial photo interpretation. Local and state government offers opportunities for employment in city, state, and regional planning and environmental analysis, while various federal departments need regional analysts, cartographers, remote-sensing experts, climatologists, and conservationists.

A.B. Major Requirements:

UNITS
Preparatory Subject Matter ...........................................10
Geography 1, 2, and .................................10

Depth Subject Matter ..............................................35-44
Geography 105 or 106; 151; and one LCD regional course and Geography 121-127 ..................................11-12

Choose one emphasis from the following five:

Emphasis I (General) .................................................24-28
One course from each of the following three groups:

a. Geography 170 or 171;

b. Geography 141 or 145;
c. Geography 108 or 115;

Four additional upper division geography courses.

Emphasis II (Cultural/historical) ..................................28
Geography 170 or 171; one course from 108, 115, 141, 155.
Four additional courses from Geography 110, 143, 172, 173, 175.

Emphasis III (Regional/economic) ...........................28
Geography 110; 141; 155; one course from 108, 115, 170, 171.
Three additional courses from Geography 104, 142, 145, 158, 160, 161, 162.
Emphasis IV (Physical) ...............................................31-32
Geography 3; 108; 110; 115; 162; 173;
one course from 141, 155, 170, 171.
One additional course from Geography 102, 110, 118, 119.
Emphasis V (Regional Planning and Analysis) .............26-32
Geography 155 or 156; 110; one additional course from 121-127; and one
course from 142, 160, 161, 162, 170, 173.
Environmental Biology and Management
110; Environmental Biology and
Management 134 or Environmental
Studies 171; Political Science 107 or
Environmental Studies 161; one course
from Economics 115A, Agricultural Eco-
nomics 148, or Geology 134.
Total Units for the Major ........................................... 45-54

Recommended: Geography 4.

B.S. Major Requirements:

Preparatory Subject Matter ........................................... 57-64

Geography 1, 2, 3, and 5 ............................................. 16

Statistics 13 or the equivalent ................................. 4

Mathematics 1A, 1B, and 1C, or Math-
ematics 21A, 21B, and 21C ................................... 9-12

Computer Science Engineering 10, 11, or
30 ........................................................................ 11-14

Chemistry 1A, 1B, 1C or 4A, 4B, 4C ................................ 15

Biological Sciences 1A ................................................. 5

Biological Sciences 1B, or Biological Science
Environmental Science or Geology 60-60L, or
Physics 6A and 6B ............................................... 5-16

Depth Subject Matter .................................................. 43-56

Geography 105, 106, 108, 115, 151 ......................... 20

Two courses from Geography 102, 110, 112, 116, 117, 122, 173 ... 7

One course from Geography 121-127 ......................... 7

Four additional upper division units chosen in consultation with the undergraduate advisor .... 20

Total Units for the Major ............................................. 109-119

Recommended: Geography 4; Physics 8A, 8B and 8C; Chemistry 8A
and 8B.

Addendum: The B.S. major provides a wide variety of possible themes, including geography, cartography, plant geography, nutritional geography, water resources studies, and mathematical geography.

An individual's program may emphasize one or more of these themes, and is planned in consultation with the major advisor.

Minor Program Requirements:

Letters and Science students who do not major in Geography may satisfy 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 advisor.

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, 156, 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

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, 162, or 170
Geography 121, 122A, 122B, 123, 124, 125A, 125B, 126, or 127.

Minor V (Environmental Resource)

Geography 160, 161, 162, 173, and 175.

Minor VI (World Regional)

Geography 121, 122A or 122B, 123 or 124, 125A or 125B, 126, or 127.

Major Advisor: See Class Schedule and Room
Directory.

Graduate Study: The department offers programs of study leading to the M.A. and Ph.D. degrees. Information concerning these programs may be obtained from the Graduate Advisor, Department of Geography.

Graduate Advisor: See Class Schedule and Room
Directory.

Courses in Geography

Lower Division Courses

1. Physical Geography (4) I. Elliott-Fisk; II. Jett

Lecture—3 hours; laboratory—2 hours. Basic physical elements of the human habitat, especially climate, landforms, soils, and natural vegetation.

2. Introduction to Cultural Geography (3) I. Jett; II. Jett


2G. Introduction to Cultural Geography: Discussion


3. Climate and Weather (4) I. Shelton

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; seasonal storms; global, regional, and local climate and weather; climate change; climate of California.

4. Maps and Map Interpretation (3) I. Bahre


5. Introduction to Urban and Economic Geography (3) I. Dingemans; III. Monsen

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/Introductory.

5G. Economic and Urban Geography: Discussion

1. Instructor: I. Dingemans; II. Monsen, 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 5G: Contemporary Societies/Introductory.

6. Human Impacts on the Landscape (4) I. The Staff

Lecture—4 hours. Local and global effects, through time, of human presence, economies, and technologies on wild and domesticated flora and fauna; soils; water; landforms; climate. Emphasis on landscape modification. Not intended for students planning to take course 161 or 170.

10. The World's Regions (3) I. Dingemans; II. Jett;
III. Jett

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.

90. Geographic and Environmental and Regional Planning (3) I. 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, USIP industrial and population shifts. European regional plans, Chinese agricultural and environmental programs.

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

The Staff

Chairpersons: consent of instructor, primarily for lower division students. (P/N grading only).

99. Independent Study (1-5) I., II., III.

The Staff

Chairpersons: consent of instructor, primarily for lower division students. (P/N grading only).

Upper Division Courses

102. Field Course in Physical Geography (4) I.

Elliott-Fisk

Lecture and field trip—normally one day per week. Prerequisite: courses 1 and 2 and consent of instructor. Research methodology and field study. Systematic mapping and analysis of elements of the natural landscape.

104. Field Course in Urban Geography (4) III.

Dingemans

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 changes 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; symbology and processing of map data; cartographic design and lettering techniques; map reproduction.

106. Aerial Photo Interpretation and Remote Sensing (4) III. Bahre

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. Advanced Cartography (4) III. The Staff

Lecture—1 hour; laboratory—18 hours. Prerequisite: course 10G. Advanced principles and techniques of cartographic representation. Emphasis on scripting, plate-making, process photography, color separation, and color printing. Use of contemporary cartographic and photographic equipment utilized in producing maps.

108. Analysis of Landforms (4) I. Elliott-Fisk

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, and fluvial, glacial, and coastal landforms.

110. Quantitative Spatial Analysis (4) III. 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 prepackaged computer programs.

112. Coastal Landforms and Landscapes (4) III.

Elliott-Fisk

Lecture—3 hours; discussion—1 hour. Prerequisite: course 108 or consent of instructor. Examination of the landforms and geohazards found along coasts. Analyses of coasts in a variety of lithologic, tectonic, and "wave-climate" settings. Emph-

*Course not offered this academic year.
115. Mesoclimatology (4) II. Shelton
Lecture—3 hours; discussion—1 hour. Prerequisite: college course 3. Areal energy and moisture exchanges at the earth/atmosphere interface; physical controls, spatial variability, forcing and modeling the exchange processes, classification of mesoclimates. Climatic and related processes in areal systems. Human alteration of mesoclimates. Offered in alternate years.

116. Climate Change (4) II. Elliott-Fisk. Shelton
Lecture—3 hours; discussion—1 hour. Prerequisite: courses 1 and 3, Nature, magnitude, timing, and causes of climate change. Spatial and temporal climatic variations within the Quaternary emphasized. Offered in alternate years.

117. Quaternary Environments (3) II. 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 in selected regions.

118. Mountain Geocology: Physical Geography (4) II. Ives
Lecture—3 hours; term paper. Prerequisite: course 1 or other introductory natural science course. Broad overview of natural systems, including tectonics and structure, climate and vegetation, geomorphic processes and natural hazards. Will integrate relevant section of cognitive disciplines to focus on three-dimensional character of mountain regions—a physical geography of mountains.

120. Deserts of California and the Southwest (3) II. Jeff
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 northern Great Basin. Desert origins, climate, vegetation, and landforms. Cultures and histories of native tribes, Hispano-Americans, and Anglo-Americans. Offered in alternate years.

120L. Field Excursion to Califormian and Southwestern Deserts (2) II. Jeff
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 repeated for credit. Limited to one credit allowed. Must be given to students having completed course 120. (P/NP grading only.) Offered in alternate years.

121. North America (4) II. The Staff
Lecture—3 hours; discussion—1 hour. Prerequisite: course 1 or 2 or consent of Instructor. Physical geography and environment and culture of the United States and Canada, and the ways in which physical and human forces have contributed to their variety. Regional stress patterns within the United States and Canada.

122A. Mexico and Central 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, from the Andes north to Mexico and 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) II. 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, from the Andes north to Mexico and Panama and in the Caribbean. Emphasis on understanding the evolution of 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) I. The Staff
Lecture—3 hours; discussion—1 hour. Prerequisite: courses 1 and 2 or consent of Instructor. Geographical 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) II. 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 introduction to contemporary Societies/Non-Introductory. Recommended GE preparation: Geography 5.

125A. North Africa and the Middle East (4) I. Griweth
Lecture—4 hours. Prerequisite: courses 1 and 2, or consent of Instructor. Geography of the Islamic world of North Africa and Southwest Asia; climatic and physical features, cultural patterns, socio-economic processes, and the influence of Islam; economic patterns and development.

125B. Sub-Saharan Africa (3) II. The Staff
Lecture—3 hours. Prerequisite: courses 1 and 2, or consent of Instructor. Physical, cultural, and historical geography of Africa south of the Sahara.

126. Southern Asia (3) III. The Staff
Lecture—3 hours. Prerequisite: courses 1 and 2, or consent of Instructor. Physical, cultural, and historical geography of Southern Asia. Offered in alternate years.

127. Contemporary Asia East (4) III. Dingemans
Lecture—3 hours; discussion—1 hour. Prerequisite: introductory course in the social sciences; course 2 or 5 recommended. Human use of the land in East Asia. Location and nature of resources, agriculture, industry, and cities. Modernization of traditional rural and urban landscapes. Emphasis on contemporary China and Japan as contrasting paths to economic development.

131. California (4) III
Lecture—3 hours; discussion—1 hour. The regional nature and variety of California: landforms, climates, and cities. Ecological problems caused by increasing population and technological pressures on these environments.

141. Organization of Economic Space (4) II. Momsen
Lecture—3 hours; discussion—1 hour. Prerequisite: course 5 or consent of Instructor. Survey of the principal environmental, economic, social, political, and cultural forces contributing to the regionalization of the world's economic activities. Outline of the more important regional patterns resulting from the interaction of these forces. Emphasis will also be put on these aspects of the problems of regional disparities both within and between nations.

142. Geography of Agriculture (4) III. Momsen
Lecture—3 hours; discussion—1 hour. Prerequisite: course 5 or consent of Instructor. Distribution and areal variety of the world's food-producing areas, and the ways physical, historical, cultural, and economic factors have influenced these aspects of agricultural geography. Current and future trends and associated resource problems.

143. Political Geography (4) I. The Staff
Lecture—3 hours; term paper. Area differentiation of major natural and cultural phenomena affecting the world's political organization.

151. History of Geographic Thought (4) II. The Staff
Lecture—3 hours; term paper. Prerequisite: three upper division courses in Geography. The literature of geographical thought, theories, subdisciplines, and development of the subject.

155. Urban Geography (4) III. Dingemans
Lecture—3 hours; term paper. Prerequisite: course 5 or consent of Instructor. Geography of land use within cities. The processes of change, and theories of economic and social organization of urban space. The urban landscape as a product of history, planning policy, transportation systems, and residential structure. General Education credit: Contemporary Societies/Non-Introductory. Recommended GE preparation: Geography 5.

156. The Urban Region (4) I. Dingemans
Lecture—3 hours; term paper. Prerequisite: course 5 or consent of Instructor. Location and functional interdependencies of urban areas and hinterland, including labor shed, service area, and economic base. Role of urbanization in regional development.

160. World Resource Patterns (3) I. The Staff
Lecture—3 hours. Prerequisite: upper division standing. Principal world patterns of resource distribution. Concentrations and voids, and their significance for economic development and agriculture. Focus on both natural and human resources of the geographic complex. Resource status of main economic regions.

161. Conservation of Resources and Environmen (4) III
Lecture—4 hours. Principles of natural resource and environmental-quality conservation. Land use conflicts between forestry, agriculture, mining, municipal, and recreational interests. Roles of industry, government, and societies in developing and resolving resource and environmental problems.

162. Geography of Water Resources (4) I. Shelton
Lecture—3 hours; discussion—1 hour. Prerequisite: course 1. Geographical survey of water on the land, need, management, and opportunity 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) II. Allan
Lecture—3 hours; term paper. Prerequisite: course 116, or consent of Instructor. Analysis of traditional adaptations of mountain peoples to their environment: resource use and environmental degradation; tourism impacts and Third World development issues. Emphasis on Himalayas; also Andes, Alps, and Rocky Mountains, providing historical perspective and discussion of current environmental crises.

170. Cultural Ecology (4) I. Jeff
Lecture—3 hours; term paper. Prerequisite: course 2 or Anthropology 2. Geographical theories of environment-man relations. Ecological relations of gatherers, fisherman, hunters, cultivators, and urbanites; their environmental impacts; their domestic plants and animals. General Education credit: Contemporary Societies/Non-Introductory. Recommended GE preparation: Anthropology 2 or Geography 2.

171. Cultural Geography (4) II. Jeff
Lecture—3 hours; term paper. Prerequisite: course 2 or consent of Instructor. Consideration of principal concepts and approaches in cultural geography in modern times, and links with, and parallels in, other disciplines. General Education credit: Contemporary Societies/Non-Introductory. Recommended GE preparation: Geography 2 or Anthropology 2.

172. Animals and Culture History (4) III. The Staff
Lecture—4 hours. Prerequisite: course 2, Anthropology 2, or consent of Instructor. Theories of animal domestication, spread of domestic animals in Old and New Worlds; contrasting roles of domesticated animals in human ecology through time; pastoral nomadism and other animal-based economies.

173. Humans and Vegetation Change (4) III. Bahre
Lecture—3 hours; term paper. Prerequisite: course 1 or Biological Sciences 1A, or consent of Instructor. Role of humans in modifying the earth's vegetation. Emphasis on cultural plant geography, factors of plant-environment, classification and standardization 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. Griweth
Lecture—3 hours; term paper. Prerequisite: course 2 or Anthropology 2; Nutrition 20 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—5-15 hours at employing agency; term paper. Prerequisite: consent of undergraduate Geography major advisor and consent of instructor. Supervised program of student internships with public agencies dealing with geographical problems. The application and evaluation of theoretical concepts through work experience with a variety of assignments and work schedules. (PIN grading only.)

188. Directed Group Study (1-5) I, II, III. The Staff (Chairperson in charge). (PIN grading only.)

199. Special Study for Advanced Undergraduates. (1-5) I, II, III. The Staff (Chairperson in charge). (PIN grading only.)

Graduate Courses

200. Research Trends in Geography (1). The Staff (Chairperson in charge). Seminar—1 hour. Major current research themes and trends in geography. (SU grading only.)

201. Sources and General Literature of Geography (4). I, II, III. The Staff. Discussion—6 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, social, economic, urban, economic, political, conservation, and regional geography.


204. Seminar in Plant Geography (4). 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.

204A. Seminar in Climatology (4). II, III. Shelton Seminar—3 hours.


207. Group Study (1-5) I, II, III. The Staff. Prerequisite: consent of instructor.

208. Research (1-12) I, II, III. The Staff (Chairperson in charge). (SU grading only.)

209D. Individual Study (1-12) I, II, III. The Staff. Prerequisite: graduate student status in Geography and consent of instructor. (SU grading only.)

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Geology
(College of Letters and Science)

Howard W. Day, Ph.D., Chairperson of the Department
Department Office, 174 Physics-Geology Building
(916-752-3305/3303)

Faculty

Sandia J. Carlson, Ph.D., Lecturer
Richard Cowen, Ph.D., Senior Lecturer
Robert E. Cotto, Ph.D., Associate Professor
Howard W. Day, Ph.D., Professor
James A. Doyle, Ph.D., Professor (Biology)
Graham E. Fogg, Ph.D., Associate Professor (Land, Air, and Water Resources)

Harry W. Green, II, Ph.D., Professor
Charles G. Higgins, Ph.D., Professor Emeritus
Anne M. Hofmeister, Ph.D., Assistant Professor
Louise H. Kellogg, Ph.D., Assistant Professor
Charles E. Lester, Ph.D., Assistant Professor
Stanley V. Margolis, Ph.D., Professor
Robert A. Matthews, A.B., Senior Lecturer
James S. McClain, Ph.D., Associate Professor
Eldridge M. Monroe, Ph.D., Professor
Jeffrey F. Mount, Ph.D., Associate Professor
Peter Schiffman, Ph.D., Lecturer
Phillip W. Signor, Ph.D., Associate Professor
Howard J. Spero, Ph.D., Assistant Professor
Robert J. Trice, Ph.D., Associate Professor
Geert A. Vermeul, Ph.D., Professor
Kenneth L. Vernebi, Ph.D., Professor

The Major Programs
"Civilization exists by geological consent—subject to change without notice." —Will Durant

Geology is the study of the Earth, and in particular the history, the structure, the evolution of life, and the processes that have molded the Earth and its inhabitants. The coming of the space age has also extended the field to include the solid planets of the solar system. Although often attracted to the study of geology by 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 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 this evolution can involve the application of any of the physical or life sciences to understanding the Earth. In this sense, geology is truly an interdisciplinary science.

The applied aspects of the science generally involve the interaction between humans and the earth. Applied studies include the study of mineral resources including oil and water, identification and mitigation of Earth hazards such as earthquakes, landslides, and volcanic eruptions; identification and mitigation of polluted ground water; and land use planning.

The Program. Students interested in becoming professional geologists or continuing their geological studies after graduation should elect 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 non-science careers. Both programs include fourteen units of upper division electives that provide students an opportunity to emphasize an aspect of the field of particular interest to them. The electives are not restricted to geology courses but must be chosen to provide a relevant, coherent, and in-depth program of study which must be approved by an undergraduate advisor before they are taken. Transfer students should have completed as much as possible of the "preparatory major subject" listed below. High school preparation for either program should include high school chemistry and four years of mathematics or the equivalent.

Internships and Career Alternatives. The largest employer of geologists has traditionally been the oil industry, although recently more opportunities have been available in environmental geology with consulting firms and government agencies. Government organizations and research laboratories also employ geologists in a variety of other capacities. There is a growing need for earth science teachers at all pre-college levels, and colleges and universities provide opportunities in teaching and research. Entry level positions are available with a Bachelor's degree. A Master's degree is the usual professional level degree, and a Ph.D. is generally required for research and academic positions. Internships during undergraduate training are a means of exploring potential career opportunities and can lead to positions after graduation. Dave's students have interned at the California Division of Mines and Geology, the State Department of Water Resources, and various consulting firms.

A.B. Major Requirements:

<table>
<thead>
<tr>
<th>Preparatory Subject Matter</th>
<th>44-45</th>
</tr>
</thead>
<tbody>
<tr>
<td>Geology 3, 50, 50L, 60, 60L</td>
<td>14</td>
</tr>
<tr>
<td>Mathematics 16A-16B-16C or 21A-21B</td>
<td>8</td>
</tr>
<tr>
<td>Chemistry 1A-1B or 4A-4B</td>
<td>12</td>
</tr>
<tr>
<td>Physics 5A-5B-5C</td>
<td>12</td>
</tr>
</tbody>
</table>

Depth Subject Matter

101, 105, 105L, 08L, 110L, 110L, 122, 123, 125

Additional upper division electives chosen from selected courses in geology and related fields approved in advance by the major advisor (see advisor for list of approved courses)

Total Units for the Major

12

Recommended

Chemistry 1C or 4C, Geology 3, 50L; Statistics 13 or 102.

B.S. Major Requirements:

<table>
<thead>
<tr>
<th>Preparatory Subject Matter</th>
<th>UNITS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Geology 3, 50, 50L, 60, 60L</td>
<td>14</td>
</tr>
<tr>
<td>Mathematics 21A or 22A or 22B, 22C</td>
<td>12</td>
</tr>
<tr>
<td>One course chosen from Mathematics 22A, 22B, 22C, Statistics 32, 102</td>
<td>3</td>
</tr>
<tr>
<td>Chemistry 1A-1B-1C or preferably 4A-4B-4C</td>
<td>15</td>
</tr>
<tr>
<td>Physics 4A-9B-9C or 5A-5B-5C</td>
<td>12</td>
</tr>
</tbody>
</table>

Depth Subject Matter

102, 105, 105L, 08L, 110L, 110L, 112, 123

Geology 190 (repeat coursework at least once) | 24 |

One course chosen from Geology 124, 125, 129 | 24 |

Additional upper division electives chosen from selected courses in geology and related fields approved in advance by major advisor (see advisor for list of approved courses)

Total Units for the Major

110

Recommended

Electives 50 general geology emphasis: Geology 108, 108L, completion of 124, 125 sequence plus one other course (consult advisor). Additional recommended courses: one or more of the following courses, depending on emphasis in geology: Mathematics 22A, 22B, 22C, Statistics 104, 106, 106, 110.


Minor Program Requirements:

Students in other disciplines may elect to complete a minor in Geology by choosing a geological subject emphasis listed below. On transcripts the minor will appear as a minor in Geology.

<table>
<thead>
<tr>
<th>General Geology emphasis</th>
<th>22</th>
</tr>
</thead>
<tbody>
<tr>
<td>Geology 50 and 50L (or 1, 1G, and 1L)</td>
<td>5</td>
</tr>
<tr>
<td>Geology 105, 106, 108</td>
<td>9</td>
</tr>
<tr>
<td>Geology 108 and 108L or 110 and 110L</td>
<td>5</td>
</tr>
<tr>
<td>Geology 113, 115, or 116</td>
<td>3</td>
</tr>
<tr>
<td>Minor Advisers: S.V. Margolis, R.J. Trice.</td>
<td></td>
</tr>
</tbody>
</table>

Geology 50 and 50L emphasis | 18-22 |

Civil Engineering Geology emphasis | 19-22 |

Civil Engineering 50 and 50L | 9 |

Three courses chosen from Civil Engineering 175, Geology 117A, 117B, 134, Soil Science 118, 130 Water Science 142, 149 | 9-12 |

*Course not offered this academic year.*
Minor Adviser, R.A. Matthews

Geochemistry .......................... 18-20
Chemistry 110A, 110C
(Chemistry majors must substitute one of the elective courses for Chemistry 110C.)
Geology 50, 51L, 115, 190, 190C .................. 9
One elective course chosen from Chemical Engineering 151, Chemistry 126, Engineer-
ing 130, 134, Geology 150A, Soil Science 172, Water Science 180, 2/3-5
Minor Adviser, R.E. Criss

Geomorphology emphasis .................. 22
Geology 50 and 50L (or 1, 1G, and 1L), 5
Geology 152 or Geography 106 ................. 4
Geology 153 or Geography 108 ................. 4
Geology 135 or 154 ......................... 3
At least six additional units chosen from
Civil Engineering 171, 172, 177
Geography 112, 117, 118
Soil Science 118, 120
Water Science 141 or Civil Engineering
142 ........................................... 6
Minor Adviser, R. J. Schweiss

Oceanography emphasis .................. 20-25
Geology 105, 116, 150A, 150B, 150C, 177
One course chosen from Environmental
Science 111A, 111B, 115B,
S119, Water Science 180, 2/3-8
Minor Adviser, S. V. Margolis

Paleobiology emphasis .................. 18-21
Geology 110 and 110L or 107 and 107L, 5
Geology 111A or 111B, 145 or 146, 7
At least six additional units from the follow-
ing: Anthropology 151 or 152 Botany
116, 140 Genetics 103, Geology 111A,
111B, 145, 146, 150C Geology 105,
112, 125, 146, 148, 7-9
Minor Adviser, R. Cowen

Interdisciplinary minors. The Geology Department administers two interdisciplinary minor programs in Environmental Geology and Geophysics which may be complete by students majoring in any discipline including Geology. Programs for these minors are listed separately in this catalog in alphabetical order. For Geology majors, one course at most from these minor programs can be counted toward satisfaction of the Geology degree requirements.

Teaching Credential Subject Representative. R. Cowen. See also under Teacher Education Program.

Graduate Study. The Department of Geology offers a program of study and research leading to the M.S. and Ph.D. degrees. For information regarding graduate study in geology, address the Graduate Adviser, Department of Geology.

Graduate Advisers. J.F. Mount, J.S. McClain.

Courses in Geology

Lower Division Courses

1. The Earth (3) I, II, The Staff
Lecture—3 hours. Introduction to study of the Earth for those not majoring in geology or associated sciences. Not open for credit to students who have taken course 50. General Education credit with concurrent enrollment in course 1G: Nature and Environment/Introductory.

1G. Earth: Discussion (1) I, III, The Staff
Discussion—1 hour. Prerequisite: course 1 concurrently. Short group discussions and preparation of short papers for course 1. General Education credit with concurrent enrollment in course 1: Nature and Environment/Introductory.

1L. Earth Laboratory (1) I, II, The Staff
Laboratory—3 hours. Lecture—2 hours. Lab-ouratory—1 hour. Prerequisite: course 1 (prefer-
tably taken concurrently). Introduction to Earth materials (minerals and rocks), crustal deformation (faults and folds), landforms, and the processes that form them. Not open for credit to students who have taken course 50L.

3. History of Life (3) I, II, The Staff
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 dif-

Upper Division Courses

102. Field Geology (5) II. Twiss
Lecture—1 hour; laboratory—2 hours; field study—8 full days. Prerequisite: courses 105L, 106, 123, 124 (may be taken concurrently); course 125 recom-

105. Structural Geology (3) I, II. Twiss
Lecture—3 hours. Prerequisite: courses 50-50L;

120. Geology of California (2) II, Moores
Lecture—3 hours. Prerequisite: course 1 (concur-
rently). Geologic history of California; the origins of rocks and the environments in which they were formed, the structure of the Earth, and the interpretation of the structures of rocks and the interpretation of the structural history, mineral resources, and appreciation of the California landscape.

43. Form, Function, and Evolution: The Molluscan Shell (3) I. Vermeij
Lecture/discussion—2 hours; term paper. Prerequi-
tive: courses 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 and architectural types in space and time. General Education credit: Nature and Environment/Introductory. Recommended GE preparation: Geology 1 or 3 or Biological Sciences 10.

50. Physical Geology Laboratory (2) I, II.
Laboratory—6 hours. Prerequisite: course 50L.

50L. Physical Geology Laboratory (2) II.
Lecture—3 hours. Prerequisite: high school physics and chemistry. The Earth, its materials, its internal and external processes, its development through time by sea-floor spreading and global plate tectonics. Students with credit for course 1 or the equivalent may receive only 2 units for course 50.

50L. Physical Geology Laboratory (2) II.
Green Laboratory—6 hours; one or two one-day field trips. Prerequisite: course 50L (preferably taken concurrently). Introduction to classification and recognition of minerals and rocks and to interpretation of topographic and geographic maps and aerial photographs. Students who wish credit for course 1L or the equivalent may receive only 1 unit for course 50L

60. General Mineralogy (3) I. Hofmeister
Lecture—3 hours. Prerequisite: Chemistry 1A or 4A. Crystallography: physical and chemical structure and properties of minerals; mineral genesis.

60L. General Mineralogy Laboratory (2) I, II. Hofmeister
Laboratory—6 hours. Prerequisite: course 60L (prefer-
tably taken concurrently). Morphological crystallography; stereographic projection; identification of the common rock-forming minerals.

99. Special Study for Undergraduates (1-5) I, II, The Staff (Chairperson in charge)
Prerequisite: consent of instructor; lower division standing. (P/NP grading only).

*Course not offered this academic year.
111B. Paleobiology of Protista (4) II. The Staff
Lecture—2 hours; laboratory—6 hours. Prerequisite: course 107. Morphology, systematics, evolution, and ecology of single-celled organisms. Offered in alternate years.

113. The Solar System (3) III. Hofmeister

113G. The Solar System: Discussion (1) III. Hofmeister
Discussion—1 hour. Prerequisite: course 113 concurrently. Small discussion groups and preparation of papers for course 113.

14. Climates of the Past: Key to the Future (3) III. Spero
Lecture—3 hours. Prerequisite: Chemistry 1A or course 1 or Biological Sciences 1A or the equivalent. Analysis of present day climate for climatic warming and cooling and its comparison to the history of Earth’s climate fluctuations over the last 70 million years. Past and present climate records are used to examine potential future climatic scenarios.

115. Geochemistry (3) I. C. C. Criss
Lecture—3 hours. Prerequisite: Chemistry 1A (may be taken concurrently); course 50. Application of principles of solution, physical, structural, colloidal, and isotopic chemistry to geologic problems. Formation of carbonate rocks and other chemical sediments, weathering, and clay mineral formation. Magmatic, metamorphic, and hydrothermal processes and radiometric dating techniques.

115. The Oceans (3) III. Margolis
Lecture—3 hours. Prerequisite: upper division standing or consent of instructor. Introductory survey of the marine environment. Oceanic physical phenomena, chemical constituents, geologic 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/Non-Introductory. Recommended GE preparation: Biological Science 10, 12, or 14; Chemistry 1A.

116G. The Oceans: Discussion (2) II. Margolis

117A. Geophysics: Gravity and Magnetics (3) II. Kellogg
Lecture—3 hours; field experience with geophysical instruments. Prerequisite: Physics 2C or 2X. Laboratory—3 hours. Prerequisite: consent of instructor. Introduction to the use of physics in the study of earth structures and processes: gravity, paleomagnetism, geoelectricism. Application to geophysical exploration as well as solid earth geophysics.

117B. Geophysics: Seismology and Heat Flow (3) I. McClain
Lecture—3 hours; field experience with geophysical instruments. Prerequisite: Physics 2B or 2X. Laboratory—3 hours. Prerequisite: consent of instructor. Introduction to the use of physics in the study of earth structures and processes: seismology, heat flow. Application to geophysical exploration as well as solid earth geophysics.

118. Summer Field Geology (8) Extra-session summer. Mount
Six weeks in field. Prerequisite: course 102. Preparation of a geologic map and report on a selected field area.

Lecture—12 hours; laboratory—25 hours. Prerequisite: one course in biology or geology and consent of instructor. Lectures and field-laboratory studies of physical and biological aspects of nearshore marine environments, and examination of the interaction of environment through the study of fossil assemblages and sedimentary rocks in coastal areas. Full time residence at Bodega Marine Laboratory is required. A 25 lab fee is required.

122. Optical Mineralogy (3) II. The Staff
Lecture—1 hour; laboratory—6 hours. Prerequisites: courses 60, 60L, or consent of instructor. Optical properties of crystals and techniques of mineral identification with the petrographic microscope.

123. Igneous Petrology (5) III. Leach
Lecture—3 hours; laboratory—6 hours. Prerequisite: course 122. Origin and occurrence of igneous rocks. Laboratory exercises emphasize the study of these rocks in hand specimen and thin section.

124. Sedimentary Petrology (5) II. Mount
Lecture—3 hours; laboratory—8 hours. Prerequisites: courses 122 and 124. Origin and occurrence of sedimentary rocks. Laboratory exercises emphasize the study of these rocks in hand specimen and thin section.

125. Metamorphic Petrology (5) I. The Staff
Lecture—3 hours; laboratory—6 hours. Prerequisite: course 122; course 123 recommended. Occurrence and origin of metamorphic rocks. Laboratory exercises emphasize the study of these rocks in hand specimen and thin section.

130. Non-Renewable Natural Resources (3) II. Matthews
Lecture—3 hours. Prerequisite: course 1. Origin, occurrence, and distribution of non-renewable resources, including nonmetallic, and energy-producing materials. Problems of discovery, production, and management. Estimations and limitations of reserves, and their sociological, political, and economic effects.

131. 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 habitants through history, including consideration of acute events like earthquakes and eruptions as well as the geology of resources, topography, and water. General Education credit with concurrent enrollment in course 116: Nature and Environment/Non-Introductory. Recommended GE preparation: Biology Science 10, 12, or 14; Chemistry 1A.

134. Environmental Geology and Land Use Planning (3) II. Matthews
Lecture—3 hours. Geologic aspects of land use and development, and problems concerning water 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—laboratory—3 hours. Prerequisites: courses 1, 1G, and 1L or 1. Analysis of the conflict between geologic processes and the urbanization and resource use of California’s watersheds. Mining, logging, and dam construction. Case studies of Sierra Nevada watersheds. Field study includes two raft trips on Sierra rivers and visit to Auburn Dam site. General Education credit: Nature and Environment/Non-Introductory. Recommended GE preparation: Geology 1.

140. Geologic Data Collection and Report Preparation (2) II. The Staff
Lecture—3 hours. Prerequisite: upper division standing and a major in Geology. Collection, organization, and presentation of data for geologic reports. Participants analyze published reports, write syntheses of published reports, and prepare reports for publication.

144. Evolution and the Fossil Record (4) II. Signor

145. Paleobiology (3) II. Signor
Lecture—3 hours. Prerequisite: course 107. Principles and methods of evaluating the fossil record of ancient animal and plant communities. Course includes statistical methods in paleobiology; principles of biostatigraphy.

146. Evolutionary Paleontology (3) I. V. Wermel
Lecture—3 hours; laboratory—6 hours. Prerequisites: courses 107 or 110. Principles of evolution from the special perspective of the fossil record. Facts and Inferences on the origin of species and higher taxa. Survey of adaptive radiation and evolution in terrestrial and marine environments. (Same course as Environmental Studies 150A.)

150A. Physical and Chemical Oceanography (4) I. Powell (Environmental Studies)
Lecture—3 hours; discussion—1 hour. Prerequisite: course 116 or Environmental Studies 116; Physics 1B; 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 interactions, currents, waves, tides, mixing, marine ecosystems, and geomorphic cycles. Offered in alternate years. (Same course as Environmental Studies 150A.)

150B. Geological Oceanography (3) II. Margolis
Lecture—3 hours. Prerequisite: course 50 or 116 introduction to the ocean and geologic evolution of ocean basins. Composition and structure of oceanic crust; marine volcanism; and deposition of marine sediments. Interpretation of geologic history of the ocean floor in terms of sea-floor spreading theory. (Same course as Environmental Studies 159B.)

150C. Biological Oceanography (3) III. Spero
Lecture—3 hours. Prerequisite: Biological Sciences 1A and a course in general ecology or consent of instructor. Survey of the ecology of major marine habitats including Intertidal, shelf, bathic, deep-sea, and plankton communities. Existing knowledge and contemporary issues in research will be equally stressed. A portion of the course will be devoted to man’s use of and impact on the ocean. Offered in alternate years. (Same course as Environmental Studies 159C.)

152. Photogeology and Remote Sensing (4) II. Higgins
Lecture—2 hours; laboratory—6 hours. Prerequisite: course 1L or 5L; course 105 recommended. Field use of aerial photographs: types and availability, stereoviewing, and basic geometry. Geologic uses and interpretation of aerial photographs and of images obtained by remote sensing.

153. Geomorphology (4) II. Higgins
Lecture—3 hours; laboratory—3 hours. Prerequisite: courses 50-50L or 1-1L: Geography 1 recommended. Landforms, landscapes, and the processes that shape them. An Introduction to geomorphic observation and theory. Alternates with and complements course 154. Offered in alternate years.

154. Environmental Geomorphology (3) II. Higgins
Lecture—3 hours. Prerequisite: courses 50-50L or 1-1L: Geography 1 recommended. Aspects of geomorphology that relate to Man’s use of the natural environment. Alternates with and complements course 153. Offered in alternate years.

162. Stress and Deformation (4) II. Green
Lecture—3 hours; discussion—2 hours. Prerequisite: Mathematics 21C and Physics 9B; Mathematics 22A, 22C, and Physics 9C recommended. Introduction to tensor analysis, field transformations, representation quadric, Mohr-circle construction; stress, strain, strain-rate, elasticity. Solution of general, three-dimensional problems with geological application.

180. Sample Preparation and Techniques (1) II. Winter
Laboratory—3 hours. Prerequisite: course 122. Intro-
185. Advanced Field Geology (1-6) I, II, III. The Staff
Fieldwork—3 to 18 hours; report. Prerequisite: course 116 or graduate standing in Geology. Advanced problems and methods in geologic field studies; preparation of a geologic report. May be repeated for total of 6 units when different subject matter studied.
191A-191B. Crisis Group Study (1-6) I, II, III. The Staff
Discussion—3 hours; seminar—2 hours. Prerequisite: major in Geology. 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 approved prior to internship. Supervised work experience in geology. May be repeated for credit for a total of 10 units. (P/NP grading only.)
194A-194B. Senior Thesis (3-3)—III. The Staff (Chairperson in charge)
Prerequisite: open to geology majors who have completed 135 units and who do not qualify for the honors program. Guided independent study of a selected topic, leading to the writing of a senior thesis. (Deferred grading only, pending completion of course sequence.)
194A-194B. Senior Honors Project (3-3)—I, II, III. The Staff (Chairperson in charge)
Independent study—9 hours. Prerequisite: open to Geology majors who have completed 135 units and who qualify for the honors program. Guided independent study of a selected topic, leading to the writing of an honors thesis. (Deferred grading only, pending completion of course sequence.)
198. Directed Group Study (1-6) I, II, III. The Staff (Chairperson in charge)
Prerequisite: senior standing in geology or consent of instructor.
198. Special Study for Advanced Undergraduates (1-3) 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 130C or 116. Prerequisite: consent of instructor. Advanced historical geology emphasizing stratigraphical and geological history of North America and selected parts of other continents. Emphasis on interpreting lithologic assemblages and stratigraphic relations in terms of modern tectonic-depositional models. Offered in alternate years.
209. Origin and Significance of Metamorphic Textures (4) II, Green
Seminar—3 hours; laboratory—3 hours. Interpretation of metamorphic textures in terms of surface energy anisotropy, growth anisotropy, crystal deformation processes, and disequilibrium phenomena. Offered in alternate years.
213. Studies in Geomorphology (3) I, Higgins
Lecture—3 hours. Prerequisite: course 153 or Geography 106. Topics selected from studies of landforms and landscape development and of the action of formative processes, methods of analysis of geomorphological phenomena, development of geomorphological theory. Topics change from year to year. May be repeated three times for credit.
215. Advanced Geochemistry (3) II. Criss
Lecture—3 hours. Prerequisite: course 115, Chemistry 110A or consent of instructor. Principles and applications of nuclear chemistry to geology; radioactivity and stable isotope geochemistry. Trace element geochemistry. Topics covered include age and origin of earth materials, geothermometry, paleomagnetics, and applications to the study of earth processes.
216. Tectonics (3) I. Moore
Seminar—3 hours. Prerequisite: course 108 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.
217. Topics in Geophysics (3) III. Versano
Lecture—1 hour; seminar—2 hours. Prerequisite: consent of instructor. Analysis and exploration of current research in a given area of geophysics. Topics will change from year to year. May be repeated for credit. Offered in alternate years.
218A. Structural Analysis I: Macrostratigraphy (3) III
Twiss
Seminar—3 hours. Prerequisite: consent of instructor. Geometric and kinematic analysis and interpretation of mesoscopic and macroscopic geologic structures and fabrics; geometry of folding, superposed folding, and folded lineations; symmetry arguments in the interpretation of fabrics; determination of slip lines of deformation; regional structural synthesis. Offered in alternate years.
218B. Structural Analysis II: Microfabrics (4) III, Green
Seminar—3 hours; laboratory—3 hours. Prerequisite: consent of instructor. Advanced petrofabric analysis. Microscopic structural aspects of deformed metamorphic rocks, emphasizing deformation features and their origin and significance of preferred crystallographic orientation of metamorphic fabrics.
219. Special Studies in Marine Geology and Paleontology (5-6) Summer. Farmer
Discussion—5 hours; seminar—3 hours; laboratory—20 hours. Prerequisite: graduate standing or completion of course 211B. Prerequisite: independent field and laboratory investigation of selected topics in marine geology and paleoecology.
220. Mechanics of Geologic Structures (3) III, Twiss
Lecture—2 hours; seminar—1 hour. Prerequisite: course 162, or consent of instructor and course 105. Application of principles of continuum mechanics to understanding development of geologic structures such as folds, faults, and fractures. Consists of instructional field and laboratory investigation of selected topics in marine geology and paleoecology. Offered in alternate years.
226. Advanced Sedimentation and Sedimentary Petrology (4) III, Mount
Lecture—2 hours; laboratory—6 hours. Prerequisite: courses 124 or consent of instructor. Advanced petrographic and stratigraphic study of major sedimentary rock suites. Lecture emphasis on recognition and interpretation of the spatial and temporal variations in sedimentary rock textures and mineralogies. Laboratory focus on petrography, diagenesis, and sequence analysis. Subjects vary yearly. May be repeated for credit. Offered in alternate years.
227. Stable Isotope Biogeochecmistry (3) III, Spero
Lecture—3 hours. Prerequisite: graduate standing or consent of instructor. Application of stable isotope techniques to paleoclimatic, paleontologic, paleoecological, and anthropological research problems. Emphasis on carbon, oxygen, nitrogen, hydrogen and sulfur stable isotopes.
228. Marine Geology (3) III, Margolis
Lecture—3 hours. Prerequisite: courses 106, 116, 150B or 165, or consent of instructor. Critical discussions and review of processes in marine geology such as paleoceanography, biostatigraphy of the ocean basin, evolution of ocean basins and margins, and sea-bed mineral resources. Topics vary yearly. May be repeated for credit. Offered in alternate years.
230. Advanced Mineralogy (3) II. Hofmann
Lecture—3 hours. Prerequisite: course 60 or the equivalent; undergraduate background in petrology. Crystalllography and crystal chemistry of the major rock forming minerals and a few examples of mineral behavior. Offered in alternate years.
231. Mineral Physics Seminar (3) I, Hofmann
Seminar—3 hours. Prerequisite: course 230. Critical review of selected topics in mineral physics (e.g., the earth's thermodynamics, the elastic properties and equations of state; phase transitions and mantle petrology; earth's structure and its evolution; transport phenomena in the earth's interior). May be repeated for credit. Offered in alternate years.
232. Advanced Theory in Geology and Geophysics (3) II, McClain
233. Theoretical Seismology (3) II, McClain
Lecture—3 hours. Prerequisite: consent of instructor. Elastic wave propagation in the Sun and other heavenly bodies; source representations. Ray theory. Plane and spherical waves and boundary conditions. Elastic wave propagation in stratified media. (P/NP grading only.) Offered in alternate years.
240. Geophysics of the Earth (3) I, Kellogg
241. Geomagnetism (3) I, Versano
242. Paleomagnetism (3) I, Versano
245. Metamorphic Petrology (5) I, Day
Lecture—3 hours; laboratory—6 hours. Prerequisite: courses 125 or consent of instructor. Metamorphic processes; origin and characteristics of metamorphic rocks; laboratory study of representative rock suites in hand specimen and thin section. Offered in alternate years.
246. Physical Chemistry of Metamorphic Processes (3) II, Day
Lecture—3 hours. Prerequisite: course 125, Chemistry 110A, or consent of instructor. Physical chemistry of metamorphic processes: reactions and phase equilibria; the paragenesis of metamorphic rocks. Offered in alternate years.
247. Metamorphic Petrology Seminar (3) II, Day
Seminar—3 hours. Prerequisite: course 245; course 246 recommended. Selected topics in metamorphic petrology (e.g., mass transport processes, tectonic settings, geothermometry, thermal structure of metamorphic belts; regional studies). May be repeated for credit when topic is different. Offered in alternate years.
250. Advanced Geochemistry Seminar (3) I, Criss
Seminar—3 hours. Prerequisite: course 115 or consent of instructor. Critical review of selected topics in geochemistry including: ore genesis, hydrothermal and geothermal fluids, recent and ancient sedimentary rocks, isotope geology, origin and chemistry of the oceans. Subject varies yearly depending on student interest. May be repeated for credit. Offered in alternate years.
254. Phase Equilibria (3) I. The Staff
Seminar—3 hours. Prerequisite: Chemistry 1C and Mathematics 22A; physical chemistry recommended. Selected topics in the phase relations in silicate systems and their application to the petrogenesis of igneous and metamorphic rocks.
260. Paleontology (3) I. Karlson; II. Sigmon; III, Verma
Seminar—3 hours. Prerequisite: course 111A or
Geophysics

(College of Letters and Science)

Geophysics is the study of the physical properties and processes within and surrounding the Earth. Many problems in the Earth Sciences require geophysical techniques for study. The interdisciplinary minor in geophysics is designed for students with backgrounds in the physical sciences, engineering, and other fields who can be interested in pursuing a graduate or professional career in geophysics, or who require a significant knowledge in the field. The curriculum reflects the need for such students to have a firm foundation of geophysics classes, as well as the vast diversity of subdisciplines from many departments that compose the character of geophysics.

The minor is sponsored by the Department of Geology, 174 Physics/Geology Building. Faculty adviser: J.S. McClain, Department of Geology 275A Physics/Geology, 752-7093.

Minor Program Requirements:

<table>
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<tr>
<th>Course</th>
<th>Units</th>
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<tbody>
<tr>
<td>Geophysics</td>
<td>21-24</td>
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<tr>
<td>Geology 117A, 117B, S181</td>
<td>9</td>
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<tr>
<td>Applied Science Engineering 115</td>
<td>3</td>
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<td>One course sequence chosen from the following:</td>
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<tr>
<td>a. Atmospheric Science 120, 191A, 191B</td>
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<tr>
<td>b. Electrical and Computer Science Engineering 112, 151, 181</td>
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<tr>
<td>c. Geology 105, 106, Physics 105C</td>
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<tr>
<td>d. Mathematics 128A, 128B, 128C</td>
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<td>e. Physics 104A, 104B, 105C</td>
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German

(College of Letters and Science)

Roland Hoermann, Ph.D., Chairperson of the Department

Department Office (German and Russian), 422 Sproul Hall (916-752-2114)

Faculty

Carrie Aman, Ph.D., Assistant Professor
Wilbur A. Berware, Ph.D., Associate Professor
Clifford A. Beers, Ph.D., Professor
Gail Finney, Ph.D., Professor
Ulrich Gailer, Dr. Phil., Visiting Professor
Ingelborg Henderson, Ph.D., Senior Lecturer
Roland W. Hoermann, Ph.D., Professor
Anna K. Kuhn, Ph.D., Professor
Winder McConnell, Ph.D., Professor
Karl R. Menges, Dr. Phil., Professor
H. Ulrich Nierjes, Ph.D., Professor Emeritus
Fritz Sammen-Frankenegg, Dr. Phil., Lecturer
Peter M. Schaeffer, Ph.D., Professor
Helmut Schneider, Dr. Phil., Professor

The Major Program

German is the language of the German-speaking world. The General Program is designed to accommodate specifically those students who are interested in studying German literature or culture. The second major courses are offered in German literature and culture. Students are encouraged to study a second language in German literature and culture. 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 culture.

Minor Program Requirements:

The Department offers a German Language minor and a German Literature minor. In addition, individual minors may be designed upon consultation with the undergraduate adviser.

Students are particularly encouraged to consider a minor that combines a coherent group of courses to emphasize area studies in German (i.e., German philology, 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 culture.

Units

**German Language**

- Choose courses numbered from 100A through 106B
- **18-24**

**German Literature**

- Choose courses numbered from 101-102, 120 and literature courses that are taught in German
- **15-24**

One lower division course from German 4b to 52 may be counted.

Minor advisers: D. C. Berr, J. P. Schaeffer.

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 the University and College requirements.

*Course not offered this academic year.
Courses in German

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 or 6A-BB.

1. Elementary German (5) I, II, III. Henderson in charge
Discussion—5 hours; laboratory—2 ½-hour sessions. Introduction to German grammar and development of all language skills in a cultural context with an 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 a P/NP option, no petition is required. All other students will receive a letter grade unless a P/NP petition is filed.)

2. Elementary German (5) I, II, III. Henderson in charge
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.

2H. Elementary Honors German (5) I, II, III. Henderson in charge
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.

3. Elementary German (5) I, II, III. Henderson in charge
Discussion—5 hours; laboratory—1 hour. Prerequisite: course 1. Completion of course 1 in areas of grammar, vocabulary, and speaking skills.

2H. Elementary Honors German (5) I, II, III. Henderson in charge
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.

4. Intermediate German (4) I, II, III. Henderson in charge
Recitation—4 hours. Prerequisite: course 3. Course 4 may be taken concurrently with 6A and/or 6B. Review of grammatical principles by means of written exercises; expanding vocabulary through readings of modern texts.

6A. Spoken German (2) I, II, III. Henderson in charge
Discussion—2 hours. Prerequisite: course 3. Courses 4 and 6B may be taken concurrently with or subsequent to 6A. Conversational practice based on expanding vocabulary of modern spoken German. (P/NP grading only)

6B. Spoken German (2) I, II, III. Henderson in charge
Discussion—2 hours. Prerequisite: course 3. Courses 4 and 6B may be taken concurrently with or subsequent to 6A. Conversational practice based on expanding vocabulary of modern spoken German. (P/NP grading only)

Upper Division Courses

100A. Advanced German Conversation (2) I. Bender
Discussion—2 hours. Prerequisite: course 4. Intensive conversational practice, accurate pronunciation, and language fluency.

100B. Advanced German Conversation (2) II. Asman
Discussion—2 hours. Prerequisite: course 4. Intensive conversational practice, accurate pronunciation, and language fluency.

100C. Advanced German Conversation (2) III. Menges
Discussion—2 hours. Prerequisite: course 4. Intensive conversational practice, accurate pronunciation, and language fluency.

101. Composition and Conversation (4) I, II, III. The Staff
Discussion—3 hours; written reports. Prerequisite: course 4 or consent of Instructor. Practice in short essay writing. Discussion based on readings from a variety of German texts.

102. Composition and Conversation (4) I, II, III. The Staff
Discussion—3 hours; written reports. Prerequisite: course 101 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.

103. Writing Skills in German (4) I, II, III. The Staff
Discussion—3 hours; term paper. Prerequisite: course 101. Practice in different kinds of writing, such as abstracts, correspondence, lecture summaries, analysis of or response to short literary texts.

104A. Translation (4) I. Jillings
Discussion—3 hours; written reports. Prerequisite: course 102 or the equivalent. Exercises in German/English translation using literary and non-literary texts of different styles and linguistic difficulties.

104B. Advanced Translation (4) I. Jillings
Discussion—3 hours; written reports. Prerequisite: course 104A or the equivalent. Exercises in German/English translation of literary and non-literary texts.

105. Phonology-Morphology (4) I. Barnawe
Discussion—3 hours; written or oral report. Prerequisite: course 4; Linguistics 1 recommended. Modern German phonetics and the structure of the phonological system. Elementary morphological analysis.

106. History of the German Language (4) II. Barnawe
Discussion—3 hours; written reports. Prerequisite: course 102; course 105 or Linguistics 1 recommended. Survey of the development of the German language and study of its structure in historical perspective.

107. Modern German Syntax (4) II. Barnawe
Discussion—3 hours; term paper. Prerequisite: course 102 or the equivalent. Linguistics 1 recommended. Examination of the major problems in describing modern German sentence structure.

108. Varieties of Contemporary German (4) Ill. Barnawe
Discussion—3 hours; laboratory and/or individual/group consultation on projects. Prerequisite: courses 102, 105. Study of relations between Standard language, Umgangsprachen and dialects. Approach is both descriptive and sociolinguistic. Class or individual projects on regional differences, including all of the contiguous German-speaking area of Europe.

109A. Business German (4) II. Henderson
Lecture-discussion—4 hours. Prerequisite: course 101 or consent of Instructor. Specialized advanced language course using business-oriented information and publications as the basis for discussions, role-plays, reports, compositions, and translations.

109B. Advanced Business German (3) Ill. Henderson
Lecture—3 hours; prerequisite: course 109A or consent of Instructor. Specialized advanced language course designed as a sequel to German 109A. Expands on previously introduced materials and features new topics of interest such as management, computers, and business law.

110. Older German Literature in English (4) I. Menges
Lecture—3 hours; discussion—1 hour. Prerequisite: upper division standing or consent of instructor. Knowledge of German not required. Analyses in English of German literature from the Middle Ages.
through the Reformation (Nelhupanailing, Gottfried's Tristan und Isolde or Wolfram's Parzival, lyric poetry, selections from Johann von Vepl, Conrad Celtes, Sebastion Brandt, Erasmus, Luther). General Education credit: Civilization and Culture/Non-introductory. Recommended GE preparation: any course from the GE Literature Preparation List.

111. Studies in Major Writers from the 17th to the 20th Century (4). J. Galler Lecture—3 hours; discussion—1 hour. Prerequisite: knowledge of German not required. Study of the principal works in English translation by one or more major authors such as Grimmeleissauer, Lessing, Schiller, D. Goethe, Heine, B. B. Hauptmann, Thomas Mann, Brecht, and Kafka. Content will vary each time course is offered.

111G. Special Topics in German Literature (4). J. Schneider Lecture—3 hours; discussion—1 hour. Prerequisite: knowledge of German not required. Analysis of significant themes in German literature: women in literature; the image of America; myths, legends and fairytales; war and social unrest as literary topics; satire and humor in contemporary German literature.

112G. Special Topics in German Literature (4). J. Schneider Lecture—3 hours; discussion—1 hour. Prerequisite: knowledge of German not required. Analysis of significant themes in German literature: women in literature; the image of America; myths, legends and fairytales; war and social unrest as literary topics; satire and humor in contemporary German literature.

112. The Staff Discussion—3 hours; written report. Knowledge of German literature and understanding of the context of the work required. Analysis of significant themes in German literature: women in literature; the image of America; myths, legends and fairytales; war and social unrest as literary topics; satire and humor in contemporary German literature. May be repeated for credit. Offered in alternate years.

118A. Fin-de-siècle Vienna (The Swan Song of the Habsburg Empire) (4). J. 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/Non-introductory. Recommended GE preparation: Comparative Literature 3 or History 4C; History 147B.

118B. Welmar Culture: Defeat, the Roaring Twenties, the Rise of Nazism (4). J. 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 Bauhaus considered in the context of the failure of the German experiment in democracy. Welmar Republic of 1919-33. Offered in alternate years. General Education credit: Civilization and Culture/Non-introductory. Recommended GE preparation: Comparative Literature 3 or History 4C; History 147B.

119. From German Fiction to German Film (4). J. Feffer Lecture—3 hours; discussion—1 hour; term paper. Examined a number of adaptations of major German prose works and plays to ascertain the types of changes involved in the shift from medium and the positive and negative effects achieved by such transplantation. General Education credit: Civilization and Culture/Non-introductory. Recommended GE preparation: History 4C.

120. Survey of German Culture (4). J. Feffer Lecture—3 hours; discussion—1 hour. Prerequisite: course 101. Major developments in such areas of German life as German historical thought, social institutions, and political history.

121. The Medieval Period in German Literature (4). I. McConnell Discussion—3 hours; term paper. Prerequisite: course 101. Major works of the Middle Ages in their historical, social, and literary context.

122. The Literary Baroque (4). I. Schaefer Lecture-discussion—3 hours; term paper. Prerequisite: course 101. Exemplary literary works of the seventeenth century tracing the principal lines of development and showing the reflection in literature of the social scene.

123. The Literature of the Classical Age (4). I. Schneider Lecture—3 hours; term paper. Prerequisite: course 101. A critical assessment of principal works of Goethe and Schiller in their development from the baroque and classicism to the romanticism and individualism and rebellion to the balanced harmony of the classical period.

124. Short Fiction Around 1900 (4). I. Schaefer Lecture—3 hours; term paper. Prerequisite: course 101. Representative short German fiction in the first decade of the twentieth century, to attain a more authentic prose style and the cultural currents they reflect.

125. Modern German Literature (4). I. Menges Lecture—3 hours; term paper. Prerequisite: course 101. Selections from the significant works of major twentieth-century writers, such as Hesse, Mann, Kafka, Rilke, Brecht, Grass. May be repeated for credit with consent of Undergraduate Major Adviser.

126. Postwar Women Writers (4). J. Finlay Lecture—3 hours; term paper. Prerequisite: course 101. Survey of major women writing in German since 1945. Considers such issues as the existence of "feminine writing" and of a feminist aesthetics. Writers include Seghers, Bachmann, Wolf, Kirsch, Morgen, Wohmann, Schneider.

127. German Lyric Poetry (4). I. Schneider Lecture—3 hours; term paper. Prerequisite: course 101. Study of the genre of lyric poetry from late Middle Ages through Renaissance, Baroque, Classical, Romantic, and Modern periods, with consideration of other literary forms and the social climate of each period.

128. The German Novelle (4). I. Benda Lecture—3 hours; written report. Prerequisite: course 101. Inquiries into the concept of the "Novelle" through analysis of the materials and formal devices of representative authors from Goethe to Kafka.

129. The German Drama (4). I. Feffer Lecture—3 hours; term paper. Prerequisite: course 101. Readings in the works of Germany's leading dramatists from the seventeenth century to the present day, such as Lessing, Goethe, Schiller, Ibsen, Hauptmann, Brecht.

130. German Political Literature from the Middle Ages to the Present (4). I. McConnell Lecture—3 hours; discussion—1 hour. Prerequisite: English 3 or 4, or French 25; course 51 recommended. Examination of the relationship of politics in German literary history from the time of Walther von der Vogelweide in the Middle Ages, through the Reformation, the period of Romanticism, and the Twentieth Century. General Education credit: Civilization and Culture/Non-introductory. Recommended GE preparation: English 3 or 4. Offered in alternate years.


160. Love in the Middle Ages (4). I. McConnell Lecture—3 hours; discussion—1 hour. Prerequisite: course 101. Analysis of the phenomenon of love in
selected medieval lyrical poems and romances of the twelfth and thirteenth century Blitzeitz Origins of county love, love and individualism, love and the Church, love and evil.

145. The German Epigram (4) I. Schaefer Lecture/discussion—3 hours; term paper. Prerequisite: course 102. Survey of the German epigram. Begins with the origins and development of the genre, its place in European literature, and its function as a mirror of the history of Ideas.

176. The Kunstmärchen in German Literature (4) III. Hoermann Lecture/Discussion—3 hours; term paper. Prerequisite: course 103. Survey of the Kunstmärchen in European literature, its place in European and German literature, and its function as a mirror of the history of Ideas.

185. The Age of Bismarck (4) II. Bernd Discussion—3 hours; term paper. Prerequisite: course 110 or 120. Comparative literature 1 or 168A strongly recommended. Development of the literary "fairy," or magical, tale—beginning with Grimmelshausen and Goethe's "epoch-making" "Die Allerheiligen," focusing on Romantik's "pie" figure as hero-messiah in the "Einleitung" in the "Einstimmungen" format, and ending with modern variations in D. Hoffmannh, Kafka, and Brecht.

240. The Renaissance and Reformation in German Literature (4) I. Schaefer Seminar—3 hours; term paper. Survey of the German Reformation and the half of the sixteenth century. May be repeated for credit with consent of instructor.

241. The efficacy of the German Reformation and thehalf of the sixteenth century. May be repeated for credit with consent of instructor.

242. The Germany of the 18th Century (4) II. Schmidt Seminar—3 hours; term paper. Prerequisite: course 240. Germany's intellectual and cultural life during the eighteenth century. May be repeated for credit with consent of instructor.

243. Fontaine and the Rise of the German Novel (4) I. Schmidt Seminar—3 hours; term paper. Prerequisite: course 240. The evolution of the German novel from its origins to the present. May be repeated for credit with consent of instructor.

244. Goethe (4) II. Schoeller Seminar—3 hours; term paper. Prerequisite: course 240. The life and work of the great German poet. May be repeated for credit with consent of instructor.

245. The works of Goethe (4) III. Schmidt Seminar—3 hours; term paper. Prerequisite: course 240. The life and work of the great German poet. May be repeated for credit with consent of instructor.

246. Schiller (4) III. The Staff Seminar—3 hours; term paper. Prerequisite: course 240. The life and work of the great German poet. May be repeated for credit with consent of instructor.

247. Heinrich von Kleist (4) III. Bernd Seminar—3 hours; term paper. Prerequisite: course 240. The life and work of the great German poet. May be repeated for credit with consent of instructor.

248. The Novels of Thomas Mann (4) III. Schmidt Seminar—3 hours; term paper. Prerequisite: course 240. The life and work of the great German poet. May be repeated for credit with consent of instructor.

249. The Classical Age of German Literature (4) I. Schaefer Seminar—3 hours; term paper. Prerequisite: course 240. The life and work of the great German poet. May be repeated for credit with consent of instructor.

250. The Romantic Period in German Literature (4) II. Schaefer Seminar—3 hours; term paper. Prerequisite: course 240. The life and work of the great German poet. May be repeated for credit with consent of instructor.

251. The Poetry of Rilke (4) II. Manges Seminar—3 hours; term paper. Prerequisite: course 240. The life and work of the great German poet. May be repeated for credit with consent of instructor.
Professional Courses

390A. The Teaching of German (2) I. Henderson
Lecture—2 hours. Prerequisite: graduate standing or consent of instructor. Theoretical instruction in modern teaching methods and demonstration of their practical application. Required of new teaching assistants. (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 new teaching assistants. (SU grading only.)

390C. The Teaching of German (2) III. Henderson
Lecture—3 hours. Prerequisite: graduate standing or consent of instructor. Theoretical instruction in modern teaching methods and demonstration of their practical application. Required of new teaching assistants. (SU grading only.)

400. Tutorial and Instructional Internship (1-3) I, II, III.
The Staff (Chairperson in charge)
Discussion—1-3 hours. Prerequisite: graduate standing. Provides an opportunity for advanced undergraduate and graduate students to gain experience in classroom teaching and other instructional activities. (SU grading only.)

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, Plan II, or Plan III. Plan I requires students to concentrate in one of the following areas: (1) 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 III. The purpose of Plan III is to enable students to study in depth the field of twentieth-century history, whose common problems of political conflict, social development, and cultural creativity cut across the several geographical fields of concentration which the department offers.

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 engage critical thinking, 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:

<table>
<thead>
<tr>
<th>UNITS</th>
<th>Preparatory Subject Matter</th>
<th>(Plans I, II, and III)</th>
</tr>
</thead>
<tbody>
<tr>
<td>20</td>
<td>Five lower division courses, including at least two from each of the following fields:</td>
<td>20</td>
</tr>
<tr>
<td>4A, 4B</td>
<td>a. Western Civilization: History 4A, 4B, 4C, 1, 3, 10, 30</td>
<td>a. Western Civilization: History 4A, 4B, 4C, 1, 3, 10, 30</td>
</tr>
<tr>
<td>15</td>
<td>d. African History</td>
<td>d. African History</td>
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*Course not offered this academic year.*
groupings include: Africa and Europe, Africa and Latin America, Africa and the United States. For other groupings, or to meet special needs, a student should obtain written approval from an advisor. Within broad fields, a student may wish to concentrate some of the courses on a particular area or period, such as China or Great Britain or Medieval Europe. Special approval is not required.

History and Philosophy of Science

The following courses count toward the History major and fulfill upper-division requirements in the European field:

History and Philosophy of Science 130B, 150, 180.

The following courses fulfill upper-division requirements in either the U.S. or European field:

History and Philosophy of Science 130B, 150, 180.

Students may also repeat a major field in History of Science and Medieval History upon consultation with a faculty advisor. (History offerings in this area include: History 85, 86, 88, 132, 139A,139B, 139A-139B, and 150A-150B.) Graduate seminars can be counted toward history degree requirements.

Consult the History and Philosophy of Science program for a more detailed description of course offerings in History of Science and Philosophy.

Major Advisors:


Minor Program Requirements:

History units may be taken in a single field of concentration, such as Africa, East Asia, Europe, Latin America, or the United States. Alternatively, students may select a minor with a thematic emphasis, as listed below, or a descriptive minor in consultation with a Department advisor.

At least 20 units of upper division history courses.

Examples of minor with thematic emphasis:

a. Pre-Law (British and American Political and Constitutional Development) - Three units chosen from History 151A, 151B, 151C, 150A, 190A, 190B, 190C, 199 or 199L (with approval of advisor).


Minor Advisors: Same as for major advisors.

Honors and Honors Program: A student may become eligible for graduation with high or highest honors by meeting the minimum grade-point average and course requirements established by the College of Letters and Science. To qualify for honors requests must also complete the History Department honors program with a grade-point average of 3.5 or above in honors courses. Students will be invited to participate in the department honors program during the latter part of their junior year on the basis of grade-point average, interviews, and faculty-recommendations. They are required to complete the History major, 10 courses in upper-division courses, which includes the completion of a senior honors thesis. Students who anticipate seeking admission to the honors program are urged to meet with a History 102 (undergraduate proponent) before the end of their junior year. They may follow any of the three plans for depth subject matter described above, and may substitute two of the History 104 courses for upper-division courses (except History 102) normally required for depth subject matter under the plan. Students who anticipate pursuing graduate work in History or a teaching credential, and who do not wish to opt for the research emphasis embodied in the honors program, are encouraged to select Plan II of the major.

Teaching Credential Subject Representative: D.L. Jacobson. See also the section on the Teacher Education Program.

Waver Program for Single-Subject Teaching Credential in History. The Department of History offers a program of study for students seeking a secondary teaching credential in History. The program may easily be accomplished within the lower-division 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, 174A Herman.

Education at Home Program (SHIP): In the Winter Quarter of 1990, the UCR campus will continue the Education at Home Program for those students with special interest in history and culture. Those selected for participation in this program will spend nine weeks in Williamsburg, one in Philadelphia, and a concluding week in Washington, D.C. This program is open to all undergraduates from any campus in the world, but only with approval of their graduate advisor, graduate students may also apply. Registration (through the Riverside campus) will be made for the following three courses in the Department of History: 157, 158, and 159. Special arrangements for international students (maximum of 4 units) may be made with the student's home campus. For further information, brochures or application forms, telephone Riverside campus, (714) 787-3830. Preference is given to applications received by June 30; the final application deadline is November 1.

Graduate Study. The Department of History offers programs of study and research leading to the M.A., M.A.T., and Ph.D. degrees in history. Detailed information may be obtained by writing to the Graduate Advisor, Department of History.


American History and Institutions. This University requirement can be satisfied by passing any one of the following courses in History: 17A, 17B, 72A, 72B, 170A, 170B, 170C, 171A, 174A, 174B, 174C, 175A, 175B, 175C, 178A, 178B, 178A, 178B, 179, 180A, 180B, 183A, 183B. The upper division courses may be used only with the consent of the instructor. (See also under University requirements.)

Courses in History

Lower Division Courses

1. The Bible and Ancient History (4) I. Lecture - 3 hours; discussion - 1 hour. Examination of the Judeo-Christian tradition as it met ancient Near Eastern and classical ideas and institutions through New Testament times. Emphasis on the Bible as a historical document and on historical-critical interpretation.

2. Ancient Civilizations (4) III. The Staff. Lecture - 3 hours; discussion - 1 hour. Growth of ancient civilizations from the Sumerians to the Fall of the Roman Empire.

3. Cities: A Survey of Western Civilization (4) II. Willis

*Course not offered this academic year.


4A. History of Western Civilization (4) I, II, III. The Staff (Chairperson in charge).

Lecture - 3 hours; discussion - 1 hour. Growth of western civilization from late antiquity to the Renaissance. General Education credit: Civilization and Culture/Introductory. (CAN Hist Seq A)

4B. History of Western Civilization (4) I, II, III. The Staff (Chairperson in charge).

Lecture - 3 hours; discussion - 1 hour. Development of western civilization from the Renaissance to the Eighteenth Century. General Education credit: Civilization and Culture/Introductory. (CAN Hist Seq A)

4C. History of Western Civilization (4) I, II, III. The Staff (Chairperson in charge).

Lecture - 3 hours; discussion - 1 hour. Development of Western Civilization from the Eighteenth Century to the present. General Education credit: Civilization and Culture/Introductory. (CAN Hist Seq A)

8. History of Indian Civilization (4) II. Metcalf 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, political and social organization, and the arts and literature. Perspectives on contemporary India. General Education credit: Civilization and Culture/Introductory.

9B. History of East Asian Civilization (4) I, II, III. The Staff.

Lecture - 3 hours; discussion - 1 hour. Survey of East Asian civilization and its modern transformation. Emphasis is on thought and religion, political and social life, art and literature. Perspectives on contemporary China are provided.


Lecture - 3 hours; discussion - 1 hour. History of the world in the twentieth century, emphasizing major powers and their leaders (Wilson, Lenin, Hitler, Roosevelt, Stalin, Mao, Nehru, Nasser, Castro), General Education credit: Contemporary Societies/Introductory.

15. Introduction to African History (4) I. Brittain Lecture - 3 hours; term paper. Examination of the long-range historical context as background to current conditions in Africa. This survey includes the early development of African civilizations through the twentieth-century colonization by Europeans.

17A. History of the United States (4) I, III. The Staff.

Lecture - 3 hours; discussion - 1 hour. Growth of the American people from Colonial times to 1815. General Education credit: Civilization and Culture/Introductory. (CAN Hist Seq B)

17B. History of the United States (4) I, II. The Staff.

Lecture - 3 hours; discussion - 1 hour. Growth of the American people from 1815 to 1915. General Education credit: Civilization and Culture/Introductory. (CAN Hist Seq B)

17C. History of the United States (4) I, II, III. The Staff.

Lecture - 3 hours; discussion - 1 hour. Growth of the American people from 1915 to the present. (CAN Hist Seq B)

22. Violence and Law in America (4) II. The Staff.

Lecture - 2 hours; discussion - 2 hours. Meetings of protest or social control from the revolutionary period to the present.
2.5. 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, methodologies, and interpretations.

30. Russian Cultural History (4) I. Crummey Lecture—3 hours; 1 hour. A 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/Non-Introductory. Recommended GE preparation: History 4B or 4C.

72A. 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 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/Non-Introductory. Recommended GE preparation: History 4A.

72B. Social History of American Women and the Family (4) III. Rosen Lecture—3 hours; discussion—1 hour. Social and cultural history of women, sex roles, and the family in twentieth-century America emphasizing female reformers and revolutionaries, working-class women, consumerism, the role of the media, the "feminine mystique," changes in family life, and the emerging women's movement. General Education credit: Civilization and Culture/Introductory; Contemporary Societies/Introductory.

85. Nature, Man, and the Machine in America (4) III. The Staff 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) I. The Staff Lecture—3 hours; tutorial supervision of research paper. History of humbug and pseudoscience in American society from the 17th century, emphasizing quackery, spiritualism, science hoaxes, technological frauds, literary and artistic forgeries, UFOs, pyramidology, astrology, psychical phenomena. Emphasis upon explanations for the persistence of quackery and pseudoscience.

98. Directed Group Study (1-5) I, II, III. The Staff (Chairperson in charge) Prerequisite: Consent of instructor. Primarily for lower division students. (P/NP grading only.)

99. Special Study for Undergraduates (1-5) I, II, III. The Staff (Chairperson in charge) (P/NP grading only.)

Upper Division Courses

101. Introduction to Historical Thought and Writing (5) III. Landau Lecture-discussion—4 hours; term paper. Prerequisite: Consent of instructor. Survey of the history of historical writing, analysis of critical and speculative philosophies of history and evaluation of modes of organization, interpretation, and style in historical writing.

102A-X. Undergraduate Proseminar in History (5) I, II, III. The Staff Seminar—3 hours; term paper. Designed primarily for history majors. Intensive reading, discussion, research, and writing in selected topics in the various fields of history: (A) Ancient; (B) Medieval; (C) Renaissance and Reformation; (D) Modern Europe to 1815; (E) Europe since 1815; (F) Russia; (G) China to 1800; (H) China since 1800; (J) Britain; (J) Latin America; (K) American History to 1877; (L) United States to 1877; (M) United States since 1866; (N) Japan; (O) Africa; (P) Christianity and Culture in Europe, 5C-1650; (Q) India; (R) Muslim Societies; (X) Comparative History, selected topics in cultural, political, economic, and social history that deal comparatively with more than one geographic field. May be repeated for credit. Limited enrollment.

103. Topics in Historical Research (4) I, II, III. 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. Discussion and research aimed at preparing students to select appropriate topics and methodologies for a senior honors essay and to situate their topics within a meaningful, broad context of historical interpretations. Cullinane in the submission of a full prospectus for an honors essay.

104B. Honors Tutorial (4) I, II. The Staff Tutorial—4 hours. Prerequisite: course 104A. Research in preparation of a senior honors thesis under the direction of a faculty advisor. (Deferred grading only; permission required.)

104C. Honors Tutorial (4) I, II. The Staff Tutorial—4 hours. Prerequisite: course 104A and 104B. Completion of a senior honors thesis under the direction of a faculty advisor.

110. Themes in World History (4) II. Margadant and Metcalf Lecture—3 hours; discussion—1 hour. Prerequisite: upper division standing; at least 8 units in History. Issues in world history from 1400 to the present. Topics will emphasize the interaction of diverse regions of the world as well as common patterns of historical change.

111A. Ancient History (4) I. Spiridakos Lecture—3 hours; discussion—1 hour. Prerequisite: upper division standing (student option). History of ancient empires of the Near East and of their historical legacy to the Western world.

111B. Ancient History (4) I. Spiridakos Lecture—3 hours; discussion or paper (student option). Political, cultural, and intellectual study of Greek world from Minyan-Mycenaean period to end of Hellenistic Age.

111C. Ancient History (4) II. Spiridakos Lecture—3 hours; discussion or paper (student option). Development of Rome from earliest times to the fall of the Roman Empire; to 476 A.D.

115A. History of West Africa (4) III. Brantley Lecture—3 hours; written reports. Prerequisite: courses 4A, 4B, 131A 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) I. Brantley Lecture—3 hours; written reports. Prerequisite: course 115A recommended. Introductory survey of the history of east and central Africa from 1000 to the present. This course is a part of an interdisciplinary East African sequence which includes History 115B (winter) and History 131A (spring).

115C. History of Southern Africa, Swaziland, Lesotho and Botswana from 1500 to the Present (4) I. 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) III. Brantley Lecture—3 hours; term paper. Prerequisite: courses 115A and 115B recommended. Themes of African History, such as African states and empires, slave trade, religion, economic and social change, and Banco origins and migrations, and French policy of Assimilation and Association.

121A. Medieval History (4) III. Bowsky Lecture/discussion and panel presentations—3 hours. European history from "the fall of the Roman Empire" to the eighth century.

121B. Medieval History (4) I. The Staff Lecture/discussion and panel presentations—3 hours. European history from Charlemagne to the twelfth century.

121C. Medieval History (4) I. Bowsky Lecture/discussion and panel presentations—3 hours. European history from the Crusades to the Renaissance.

122. Selected Themes in Medieval History (4) II. Bowsky Lecture—3 hours; term paper. Each offering will focus on single major theme, such as medieval agrarian history, feudalism, the family, medieval Italy, or the Crusades. Readings include original sources in English translation and modern works. May be repeated for credit.

125. Topics in Early Modern European History (4) III. Findlen 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 Iberia, Ancient Rome, family and household, and material culture and daily life. May be repeated for credit.

130A. Christianity and Culture in Europe: 50-1450 (4) I, II. The Staff Lecture—3 hours; written report or research paper. A historical survey of the ideas and institutions of Christianity and their impact on the later Roman Empire and medieval Europe in terms of outlook on life, art, politics, and economics.

130B. Christianity and Culture in Europe: 1450-1650 (4) I, II. The Staff Lecture—3 hours; written report or research paper. A history of the Lutheran, Zwinglian-Calvinist, Radical, Anglican, and Catholic Reformations as foundation stones of a new cultural order. Emphasis on special attention to the interconnections between the revival of antiquity and the different reform movements.

130C. Christianity and Culture in Europe: 1650-1850 (4) III. The Staff Lecture—3 hours; written report or research paper. A survey of the intellectual, cultural and political reorientation of European society in the aftermath of the Wars of Religion. "Secularization" will be discussed in the context of the Enlightenment and Romanticism.

131A. Early Modern European History (4) I, II. The Staff Lecture—3 hours; written reports. Prerequisite: courses 4A, 4B recommended. Western European history from about 1500 to about 1650.

131B. Early Modern European History (4) I, II. The Staff Lecture—3 hours; written reports. Prerequisite: courses 4A, 4B, 131A recommended. Western European history from about 1500 to about 1650.

131C. Early Modern European History (4) III. The Staff Lecture—3 hours; written reports. Prerequisite: courses 4A, 4B, 131A recommended. Western European history from about 1500 to about 1650.

133. The Age of Ideas (4) II. Lecture—3 hours; written reports. The Enlightenment and its background in the seventeenth century.

134A. The Age of Revolution (4) II. 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) II. Dobbs Lecture/discussion—3 hours; term paper. Prerequisites: 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.

*Course not offered this academic year.
135B. History of Science, 18th to 20th Centuries (4) III. Dobbs
Lecture-discussion—3 hours; term paper. Prerequisites: upper division standing. Survey of the historical development of scientific thought in geology, biology, chemistry, physics, and cosmology from the eighteenth to the twentieth century, with special emphasis on emergence of broad explanatory principles that serve more than one science.

136. Scientific Revolution (4) II. Findlen
Lecture—3 hours; term paper. Prerequisites: course 135A or 135B recommended. History of science in Western Europe (1400-1750). Investigates the changing definitions of science in the age of Copernicus, Vesalius, Harvey, Galileo, and Newton. Considers the evolution of new ideas about nature, experiment, observation, and scientific theory.

137A. Russian History: Klevan, Muscovite, and Petrov (4) I. Crumey
Lecture—3 hours; term paper. Russian civilization from early times to 1725. Emphasis on the rise of autocracy and the evolution of society and culture.

137B. Russian History: The Empire, 1725-1900 (4) II. Grouf
Lecture—3 hours; term paper. Russian civilization from the Peter the Great reforms to the end of the nineteenth century. Emphasis on the strengthening and reform of the autocracy, the rise of movements for revolutionary change within the state, and the transformation of society and culture.

137C. Revolutionary and Soviet Russia, 1900 to the Present (4) II. Brower
Lecture—3 hours; written reports. Evolution of the Russian state and society from the collapse of tsarist Russia through the creation and consolidation of the new Soviet order.

138. History of the Russian Revolution (4) II. Brower

139A. Medieval and Renaissance Medicine (4) III. Findlen
Lecture—3 hours; discussion—1 hour; term paper. The history of medicine, circa 1000-1500. 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.

139B. Medicine, Society, and Culture in Modern Europe (4) II. Kudlick
Lecture—2 hours; discussion—1 hour; term paper. History of European medicine, 16th to 20th centuries, by examining the development of medical knowledge in epidemiology and anatomy; function of this knowledge, how it changed with technological breakthroughs and professionalization; and role of medicine in attitudes toward poverty, women, race, disease. Offered in alternate years.

140. The Rise of Capitalism in Europe (4) III. Hagen
Lecture—3 hours; term paper. Prerequisites: course 4B or 4C. Comparative analysis of major interpretations of the rise of merchant capitalism during the Middle Ages and Renaissance; European expansion overseas, 1450-1815: the transition to modern capitalism via industrial revolution, interplay of social, political, cultural, and economic history. Offered in alternate years. General Education credit: Civilization and Culture/Non-Introductory. Recommended GE preparation: History 4A, 4B, or 4C.

141. France Since 1815 (4) II. Margadant
Lecture—3 hours; term paper.

142. Why the Holocaust? (4) II. Goodman
Lecture—3 hours; term paper. Long- and short-term causes of the Holocaust and anti-Semitism in Europe; the rise of modern anti-Semitism; national question in central Europe; anti-Semitism 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; essays. History of the Baltic, Danubian, and Balkan lands since the Middle Ages. National cultures and conflicts in the Polish Commonwealth, and the Habsburg and Ottoman Empires; nationalist movements, 1789-1914; the twentieth century, including an analysis of the contemporary scene.

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, 1789-1815 (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) II. Hummel
Lecture—3 hours; term paper. Survey of the history of Europe from 1919 to 1939.

146B. Europe in the Twentieth Century (4) III. Willett
Lecture—3 hours; term paper. Survey of the history of Europe since 1939.

147A. European Intellectual History, 1800-1870 (4) I. The Staff

147B. European Intellectual History, 1870-1920 (4) II. The Staff

147C. European Intellectual History, 1920-1970 (4) III. The Staff
Lecture—3 hours; term paper. European thought and culture since World War II. Coverage includes: literature and politics; Communist and Western Marxism; Fascism and anti-Fascism; Jewish culture; Particular attention to Lenin, Brecht, Hitler, Sartre, Camus, Beckett, Marcuse, Foucault, Woolf and de Beauvoir. General Education credit: Civilization and Culture/Non-Introductory. Recommended GE preparation: History 4C.

148A. Women and Society in Europe: 1500-1750 (4) III. Kudlick
Lecture—3 hours; term paper. Prerequisite: course 4B recommended. Roles and perceptions of women from the Renaissance to the French Revolution. Emphasis on social and economic factors as well as on discussions of women in the writings of political theorists and philosophers.

148B. Women and Society in Europe: 1750-1920 (4) II. Kudlick
Lecture—3 hours; term paper. Prerequisite: course 4C, 148A recommended. Roles and perceptions of women in the context of the European revolution to World War I, primarily in France and England. Emphasis on social and economic developments within a loosely chronological and comparative framework.

150. Ethnic Conflict and Anti-Semitism in Modern Europe (4) II. The Staff
Lecture—3 hours; term paper. Prerequisites: course 4C. Historical dynamics of ethnic conflict and radical nationalism in nineteenth- and twentieth-century Europe. Focusing on selected examples (e.g., the Habsburg Empire; the Celtic lands; forms and functions of anti-Semitism; Interpretations and consequences of the Holocaust). Offered in alternate years.

151A. England: The Middle Ages (4) II. The Staff
Lecture—3 hours; term paper. Prerequisite: course 44 recommended. Origins of England to the accession of the Lancastrians. Survey includes: Impact of Norman Conquest on Anglo-Saxon institutions; rise of the Church, common law, parliament, and the economy; thought, arts, and literature to the age of Chaucer and Wycliff.

151B. England: The Early Modern Centuries (4) II. 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 world economy; political and parliamentary 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 fit to engender the Industrial revolution.

151D. Industrial England (4) III. Landau
Lecture—3 hours; term paper. English history from Waterloo to the Battle of Britain; the rise and continuance of the first industrial society; the transformation of landed to mass society, oligarchy to democracy and bureaucracy, Bentham to Bloombery, empire to commonwealth.

154. Tudor and Stuart England (6) III. The Staff
Seminar—3 hours; reports and research paper. Prerequisites: courses 151A, 151B and/or consent of instructor. Intensive investigation of selected aspects of Tudor and Stuart history, emphasis on social problems and the arts and learning.

155A. British Foreign Policy since 1920: The End of the British Empire (4). I. The Staff
Lecture—3 hours; term paper. Prerequisite: upper division standing. How and why British passed as rapidly and by constitutional process from being the preeminent power in history to non-imperial, middle-grade status; the background against which the global responsibilities of the U.S. developed with equal rapidity.

155B. British Foreign Policy since 1920: Britain's Relations with the U.S. and the U.S.S.R. (4). I. The Staff
Lecture—3 hours; term paper. Prerequisite: upper division standing. Britain's supposedly intimate relationship with the U.S.; its modifications with change in power structure and with Britain's EEC membership; the effect of relations with the U.S.S.R. (and other NATO powers); efforts to achieve independent relations with the U.S.S.R.

161A. History of the Colonial Spanish Americas (4). I. Baur
Lecture-discussion—3 hours; written reports. Pre-Columbian civilizations of Middle America and the Andean region (mainly Aztec and Inca); the impact of European conquest and colonization; the formation of a hybrid culture. Extensive use of photographic slides. General Education credit: Civilization and Culture/Introductory.

161B. Latin American History (4) II. The Staff
Lecture-discussion—3 hours; written reports. Evolution of modern Latin America, from colonial to oligarchic rule; reform and revolution; the difficulties of the twentieth century. Emphasis on Mexico, Cuba, the Andean region, Chile, and Argentina. Photographic slides.

182. History of the Andean Region (4) III. Bauer
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.

184. History of Brazil (4) II. The Staff
Lecture—3 hours; written reports. The history of colonial and imperial Brazil from 1500 to 1889. Offered in alternate years.

*Course not offered this academic year.
168. History of Brazil (4) II. The Staff
Lecture-discussion—3 hours; term paper. The history of the Brazilian republic from 1889 to the present. Offered in alternate years.

*164. History of Chile (4) II. Bauer
Lecture—3 hours; term paper. Prerequisite: course 161A, 161D, 165, or 166 recommended. Emphasis on the history of Chilean political economy from 1930 to the present. Various strategies of development (modernization, Marxism, Neoliberalism). The role of mass politics and social relations as factors in political change. (Formerly Education credit: Contemporary Societies/Non-Introduction. Recommended GE preparation: History 4C, 179, or Political Science 2.)

165. Latin American Social Revolutions (4) I. The Staff
Lecture—3 hours; written reports. Major social upheavals since 1910 in selected Latin American countries. Similarities and differences in cause, course, and outcome. General Education credit: Contemporary Societies/Non-Introduction. Recommended GE preparation: History 4C, 179, or Political Science 2.

166. History of Mexico to 1440 (4) III. Bauer
Lecture-discussion—3 hours; written and/or oral reports. Political, economic, and social development of pre-Columbian and colonial Mexico to 1440. Offered in alternate years.

167. History of Mexico Since 1848 (4) III. The Staff
Lecture-discussion—3 hours; written and/or oral reports. History of Mexico from 1848 to the present. Offered in alternate years.

168. History of Inter-American Relations (4) II. Pappano
Lecture—3 hours; written reports. Diplomatic history of Latin America since Independence. Inter-American relations, relations with the United States, participation in international organizations, and communal life in Latin America.

169. Mexican-American History (4) I. Ruiz
Lecture-discussion—3 hours; written and/or oral reports. Economic, social, religious, cultural, and political development of the Spanish-speaking population of the Southwestern United States from about 1800 to 1910. General Education credit: Civilization and Culture/Non-Introduction. Recommended GE preparation: History 17A or 17B.

170. Mexican-American History (4) II. Ruiz
Lecture-discussion—3 hours; written and/or oral reports. Economic, social, religious, cultural, and political development of the Spanish-speaking population of the Southwestern United States from about 1800 to 1910. General Education credit: Civilization and Culture/Non-Introduction. Recommended GE preparation: History 17B.

170A. Colonial America (4) I. Jacobson
Lecture—3 hours; term paper. Colonial society from 1620 to the American Revolution, with emphasis on European expansion, political, social, and economic foundations, colonial thought, and cultural imperialism.

170B. The American Revolution (4) III. Jacobson
Lecture—3 hours; term paper. Analysis of the Revolutionary epoch with an emphasis on the structure 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. Jacobson
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-discussion—3 hours; written and/or oral reports. 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) I. 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).

171C. Intellectual History of the United States (4) III. ———
Lecture—3 hours; oral or written reports on reading. Panel discussion preparation. Prerequisite: course 175B or the equivalent; or a course in philosophy since the Renaissance, political theory, American literature, or sociological theory. Nineteenth-century American thought from the 1820's to about 1870, emphasizing transcendentalism, Jacksonian democratic thought, the impact of Darwinism, and pragmatism.

*175C. Intellectual History of the United States (4) III. ———
Lecture—3 hours; oral or written reports on reading. Panel discussion preparation. Prerequisite: course 175B or the equivalent; or a course in philosophy since the Renaissance, political theory, American literature, or sociological theory. Nineteenth-century American thought from the 1820's to about 1870, emphasizing transcendentalism, Jacksonian democratic thought, the impact of Darwinism, and pragmatism.

*Course not offered this academic year.
183B. The Frontline Experience: Time-Mississippi West (4) II. M. Smith
Lecture—3 hours; written and oral reports. Spared of the mining kingdom, the range cattle industry, Indian—military affairs, settlement of the Great Plains and Rocky Mountain regions and political organization of the West.

1858. History of Science in America (4) II. The Staff
Lecture—3 hours; research paper. Survey of the European background. Study of American scientific institutions, ideas, personalities, creative processes in science, and of relationships between society and science from colonial time to present.

1868. History of Technology in America (4) I. M. Smith
Lecture—3 hours; research paper. Study of American technology, emphasizing biographical approach to historical understanding of technological change, creative processes, institutions, ideas, and relationships between technology and society from colonial times to present.

187A. American Business History to the 1860s (4) I. Rothstein
Lecture—3 hours; term paper. Changes in the role of entrepreneurs, organizations, and management practices from the colonial period to the 1860s, with emphasis on the transition from mercantile capitalism to industrial capitalism, marketing, financial intermediaries, and concentration. Offered in alternate years.

187B. American Business History, 1860s to the Present (4) II. Rothstein
Lecture—3 hours; term paper. Changes in the role of entrepreneurs, organizations, and management practices from the 1860s 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) II. Rothstein
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/Non-introductory. Recommended GE preparation: History 17A, 17B, or Agrarian Studies 2.

188B. History of Agriculture in the U.S. since 1900 (4) II. Rothstein
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/Non-introductory. Recommended GE preparation: History 17A, Agrarian Studies 2, Agricultural Economics 120, or Political Science 1.

188A. History of California (4) I. M. Smith
Lecture—3 hours; written and oral reports. Spanish exploration and settlement; the mission as a frontier institution; revolt of the Californios; penetration by Mountain Men; pioneer trails and settlement; Bear Flag Revolt and Mexican War.

188B. History of California (4) II. M. Smith
Lecture—3 hours; written and oral reports. State constitution; land grant and Indian policies; Gold Rush; vigilism; railroad construction; the wheat era; changing economy; social and literary developments; Progressive reform.

198C. History of California (4) II. M. Smith
Lecture—3 hours; written and oral reports. Impact of World War I; conservative reaction of the 1920s; rise of organized labor; the automobile and moving picture industry; New Deal developments; changes with World War II; role of minorities; contemporary politics.

199A. Late Imperial China: Background to Revolution (4) I. Mann
Lecture—3 hours; discussion—1 hour; term paper. Political problems of China: life traced through the Ming and Ch'ing dynasties. Readings include literary materials in English translation (particularly novels) which reflect the social and intellectual scene, the elite culture as well as popular culture. Offered in alternate years.

199B. Late Imperial China: Background to Revolution (4) II. Li
Lecture—2 hours; discussion—1 hour; term paper. Political and social development in China from the early nineteenth through the early twentieth century. Emphasis on the impact of the West and the beginning of revolutionary change. Offered in alternate years.

199C. The Chinese Revolution (4) I. Price
Lecture—3 hours; term paper. Analysis of China's cultural and political transformation from Confucian empire into Communist state. Emphasis on the emergence of the People's Republic and the Cultural Revolution (to 1949), with some attention to its implications for post-revolutionary cultural and politics.

191A. Classical China (4) III. Price
Lecture—3 hours; term paper. History of Chinese civilization from its origins through the establishment of city states and the flowering of classical philosophy, to the rise and fall of the First Empire.

191B. High Imperial China (4) III. Price
Lecture—3 hours; term paper. Political and social development in China from the Han to the Manchus. Emphasis on the grand dynasties of T'ang and Sung and their influence on society, culture, and thought.

192. Internship in History (1-12) I, II, III. The Staff (Chairperson in charge)
Prerequisite: satisfactory performance on all or part of the professional sequence, or permission. Internship is available in business, government, non-profit agencies, and units of wide professional interest. Include the range of academic institutions. Offered in alternate years.

193. History of the People's Republic of China, 1949 to the Present (4) III. Mann
Lecture—2 hours; discussion—1 hour; term paper. Contemporary issues in Chinese history, including land reform, the Cultural Revolution, the post-Mao era, and China's foreign relations from 1949 to the present. Offered in alternate years.

194A. Aristocratic and Feudal Japan (4) I. Kinmonth
Lecture—3 hours; term paper and/or discussion. Broad survey of the cultural, social, religious, and political aspects of Japan from ancient times through the early modern period emphasizing the roles of the organizations, values, and beliefs associated with the aristocratic and feudal periods. Offered in alternate years.

194B. Early Modern Japan (4) III. Kinmonth
Lecture—3 hours; term paper and/or discussion. Survey of the cultural, social, religious, and political aspects of Japanese history from the seventeenth through the nineteenth centuries emphasizing the development of those patterns of thought and political organization which with Japan met the challenge of the nineteenth century Western expansionism.

194C. Modern Japan (4) II. Kinmonth
Lecture—3 hours; term paper and discussion. Survey of the cultural, social, political, and economic aspects of Japanese history in the twentieth century, emphasizing labor and social movements, militarism and the Pacific War, and the emergence of Japan as a major economic power.

194D. Business and Labor in Modern Japan (4) I. Kinmonth
Lecture—3 hours; term paper or papers. Survey of labor and management relations in Japan from the mid-eightheenth century to the present. Offered in alternate years.

194E. Education and Technology in Modern Japan (4) I. Metcalf
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 interaction of the civilizations of Hinduism and Islam and on the changing nature of the state.

196B. Medieval 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.

197T. Tutoring in History (2) I, II, III. The Staff (Chairperson in charge)
Discussion—1 hour; laboratory—3 hours. Prerequisite: enrollee as a History major with senior standing and consent of Department Chairperson. Tutoring of students in lower division courses. Weekly meeting with the Instructor. Tutoring in written reports on methods and materials required. May be repeated once for credit. No final examination. (PINP grading only).

198. Directed Group Study (1-5) I, II, III. The Staff (Chairperson in charge)
Prerequisite: consent of instructor; upper division standing. (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

201A. Sources and General Literature of History (4) I, II, III. The Staff
Seminar—3 hours; term paper. Selected primarily for students preparing for higher degrees in history. (A) Ancient; (B) Medieval; (C) Renaissance and Reformation; (D) Early Modern Europe; (E) Europe since 1815; (F) China to 1880; (G) China since 1880; (H) Britain; (I) Latin America since 1810; (J) American History to 1787; (K) United States, 1787-1866; (L) United States since 1866; (M) Modern Japan; (N) Cross-Cultural Women's History; (P) History of Science and Medicine; May be repeated for credit when different subject area is studied.

202A. 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. Readings, papers, and class reports. May be repeated for credit when a different subject area is studied.

203. Seminar Research (4) I, II, III. The Staff (Chairperson in charge)
Seminar—2 hours. Prerequisite: consent of instructor. Designed primarily for students preparing for higher degrees in history. Individual research and analysis resulting in substantial research paper. May be repeated for credit.

204A. Historiography (4) II. The Staff (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.

204B. New Methods in Historical Research (4) III. The Staff (Chairperson in charge)
Seminar—3 hours; research paper. Prerequisite: consent of instructor for non-History graduate students. Introduction to basic historical data, to the methods currently employed in historical research, and to the problems of presenting findings in a literary form.

211. Ancient History (4) I, II, III,
Seminar—3 hours. Prerequisite: courses 111A, 111B, 111C. Seminar dealing with the various aspects of Near Eastern and Greek-Roman civilization.

221. Medieval History (4) I, II, Bowsky
Seminar—3 hours. Prerequisite: courses 121A, 121B, 121C recommended. Topics in the history of medieval and early Renaissance Europe.

227. Russian History (4) I, II
Seminar—3 hours. Prerequisite: a reading knowl-
ed of Russian. Topics relating to the history of Muscovy and Imperial Russia before 1600.
245. History of the Enlightenment (4) III, Seminar—3 hours. Prerequisite: reading knowledge of French. Intellectual and social history of Europe during the Enlightenment. May be repeated for credit.
246. Modern European History (4) III. Seminar—3 hours. Prerequisite: course 245. Primary sources and research methodologies in the history of modern France and Germany. May be repeated once for credit.
247. Europe in the Twentieth Century (4) I. Willis Seminar—3 hours. Political history of Europe since 1919, with particular emphasis on the post-1939 period.
248. Latin American History (4) I, II, III. Bauer, Popkin Seminar—3 hours. Prerequisite: two courses in Latin American history; reading knowledge of Spanish or Portuguese.
252. Social History of Science and Technology in America (4) III. Sherwood Seminar—3 hours. Prerequisite: graduate standing.
255. College Teaching Internship (4) I, II, III. Sherwood Internship—4 hours. Prerequisite: course 200 (may be taken concurrently). Student prepares and teaches lower division history course in a nearby college community under the supervision of a UC Davis instructor and a community college instructor. (SU grading only)
256. Group Study (1-5) I, II, III. The Staff (Chairperson in charge) (SU grading only)
257. Research (1-12) I, II, III. The Staff (Chairperson in charge) (SU grading only)
258. Individual Study (1-12) I, II, III. The Staff (Chairperson in charge) (SU grading only)
259. Teaching History in the Community College (3) Sherwood

Discussion—laboratory—3 hours. Prerequisite: graduate standing. Designed for MAT majors, graduate students, and teachers of secondary school history. (SU grading only)

390. Teaching History in College (2) I, II, III. The Staff Discussion—2 hours. Designed for teaching assistants with emphasis on problems and procedures encountered by teachers of lower division classes at the university. (SU grading only)

**History and Philosophy of Science**

*(College of Letters and Science)*

James R. Griesemer, Ph.D., Program Director Program Office, 406 Surge IV (916-752-9621)

**Committee in Charge**

Betty J. Dobbs, Ph.D (History)
Michael R. Dietrich, Ph.D. (Philosophy, History and Philosophy of Science)
Paula E. Findlen, Ph.D. (History)
James R. Griesemer, Ph.D. (Philosophy)
Michael Smith, Ph.C. (History)
Paul Teller, Ph.D. (Philosophy)

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.

**Minor Program Requirements:**

- **History and Philosophy of Science**
- **Philosophy 104**
- **History 135A or 135B**
- **Four courses from those listed below. One course must be from each of three areas:**
  - a. History, b. Philosophy, and c. History and Philosophy of Science
  - **History 102, 136, 139A, 139B, 185A**
  - **Philosophy 106, 107, 108, 109, 110, 111**
  - **Science 130A, 130B, 150, 180**

**Courses in History and Philosophy of Science**

**Upper Division Courses**

- **130A. From Natural History to the History of Nature (4) I. Findlen**
  - Lecture/discussion—3 hours; term paper. Prerequisite: History 135 recommended. Evolution and demise of natural history as a discipline from Aristotle to Linnaeus. Consider the scientific method and its role in the Renaissance. These developments emphasize the emergence of biology, botany, zoology; the history of taxonomy and classification.

- **130B. History of Modern Biology (4) I. The Staff**
  - Lecture/discussion—3 hours; term paper. Prerequisite: course 130A recommended. Development of modern biology from pre-Darwinian roots to the present. Emphasizes modern biological speciation and consolidation of biological theory around evolutionary ideas. History of allied fields such as genetics, paleontology, embryology, ecology, systematics and molecular biology.

- **150. Gender and Science (4) II. The Staff**
  - Lecture/discussion—3 hours; term paper. An interdisciplinary approach to the questions between gender and science. Topics include the biological and cultural construction of sexual difference, the role of women in the sciences, and feminist approaches to science.

- **180. Topics in History and Philosophy of Science**
  - Lecture/discussion—1-3 hours; term paper. Prerequisite: consent of instructor. In-depth treatment of selected topics in the history and philosophy of science. Possible topics include: History of modern physics, history of molecular biology, science and society, scientific explanation, technology and culture, theory testing.

**Graduate Courses**

- **250. History and Philosophy of Science (4) III. The Staff**
  - Seminar—3 hours; term paper. Prerequisite: graduate standing or consent of instructor. Interdisciplinary seminar in the history and philosophy of science. Focuses on issues such as historiography, methodology, and the conceptual foundations of science. May be repeated for credit with consent of instructor.

**Home Economics**

*(College of Agricultural and Environmental Sciences)*

**Program of Study**

The Home Economics major is no longer available at UC Davis. If you have begun coursework for this major as an enrolled student before spring quarter 1987, you may complete a B.S. degree by following the major requirements as listed in a prior edition of this catalog.

**Courses in Home Economics**

**Lower Division Courses**

- **90. Challenges and Opportunities in Home Economics (1) I, III**
  - Seminar—1 hour. Specialized in selected areas of home economics address current issues facing today's professional including challenges, opportunities, and prospects for appropriately trained university graduates. May be repeated once for credit with consent of instructor. (P/N grading only) Offered in alternate years.

- **92. Internship in Home Economics (1-12) I, II, III**
  - The Staff Internship—3-36 hours. Prerequisite: consent of instructor. Work experience off and on campus in a home economics related area. Internship supervised by a member of the faculty. (P/N grading only)

**Upper Division Courses**

- **192. Internship in Home Economics (1-12) II, III**
  - The Staff Internship—3-36 hours. Prerequisite: consent of instructor. Work experience off and on campus in a home economics related area. Internship supervised by a member of the faculty. (P/N grading only)

- **198. Directed Group Study (1-5) I, II, III**
  - The Staff Prerequisite: consent of instructor. (P/N grading only)

- **199. Special Study for Advanced Undergraduates (1-5) I, II, III**
  - The Staff Prerequisite: consent of instructor. (P/N grading only)

**Home Economics Education**

See Agricultural Education
Horticulture
(A Graduate Group)

David W. Burger, Ph.D., Chairperson of the Group
Group Office, 1035 Wickson Hall
Faculty. The faculty includes departmental members of
Environmental Horticulture, Pomology, and Viticulture
and Enology.

Graduate Study. The Graduate Group in Horticulture
offers programs of study leading to the M.S. degree.
The programs provide opportunities for specializa-
tion in the production and management of horti-
cultural plants and the post-harvest handling of horti-
cultural commodities. Areas of specialization include:
floriculture, nursery production, landscape horti-
culture, pomology, and viticulture. Research may be
conducted on an applied or basic problem having
physiological, nutritional, genetic, or ecological
emphasis.

Preparation. A level of competence equivalent to
that of a sound undergraduate program in Plant
Science is required. This includes coursework in gener-
al chemistry, physics, quantitative methods, genetics
and plant physiology. A thorough understanding of
these areas should be equivalent to that of a sound
undergraduate program in Plant Science.

Graduate Advisers. Consult the Group Office.

Courses in Horticulture

Graduate Courses

251. Modeling Horticultural Systems (3) II. Lsth
Lecture—2 hours; laboratory—3 hours. Prerequisite:
Plant Science 101, calculus, or consent of instructor.
Introduces students to systems modeling. Primarily
emphasizes on physiological and ecological models
with examples drawn from areas of interest to class
participants. Applications to horticultural systems
will be explored. Students will receive hands-on experi-
ence.

200. Seminar (1, I, II. III. The Staff
Seminar—1 hour. Prerequisite: graduate standing at
UCD. Seminars presented by invited speakers, stu-
dents, or faculty on selected topics in horticulture.
(SU grading only.)

Human Anatomy

See Cell Biology and Human
Anatomy in Medicine, School of

Human Development

(College of Agricultural and Environmental Sciences)

Faculty
See under Department of Applied Behavioral
Sciences.

The Major Program

Human development explores the developmental
process in humans throughout the life cycle.

The Major Program

Human development explores the developmental
process in humans throughout the life cycle.

The Program. Human development majors complete
a group of preparatory courses in anthropology, bio-

chology, statistics, and human development. Upper
division students can design their programs in
consultation with a faculty member to emphasize a par-
ticular area of interest. For instance, students can study
the social and the biological aspects of human develop-
ment while emphasizing child or adult development.

Internships and Career Alternatives. At least one
practicum course is required. In addition, students
can intern in internship 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 elementary and special educational
settings, as well as governmental jobs related

...and special educational settings, as well as governmental jobs related
to social welfare and recreation. Those who

emphasize the biological aspect of human development
can apply to medical school or choose para-
medical positions within the health sciences. Human
devolution prepares students to pursue advanced
degrees in the behavioral sciences, education, child

...and special educational
settings, as well as governmental jobs related
to social welfare and recreation. Those who

emphasize the biological aspect of human development
can apply to medical school or choose para-
medical positions within the health sciences. Human
devolution prepares students to pursue advanced
degrees in the behavioral sciences, education, child

guidance, social work, health sciences, or further
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. Either one equivalent or more
comprehensive courses are acceptable. Courses
shown without parentheses are required.

UNITS

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<tr>
<th>Course Description</th>
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<td>Additional English (Choose from English 102, 103, 104)</td>
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<td>Preparatory Subject Matter</td>
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<td>Anthropology 1, 2, and 15</td>
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<td>Biological sciences (Biology 10, 10E, 10F)</td>
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<td>Genetics (10 or 100)</td>
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<td>Human development (Human Development 30)</td>
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<td>Statistics (Math 105)</td>
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<tr>
<td>Physiology (10 or 110 or Biological Sciences 1B)</td>
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<tr>
<td>Psychology (Psychology 1 or 15)</td>
<td>3-4</td>
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<tr>
<td>Social Science (Sociology 114, Psychology 41, Sociology 46A and 46B, or Statistics 13)</td>
<td>4</td>
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Chemistry 1A is recommended prerequisite for Biological Sciences 1A.

The Biological Sciences 1A and 1B series will satisfy the Biological
Science, Genetics, and Physiology requirements.

Breadth/General Education | 14-32 |
| Satisfaction of General Education requirement | 8-24 |
| American history/ American government (History 17A, 17B, 72A, 72B, and Political Science 1 are recommended courses) | 8 |

Depth Subject Matter | 52 |
| 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 140-149) | 4 |
| or 141 | 4 |

Four additional upper division courses chosen from the Human Development courses or a list of restricted electives (in consultation with faculty ad-
viser) | 16 |

Unrestricted Electives | 40-67 |
Total Units for the Degree | 180 |

Major Adviser. L.V. Harper.

Related Major Program. See the major in Applied
Behavioral Sciences.

Minor Program Requirements:

UNITS

Aging and Adult Development | 21-27 |
Human Development 100C, 160, 191 | 8 |
Community Health | 180 | 3 |
Human Development 110, 110A, 110B | 2 |
Practicum, 2 units minimum | 26 |
Minor Adviser. L.V. Harper.

Human Development | 20 |
Human Development 100A | 4 |
Human Development 100B or 100C | 4 |
Human Development 110 or 103 or 151 | 4 |
Two courses from Human Development 101, 102, 130, 131, or 132 | 8 |
Minor Adviser. L.V. Harper.

Graduate Study. Refer to the Graduate Division sec-
tion in this catalog.

Courses in Human Development

Questions pertaining to the following courses
should be directed to the Instructor, to the Ap-
plied Behavioral Sciences Advising Office, 101
ACB 4 (916-752-2244).

Lower Division Courses

12. Human Sexuality (2) I, II. III. Qanti
Lecture—2 hours. Vocabulary; structure and function of genital system; sexual response; menstruation; fetal growth and development; child care; sex in religion and law; sex education; homosexuality; masturbation; establishing and maintaining intimacy; intimate communication; attitudes and values; sexual dysfunctions; lovemaking. (P/NP grading only)

15. Family and the Life Cycle (4) I. Walker
Lecture—4 hours. Prerequisite: Psychology 1, or 15
and 16. Socialization in families throughout the life
cycle. Impact of alcoholism and abuse. Sources of
strength and help. Not open for credit to students who
have completed courses 100A, 100B, 110 and/or Psy-
chology 112, 114, and 115. General Education credit:
Contemporary Societies/Non-Introductory. Recom-

19. Life Cycles, Kinship, and Growth in Human
Populations (4) I. Carey
Lecture—3 hours; discussion—1 hour. Human popu-
lations at different levels of organization: including
life cycle, family cycle, race, ethnicity, geneology,
and population traits and changes. General Educa-
tion credit: Nature and Environment/Introductory.

30. Observation Techniques in Human Develop-
ment (4) I, III. Stockman
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
tyerears; analysis and use of observational data.
Students may not preenroll for this course, but must
sign up for laboratory time at the Early Childhood
Laboratory prior to fall semester enrollment.

53. Directed Group Study for Undergraduates
(1-5) I, II. The Staff
Prerequisite: consent of instructor. (P/NP grading
only)

99. Special Study for Undergraduates (1-5) I, II, III.
The Staff (Chairperson in charge)
(P/NP grading only)

Upper Division Courses

100A. Infancy and Early Childhood (4) I. Harper
Lecture—4 hours. Prerequisite: Psychology 1 or 15,
Biological Sciences 1A or 10. Analysis of the biologi-

*Course not offered this academic year.
100B. Middle Childhood and Adolescence (4). II.
The Staff.
Lecture—4 hours; three brief observations of school-age children. Prerequisite: course 100A or the equivalent; introductory biology, analysis of the interplay of biological and cultural factors in the emotional, cognitive and social development from middle childhood through adolescence.

100C. Adulthood (4) III. The Staff.
Lecture—3 hours; to be arranged—1 hour. Prerequisite: course 100B or Psychology 1 or 16. Biological, cognitive and social psychological aspects of adult development.

101. Cognitive Development (4) II. The Staff.
Lecture—4 hours. Prerequisite: courses 100A-100B or Psychology 112. Theories of cognitive development including developmental views of perception, learning, memory, concept formation, and language.

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 cultural skills.

103. Cross-Cultural Study of Children (4) III. Werner.
Lecture—4 hours. Prerequisite: course 100A or consent of instructor. Cross-cultural studies of children in developing countries and among minority groups in the U.S.

110. Contemporary American Family (4) III.
Chisholm.
Lecture—4 hours. Prerequisite: Introductory psychology; Factors currently influencing American families including changing economic conditions, changing sex roles, divorce, and parenthood; theories and research on family interaction.

Lecture—4 hours; laboratory-discussion—1 hour. Prerequisite: courses 100A and 100B; elementary statistics. Research methods in selected areas of human development (i.e., infancy, learning, cognition, personality).

121. Psychopathological Assessment (4) I. The Staff; III. Barton.
Lecture—4 hours. Prerequisite: courses 100A-100B; elementary statistics. Current issues and methodology related to the process of psychological assessment with children and adolescents.

130. Emotionally Disturbed Children (4) I. Bryant.
Lecture—3 hours; discussion—1 hour. Prerequisite: courses 100A-100B or consent of instructor. Discussion of emotional and behavioral disorders in children.

Lecture—4 hours. Prerequisite: course 100A or consent of instructor. Mental retardation and special learning disabilities; etiology, diagnosis, education and socialization. Introduction to community resources.

132. Individual Differences in Giftedness (4) III.
Kraft.
Lecture—3 hours; discussion—1 hour. Prerequisite: courses 100A-100B or consent of instructor. Conceptualization, identification and education of the intelligent, the creative and the talented, gifted individual.

140. Communication and Interaction with Young Children (2). I, II. Stockman.
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. Students may not preregister for this course, but must sign up for laboratory time at the Early Childhood Laboratory prior to in-person enrollment.

140L. Laboratory in Early Childhood (3-6). I, II. Stockman.
Discussion—1-3 hours; laboratory—6-12 hours. Prerequisite: course 140L 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 required for credit for a total of 12 units.

141. Field Studies with Children and Adolescents (4-8). II, 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 effective, cognitive and social development within the context of family/school environments, hospital and foster group homes. May be repeated for credit for a total of 12 units following consultation with and consent of instructor.

142. Field Studies with Exceptional Children (4-6) I. Bryant.
Discussion—1-2 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 emotionally disturbed, or intellectually gifted. May be repeated for credit for a total of 12 units following consultation with and consent of instructor.

150. Supervision and Administration of Early Childhood Education Programs (4). Waker.
Lecture—40 hours total. Prerequisite: course 140 or prior experience in an early childhood education program. History of early childhood programs in California, federal aid and local regulations and local implica- tions of different regulations for funds and budgets; policy making mechanisms; professional and legal responsibilities; staff development; and professional attitudes and issues.

151. Child-Child Care (4) II. 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, staff, and employers on the development of children’s development. Reviews child care legislation and social policy issues.

160. Social Aspects of Aging (4) II. Adkin.
Lecture—4 hours. Prerequisite: course 100C or Psychology 115. How the social context affects adult development and aging. Emphasis on demography, social policy and culture, and adaptation. Oral histories as class material.

190C. Introductory Research Conference (1) I, II, III. The Staff.
Discussion—1 hour. Prerequisite: enrollment in ongoing research. Participants discuss topics of research projects and the progress of current research. Students present their research projects in class and are evaluated on the basis of participation and presentations.

191. Proseminar: Issues in Aging (2) I. The Staff.
Seminar—2 hours. Prerequisite: upper division standing. 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 off 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.

Lecture—3 hours; discussion—1 hour. Prerequisite: Graduate standing; basic biology/psychology; one upper division course in psychology or a related field; one upper division or graduate course in development psychology (may be taken concurrently). Theory and research on the biological, social, cognitive, and cultural aspects of development from conception to the age of five years.

200B. Middle Childhood and Adolescence (4). II.
Lecture—3 hours; discussion—1 hour. Prerequisite: Graduate standing; basic biology or psychology, and at least two upper division or graduate-level courses in psychology or related fields. Research on biological, social, cognitive, and cultural influences on behavioral development from ages five years until late adolescence.

200C. Development in Adulthood (3) III. Aldwin and Ober.
Lecture/discussion—3 hours. Prerequisite: courses 200A and 200B. Theory and research focusing on social, personality, cognitive, and biological development from early to late adulthood. Emphasis is on theory development and continuity and change.

201. Social-Emotional Development in Infancy (4) I. The Staff.
Lecture-discussion—4 hours. Prerequisite: course 201. 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 psychological topics include the interplay of sensory, sex differences, compliance, and self-regulation.

203. Development in Middle Childhood (3) II.
Bryant.
Seminar—3 hours. Prerequisite: graduate standing; human development in developmental psychology or human development; consent of instructor. Critical evaluation of current theory and research regarding normal and abnormal development in middle childhood. Emphasizes social-emotional development in varying contexts (family, school, neighborhood) and considers the interplay of cognitive, biological, social, and emotional processes during middle childhood. Offered in alternate years.

211. Theories of Behavioral Development (3) III.
Werner.
Lecture—2 hours; discussion—1 hour. Prerequisite: graduate standing in behavioral sciences. Consideration of enduring issues in theories of behavioral development: analysis of major theoretical schools (e.g., social learning, Piagetian) as scientific theories. Offered in alternate years.

214. Physiological Correlates of Behavioral Development (3) III.
Harter.
Seminar—3 hours. Prerequisite: consent of instructor. An overview of mechanisms of organismic development and the implications of developmental biology for the analysis of behavioral ontogeny; consideration of parallels between processes of organismic development and behavioral development in children and infra-human mammals.

215. Cross-Cultural Study of Children (3) III.
Schwab.
Lecture—2 hours; discussion—1 hour; field project or paper. Prerequisite: graduate standing in Human Development, Education, Anthropology, Psychology or Sociology. Current theory and research concerned with comparative child development. Introduction into the major issues and methods of cross-cultural research (e.g., biological, cognitive and social development of children in different cultures and subcultures in U.S.A.).

216. Development of Cortical and Perceptual Latency (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 latency emphasizing the relationship of this development to thinking and behavior.

220. Research Methods in Human Growth and Development (3) II. The Staff.
Lecture—3 hours. Prerequisite: Statistics 13 or the
equivalent and at least two upper division courses in human biology or developmental psychology. Theory and research methods in biological growth, and cognitive and socioemotional development from prenatal period to death.

221. Psychological Assessment of Children (4) Ill. Barton 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.

*225. Behavioral Development and Food Intake (4) Ill. Politt Lecture—3 hours; discussion—1 hour. Prerequisite: graduate standing in Human Development (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) Ill. Kraft Seminar—3 hours. Prerequisite: consent of instructor. Study and evaluation of key issues in the theoretical and empirical literature on cognitive and linguistic development.

232. Cognition and Aging (3) I. Ober Lecture/discussion—3 hours. Prerequisite: course 200! The manner in which cognitive processes are affected by aging as well as an understanding of the changes in the central nervous system occurring with aging. Offered in alternate years.

*237. Parent-Child Interaction (3) Ill. The Staff Seminar—3 hours. Prerequisite: consent of instructor: upper division course on the family recommended. Current theory and research. Emphasis on parental behavior in other animals and other cultures, child-rearing practices, the child's perception of parental behavior, the potential influence of each parent on the child's psychological well-being, sex-role development, and moral development.

*241. Consultation Approaches to Child Development (3) I. 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. A critical analysis of consultation approaches and child development to facilitate delivery of client-related services (e.g., educational and mental health). Develop working knowledge of consultation skills for working with adults directly interacting with children and adolescents.

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.

290. Seminar (I) I, II. III. The Staff Seminar—3 hours. Discussion and evaluation of theories, research, and issues in human development. Different topics each quarter.

*290C. Research Conference (1) I, II, III. The Staff Discussion—1 hour. Prerequisite: graduate standing and consent of instructor. Supervising instructors lead research discussions with their graduate students. Research papers are reviewed and project proposals are presented and evaluated. May be repeated for credit. (SU grading only.)

291. Research Issues in Human Development (3) I. The Staff; II. Werner Lecture—3 hours. Prerequisite: graduate standing in the behavioral sciences. In-depth presentations of research issues in particular areas of behavioral development.

298. Group Study (1-5) I. Chisholm; II. III. The Staff (Chairperson in charge)

299. Research (1-12) I, II. III. The Staff (Chairperson in charge) (SU grading only.)

HUMANITIES

(16 credits)

Humanities

(16 credits)

James J. Murphy, Ph.D., Program Director
Program Office, 922 Sprout Hall (916-752-1219)

Committee In Charge

Ingebord Henderson, Ph.D., (German)
Robert H. Hopkins, Ph.D., (English)
Earl H. Konrath, Ph.D., (History)
James J. Murphy, Ph.D., (Rhetoric and Communication, English), Chairperson
Lynn E. Roller, Ph.D., (Classics)

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

Lower Division Course

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

140. Advanced Computing in the Humanities (4) II. Roddy Lecture—3 hours; laboratory—3 hours; research project. Prerequisite: course 40 or consent of instructor. The computer as support for the humanities. Topics include advanced textual analysis, editing, vocabulary control, and data base management (design, application and evaluation, and search strategies).

180. Topics in the Humanities (4) I, II, III. The Staff Lecture—discussion—4 hours; term paper. Analysis of interdisciplinary issues in the humanities. Topics will vary. May be repeated once for credit.

198. Directed Group Study (1-4) I, II, III. The Staff (Chairperson in charge)
Prerequisite: consent of instructor. (P/NP grading only.)

199. Special Study for Advanced Undergraduates (1-4) I, II, III. The Staff (Chairperson in charge)
Prerequisite: consent of instructor. (P/NP grading only.)

Graduate Courses

250. Topics in the Humanities (I, II, III. The Staff (Program Director in charge)
Seminar—3 hours; term paper. Prerequisite: graduate standing or consent of instructor. Topics in the humanities, selected by the instructor. May be repeated once for credit.

299. Individual Research (1-4) I, II, III. The Staff (Program Director in charge)
Individual research in the humanities resulting in a formal written research report. (SU grading only.)

HYDROLOGIC SCIENCES (A GRADUATE GROUP)

Mark E. Grismer, Ph.D., Chairperson of the Group Office, 113 Wilm Hall
(916-752-8243/0483)
Faculty. The Group consists of faculty members from the Departments of Civil Engineering; Environmental Studies; Geography; Geology, and Land, Air and Water Resources.

Graduate Study. The Graduate Group in Hydrologic Sciences is a unique interdisciplinary program offering M.S. and Ph.D. degrees. 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 Sciences program is a core curriculum of courses in fluid dynamics, hydrologic phenomena, hydrogeochemistry, hydrologic techniques, and hydrologic policy. The program has three degree options including Water Resources, Groundwater Hydrology (Hydrogeology) and Hydrogeochemistry. Presently, only the option in Groundwater Hydrology is well defined. The remaining options are under development.

Preparation. Applicants to the program are expected to have completed or to be in the process of completing an undergraduate degree in some aspect of the 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 advanced mathematics, applied statistics, and computer programming are recommended.

Specialization. Each student will pursue an individual program of advanced study under the direction of a group of faculty members with similar interests but diverse backgrounds. Course work in addition to the above is typically taken in the most appropriate departments.

Graduate Adviser: M.E. Grismer (Land, Air and Water Resources).

Graduate Courses


Immunology (A Graduate Group)

M. Eric Gerakh, M.D., Chairperson of the Group Office, 3146 Medical Sciences-1A
(916-752-3392)
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, Immunoochemistry, Immunogenetics, cellular immunology, clinical immunology, and tumor and development 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, immunology, human genetics, general physics, chemistry, and biochemistry.

For work leading to the Ph.D. degree, the requirements include cell biology, chemical immunology,
Individual Major
(Colleges of Agricultural and Environmental Sciences and Letters and Science)

The Major Program
The Individual Major, an integrated program composed of courses from two or more disciplines, designed by the student and 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 a single framework of the 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.

College of Agricultural and Environmental Sciences
Program Office, 122 Hoagland Hall (918-752-0610)

B.S. Major Requirements:

Preparatory Subject Matter ................................ (variable)
Lower division courses basic to the program or needed to satisfy prerequisites for upper division requirements.

Depth Subject Matter .................................................. 45
An individualized program of 45 upper division units from two or more areas of study. At least 30 of the 45 units must be taken from courses provided by the College.

Unrestricted Electives .............................................. (variable)

Total Units for the Degree ........................................ 180

Additional requirements
At least 54 of the 180 units needed for graduation must be upper division. The College also requires satisfaction of the General Education Requirement and not less than 7 units in English and/or Rhetoric and Communication courses that emphasize written or oral expression (as documented in College requirement).

Master Adviser. C.L. Keen (Nutrition). The course of study must be developed in consultation with the Master Adviser, and two or more faculty members prior to final review by the Individual Major Committee for the College.

Incoming transfer students applying for an Individual Major will be admitted into the Exploratory Program.

College of Letters and Science
Program Office, 150 Mraz Hall (Dean's Office), (918-752-0392)

Committee in Charge
Ed M. Bernoulli, Ph.D. (Physical Education)
Robert D. Glazier, Ph.D. (Mathematics)
Robert M. Murphy, Ph.D. (Chemistry)
Peter M. Schaeffer, Ph.D. (German and Russian)

A.B. and B.S. Major Requirements:

Preparatory Subject Matter ........................................ (variable)
Lower division courses basic to the program or needed to satisfy prerequisites for upper division requirements.

Depth Subject Matter ............................................... 45-54
Upper division units must include:
   a. Interrelated and complementary courses from two or more departments which provide a unified pattern and focus;
   b. At least 30 units from Letters and Science teaching departments or programs;
   c. No more than 10 units in courses numbered 194H, 198 and 199;
   d. For the A.B. degree, a maximum of 30 units toward the major; for the B.S.
degree, a maximum of 110 units toward the major.

Total Units for Degree ............................................. 180

Student Proposal. A student submits to the Dean's Office a major proposal and an essay, discussing educational purposes, personal or professional objectives, along with faculty letters of recommendation. After review, the Faculty Committee on Individual Majors evaluates the proposal and provides final action.

Major Advisers (selected by student). Principal Adviser: a faculty member teaching in the department or program in the College of Letters and Science and major field of emphasis. Secondary Adviser: a faculty member from secondary area of interest.

Honors Program. Toward the end of the junior year, students potentially eligible for high or highest honors at graduation (see College section), may petition the individual Majors Committee for tentative acceptance into an honors program.

Final admission will depend upon the Committee's approval of a senior thesis prospectus that has been agreed upon by the student and faculty adviser. The prospectus must be presented to the Committee during the first quarter of the senior year. Graduation with high or highest honors will be conditional upon both the maintenance of the required grade-point average and the completion of the senior thesis project.

Students who anticipate doing a senior honors thesis should allow up to 3 units of independent study in the program during each of the last quarters in the senior year as course options.

Integrated Studies
(Colleges of Letters and Science)
Nora A. McGuinness, Ph.D., Program Director
Program Office, 816 Spruill Hall (918-752-3377)

Committee in Charge
Daniel R. Crow, Jr., Ph.D. (History)
Richard T. Curley, Ph.D. (Anthropology)
Kurt Krein, Ph.D. (Mathematics)
Nora A. McGuinness, Ph.D. (Integrated Studies)
Jay Meichling, Ph.D. (American Studies)
Daniel L. Wick, Ph.D. (Integrated Studies)

Faculty
John Boyle, Ph.D., Lecturer (English)
Thomas A. Cahill, Ph.D., Professor (Physics)
Richard T. Curley, Ph.D., Associate Professor (Anthropology)
Donald Gibbs, Ph.D., Associate Professor (Biology and Japanese)
Bruce M. Hackett, Ph.D., Associate Professor (Sociology)
Jared Haynes, Ph.D., Lecturer (Writing Center)
Nora A. McGuinness, Ph.D., Lecturer (Integrated Studies)
Jay Meichling, Ph.D., Professor (American Studies)
Deborah Pinnock, M.A., Lecturer (Music)
Ted H. Reid, Ph.D., Professor in Residence (Ophthalmology)
Mark Sanders, Ph.D., Lecturer (Genetics)
Eric Schroeder, Ph.D., Lecturer (History)
Kenneth L. Vercob, Ph.D., Professor (Geology)
Daniel L. Wick, Ph.D., Lecturer (Integrated Studies)

The Program of Study
Integrated Studies is an invitational freshman honors residential program offering specially designed courses in humanities, social sciences, and arts.
3A. Contemporary Societies: History In Our Time (4) L. Wick Lecture—4 hours. The Western World since the second World War covering the Cold War, European recovery, and the emergence of Socialist democracies, the spread of Communist regimes in Eastern Europe and the USSR, and the detente of the 70’s. General Education credit: Contemporary Societies/Introductory.

3B. Society Through Literature: Modern Europe (4) L. Wick Lecture—4 hours; discussion—1 hour. Readings and discussion concerning European experience as related to the Russian revolution, 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/Introductory.

3C. Society Through Literature: Modern China (4) II. Gibbs Lecture—3 hours; discussion—1 hour. China’s twenty-first-century experience: national humiliation, invasion, isolation, opposition, and the overthrow of ancient values, as reflected in short stories, novels, poetry, and film. General Education credit: Civilization and Culture/Introductory.

3D. Contemporary Societies: Speech, Privacy, and Conscience (4) L. Crockett Discussion—4 hours. An 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, obscenity, and the social and political aspects of privacy and atheism. General Education credit: Contemporary Societies/Introductory.

3E. Contemporary Societies: Sociology (4) III. Hackett Lecture—2 hours; discussion—2 hours. Introduction to sociology, social life in the United States. General Education credit: Contemporary Societies/Introductory.

8. Colloquium (1) I, II, III. The Staff (N. McGuinness in charge) Discussion—1 hour. Lectures, films, and readings on the topic of the arts and sciences. May be repeated for credit. (P/NP grading only.)

9A. Special Topics In Natural Science and Mathematics (4) II, III. The Staff Lecture—3 hours; discussion—1 hour. Group study of a special topic in natural sciences and mathematics. Course credit varies with topic offered. Limited enrollment. May be repeated for credit. General Education credit: Natural Environment/Introductory.

9B. Special Topics In Humanities (4) II, III. The Staff Lecture—4 hours; discussion—1 hour. Group study of a special topic in humanities. Course credit varies with topic offered. Limited enrollment. May be repeated for credit. General Education credit: Natural Environment/Introductory.

9C. Special Topics In The Social Sciences (4) II, III. The Staff Lecture—4 hours; discussion—1 hour. Group study of a special topic in social sciences. Course credit varies with topic offered. Limited enrollment. May be repeated for credit. General Education credit: Contemporary Societies/Introductory.

9. Seminar (1) I, II, III. The Staff (N. McGuinness in charge) Lecture—1 hour. Lectures, films, and readings on the theme for the year. May be repeated for credit. (P/NP grading only.)

Internal Medicine

See Medicine, School of...
International Agricultural Development 10, 110

International Agricultural Development (International Agricultural Development 101, 102, 103, 141, 190, 191, 195, 198)

Economics and social sciences: Economics 1A-1B and two upper division courses relevant to development (Agricultural Economics 102A, 108, 109, 111, 116 or 113, 114, 115, 147, 150, 160; Economics 100, 100M, 100A, 115A, 115B, 118; Anthropology 126, 131, 135; Applied Behavioral Science 153; Political Science 126, 148A, 148B; Sociology 144, 145)

Primary Field of Specialization 60
Natural Sciences or Social Sciences: Courses chosen by student, with an adviser that specializes in, to include additional preparation required for a particular specialization, depth subject matter, and supporting disciplines.
Natural Sciences: Student should include some coursework in physical sciences and social sciences appropriate to the geographic area of personal interest (e.g., anthropology, geography, history, political science, economics, and life sciences). 

Unrestricted Electives 1-34

Students not possessing a reading/speaking ability in a foreign language will be encouraged to use these electives for foreign language study or to attend an intensive language school.

Total Units for the Degree 180

Specialization Adviser A listing of faculty in the various areas of specialization and with interests in International Agricultural Development is available from the Major Adviser.

Major Adviser S. B. Brush (Applied Behavioral Sciences)

Minor Program Requirements:

International Agricultural Development 20

International Agricultural Development 101, 102, 110

Minimum of four units from International Agricultural Development 101, 102, 103, 141, 190, 195, Economics 115A-115B, Vegetable Crops 150, Agronomy 100, 100A, 100B

Minor Adviser S. B. Brush (1A4 AOB 4)

Graduate Study A program of study and research leading to the M.S. degree is available in international agricultural development. Detailed information regarding graduate study may be obtained by writing to the Coordinator of Graduate Recruitment (L.A.D.), Graduate Division, UC Davis.

Graduate Advisers S. B. Brush, (Applied Behavioral Sciences); D.J. Boyd (Anthropology); K. C. Cashman (Agricultural and Range Science); L.S. Jarvis (Agricultural Economics)

Related Courses: See Agricultural Economics 148, 215C; Agronomy 111; Animal Science 180; Anthropology 221, Economics 115A-115B, 118, 215A-215B-215C; Geography 142; Nutrition 20; Sociology 144; Vegetable Crops 150.

Courses in International Agricultural Development

Questions pertaining to the following courses should be directed to the instructor or to the Department of Applied Behavioral Sciences, Advising Center in AOB 4 (916-752-2244).

Lower Division Courses

10. Introduction to International Agricultural Development (4) I. Brush
Lecture—3 hours; discussion—1 hour. Theories, practices and institutions relating to agricultural development; the interaction of social, cultural, and economic organization through various stages of economic development; impact of new agricultural technology on underdeveloped regions. General Education credit: Contemporary Societies/Non-Introduction credit: preparation: Economics 1A-1B or Anthropology 2.

12. 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) I. Buddenhagen (Agricultural and Range Science)
Lecture—4 hours. Prerequisite: Plant Science 2 or Biological Sciences 1C, and Soil Science 100 or Agronomy 100. Environment and management factors 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 Resources Animal Agriculture (4) I. Brown (Animal Science)
Lecture—3 hours; laboratory—3 hours; field work—one Saturday. Prerequisite: Animal Science 2 or consent of instructor. Diverse production objectives of limited resource animal production systems in an environmentally and economically sound manner without compromising welfare of animals. Management, engineering, and production in progressively more complex systems.

103. Social Change and Agricultural Development (4) I. Brush

110. Agricultural Production Economics (4) I. The Staff
Lecture—4 hours. Prerequisite: upper division status and an introductory course in microeconomics (Economics 1A). Economic analysis of agricultural production in low income countries, from field-level data collection to national food policy. Emphasis is given to construction and use of farm models in project evaluation.

111. Agricultural Marketing Systems (4) II. The Staff
Lecture—4 hours; discussion—1 hour. Prerequisite: upper division status and an introductory course in microeconomics (Economics 1A). Economic analysis of agricultural marketing systems in low income countries, including the functions of transportation, storage, packaging, handling, grading and standardization, processing, and marketing. Emphasis is given to evaluation of interventions in marketing systems to speed economic development.

141. Technology for Agriculture in Developing Regions (3) I. Chancellor (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, site-scale, costs, support infrastructure development, and productivity potentials. (Same course as Agricultural Engineering Technology 141.)

190. Seminar in International Agricultural Development (1-12) I, II, III. The Staff
Seminar—1 hour. Presentation and discussion of current topics in international agricultural development by visiting lecturers, staff and students. May be repeated for credit.

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 and impact on developed nations—variable content. May be repeated for credit.

192. Internship (1-12) I, II, III. The Staff (Chairperson in charge)
Internship—3-36 hours. Prerequisite: consent of instructor. Supervised internship, off and on campus, in community and institutional settings. (P/NP grading only)

195. Field Study in Agricultural Development (3) III. The Staff
Lecture—2 hours total; seminar—4 hours total; field work—overnight trips to cities in California (four two-day visits) or Mexico (one eight-day visit). Students will incur travel expenses. Observation of agricultural development strategies and impact on rural communities. Discussion with farmers, workers and organizational staff members. Study of farm commodities, institutions and experiences in dealing with agricultural development problems. International influence on United States agriculture. (P/NP grading only)

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

199. Special Study for Advanced Undergraduates (1-5) I, II, III. The Staff (Chairperson in charge)
(P/NP grading only)

Graduate Courses

200. Analysis and Determinants of Cropping Systems (4) I. The Staff
Lecture—3 hours; discussion—1 hour. Prerequisite: course 101, Agricultural Science and Management 150 (or comparable statistics course). Cropping systems as a function of farm objectives, resource availability, environment, and yield potential. Interaction among management strategies, resource use efficiency, and the agroecosystem; stability, diversity, and sustainability of cropping systems.

201. The Economics of Small Farms and Farming Systems (4) I. 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 economic environment, and for proposing government policies to increase small farm production and improve farmer and national welfare.

202. Social Systems and Agricultural Development (4) I. Orkove
Lecture—3 hours; discussion—1 hour. Prerequisite: upper division courses 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; adoption of rural people to development process; agrarian movements and revolution; evaluation of theories of rural development; analysis of social organization to design and implementation of rural and agricultural policies and programs.

203. Management Systems for Agricultural Development (4) I. Wolf (Graduate Group Chairperson in charge)
Lecture—3 hours; discussion—1 hour. Prerequisite: consent of instructor. Concepts or 201 or 200 as consent of instructor. Contexts of agricultural and rural development: strategies for program implementation; planning, staffing, and financing agricultural development; processes and structures of implementation; decentralization, devolution, and system changes.

220. Food and Nutrition Strategies in Developing Countries (3) I. Jarvis
Lecture—2 hours; discussion—1 hour. Prerequisite: Agricultural Economics 100A. Identifies important policy problems in food and nutrition policy, develops theoretical frameworks for their analysis, examines the empirical information relevant to the problems, and, using theoretical and policy models, draws appropriate policy implications. Offered in alternate years.
Committee in Charge
Donna L. Baby, Ph.D. (Political Science)
Michael R. Caputo, Ph.D. (Agricultural Economics)
Dennis J. Dinger, Ph.D. (Geography)
Michael J. Glennon, J.D. (School of Law)
Emily G. Goldman, Ph.D. (Political Science)
W. Eric Gustafson, Ph.D. (Economics)
Philip L. Martin, Ph.D. (Agricultural Economics)
Michèle Prager, Ph.D. (French)
Ellie H. Tuma, Ph.D. (Economics)
Clarence E. Walker, Ph.D. (History)
Diane L. Wolf, Ph.D. (Sociology)

The Major Program
Problems of security, human rights, energy and mineral resources, and the environment are increasingly confronted at a global rather than a national level. With its theoretical moorings in real world application, the study of international relations has become an exciting and highly relevant interdisciplinary major.

The Program. Graduation with a major in international relations requires completion of introductory courses in political science, economics, geography, and history. Upper division work is comprised of four core 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 credit) of equivalent fluency of one of other modern languages.

Programs, Internships, and Career Alternatives. One program of special interest to international relations majors is the Education Abroad Program, which provides insight into politics and culture of other countries. At UCD, the internship program assists students in obtaining legislative, legal, and business internships. In addition, the UC Davis Washington Center arranges summer internships in Washington, D.C. International relations graduates are prepared for employment in international governmental agencies abroad (such as the Foreign Service), with state agencies, international non-governmental organizations (such as the United Nations), foundations, and companies having interests in international business, trade, or finance. The stringent language requirement of the major program enhances career prospects in jobs which demand knowledge of the language and culture of other countries.

A.B. Major Requirements:

<table>
<thead>
<tr>
<th>Subject Matter</th>
<th>UNITS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Economics 1A, 1B</td>
<td>10</td>
</tr>
<tr>
<td>Political Science</td>
<td>4</td>
</tr>
<tr>
<td>Geography</td>
<td>3</td>
</tr>
<tr>
<td>History 4C</td>
<td>2</td>
</tr>
<tr>
<td>One course selected from Anthropology 2,</td>
<td></td>
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<tr>
<td>Environmental Studies 30, Geography 2,</td>
<td></td>
</tr>
<tr>
<td>History 4E, 1A, 1B, 10, 15, 17C, International</td>
<td></td>
</tr>
<tr>
<td>Agricultural Development 10, Political</td>
<td></td>
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<tr>
<td>Science 1, 2</td>
<td>3</td>
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<tr>
<td>Approximately 24 to 30 units (for cluster equivalent)</td>
<td>0-30</td>
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<tr>
<td>Recommended: one course in statistics (e.g., Sociology 46A, 46B, Statistics 13)</td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>Subject Matter</th>
<th>UNITS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Economics 115A or 115B</td>
<td>4</td>
</tr>
<tr>
<td>Economics 160A-160B (Cluster I) or 162</td>
<td>4-8</td>
</tr>
<tr>
<td>(Cluster I students: note prerequisites</td>
<td></td>
</tr>
<tr>
<td>for courses 160A-160B)</td>
<td></td>
</tr>
<tr>
<td>Political Science 123</td>
<td>4</td>
</tr>
<tr>
<td>Political Science 130</td>
<td>4</td>
</tr>
<tr>
<td>Cluster emphasis</td>
<td>52</td>
</tr>
</tbody>
</table>

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

Economics 100
Economics 101
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), 11B

Two courses to be selected from:

Anthropology 122, 123, 131, 135
Geography 141, 142
Political Science 124, 178
Sociology 139, 141, 144, 145A
Three regional courses from Group A (History)

Cluster II: International Relations of the Third World

(Provides students with an opportunity to concentrate on problems of development of the Third World in recent times)

One course to be selected from each of four subjects:

Anthropology 122, 123, 131, 134
Sociology 118, 139, 141, 145A
Political Science 124, 126, 127, 128, 178
Economics 110B, 115A or 115B

One course is not used to fulfill the core requirement above, 11B

Four regional courses focused on Third World:

Select two courses from Group A (History)

Select two courses from Group B (Anthropology, Economics, Geography, Political Science, and Sociology)

Cluster III: Global Resources and Environment

(Designed to familiarize students with major patterns of resource distribution in the world and the role resources play in international affairs)

Three courses to be selected from:

Economics 147, 176
Economics 123
Environmental Studies 101
Geography 161
Political Science 107
Resource Sciences 100

Two additional courses to be selected from two of the following groups:

Energy—Agricultural Economics 169, Geology 130
Political Science 171
Food Resources—Geography 142, 175, Sociology 144
Population—Sociology 170
Rural Development—Anthropology 128, 131, 133, 135
Urbanization—Anthropology 127, Geography 156, Sociology 143A, 145A
Water Resources—Geography 162, Geography 116

Three regional courses:

Select two courses from Group A (History)

Select one course from Group B (Anthropology, Economics, Geography, Political Science, and Sociology)

Cluster IV: World Politics

(Examines political relationships in international relations. The focus is on national governments and their activities in the global political system)

One course to be selected from: Political Science 120, 121

Two courses to be selected from:

Economics 116

*Course not offered this academic year.
Internship
See Internship Program below; also UC Davis Washington Center

Internship Program
Lawrence B. Coleman, Ph.D., Director
The Internship and Career Center 2nd Floor, South Hall (916-752-2855)

Program Areas
Agricultural and Environmental Sciences
Joe J. Stasulat, Program Manager
Education and Graduate Placement
Maggie Lee, Coordinator
Kathie Shull, Coordinator
Engineering and Physical Sciences
Kevin T. Bennett, Program Manager
Health and Biological Sciences
Linda R. Hughes, Program Manager
Liberal Arts
Donald J. Hagerty, Program Manager

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 99 and 192) are available for credit on a variable-unit and Pass/Not Passed grading basis. A maximum of 12 units of 99 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 48 units of credit. All credited internships require approval and sponsorship by a faculty member from an appropriate discipline. Arrangements may be made through the department of the sponsoring faculty member and facilitated by The Internship and Career Center Staff.

Italian
(College of Letters and Science)
JoAnn Cannon, Ph.D., Program Director
Department Office (French and Italian), 516 Sproul Hall (916-752-0830)

Faculty
JoAnn Cannon, Ph.D., Associate Professor
Dennis J. Dutschke, Ph.D., Professor, Director, EAP—Padua, Italy
Gustavo Foscarini, M.A., Lecturer
Juliana Schiesari, Ph.D., Assistant Professor

The Major and Minor Programs
The major in Italian is intended 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, 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.

A.B. Major Requirements:

Preparatory Subject Matter .............................. 0-24
Italian I, 2, 3, 4, 5, 6, and 9 (or the equivalent) .............................. 0-24

Depth Subject Matter ...................................... 36
Italian 101 and either 102 or 104 ...................... 8
Upper division courses in literature, taught in the language .................. 28
Must include at least one course from each of the following literary periods:
(a) Early Italian, (b) Renaissance and Baroque, (c) Eighteenth through Twentieth Centuries.
A total of 8 units in literature may be replaced by Italian 107 (highly recommended) and/or by courses in related fields such as history, art history, and music.

Note: All upper division courses are to be chosen in consultation with the major advisor.

Total Units for the Major .................................. 36-60

Recommended
One year of college Latin or a Romance Language.

Major Adviser. G. Foscarini.

Minor Program Requirements:

Units
Italian .......................................................... 20
Language, Italian 101 and either 102 or 104 .............. 8
Literature, three courses chosen in consultation with major adviser .................. 12
One course chosen from each of the following three areas: (a) Early Italian Literature, (b) Renaissance and Baroque, and (c) Eighteenth through Twentieth Centuries. (One of the above courses may be replaced by course 107 or by a course of literature in translation offered by the Italian Program).

Prerequisite Credit. Credit will not normally be given for a course if it is a prerequisite of a course already successfully completed. Exceptions can be made only by the Program Director.

Honors and Honors Program. The honors program comprises two quarters of study under course 194H, 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
Lower Division Courses
Students offering high school language preparation as a prerequisite must take a placement test.
1. Elementary Italian (I, II, III). Foscari in charge Discussion—5 hours; laboratory—1 hour Introduction to Italian grammar and development of all language skills in a cultural context with special emphasis on communication. Students who have successfully completed any course at 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 students P/NP option, no petition is required. All other students will receive a letter grade unless an P/NP petition is filed.

2. Elementary Italian (I, II, III). Foscari in charge Discussion—5 hours; laboratory—1 hour. Prerequisite: course 1. Continuation of course 1 in areas of grammar and conversation.

3. Elementary Italian (I, II, III). Foscari 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 (I, II, III). Director in charge Lecture/discussion—3 hours. Prerequisite: course 3 or the equivalent. Review of grammar and syntax through written exercises, and readings of short prose works. Intended to develop the linguistic foundations of students who have completed the first-year language classes.

5. Intermediate Italian (I, II, III). Director in charge Lecture/discussion—3 hours. Prerequisite: course 4 or the equivalent. Review and study of grammar and structure of short prose works, and written exercises. Intended to prepare students to read, understand and discuss modern Italian.

8A. Italian Conversation (I, II, III). The Staff Discussion—3 hours. Prerequisite: course 3 or the equivalent. Course designed to offer practice in speaking Italian. May be repeated once for credit (P/NP grading only).

8B. Italian Conversation (I, II, III). The Staff Discussion—3 hours. Prerequisite: course 4A. Course designed to offer practice in speaking Italian (P/NP grading only).

9. Reading Italian (I, II, III). Director in charge Lecture/discussion—3 hours. Prerequisite: course 5. Reading and discussion of modern Italian prose, including selections from novelistic, scientific and journalistic writings. Introduction to contemporary Italian literature and culture, as well as a means of strengthening the student's command of the Italian language.

25. Italian Literature in Translation (I, II). The Staff (Director in charge) Lecture—1 hour; discussion—2 hours. Course intended to acquaint the non-major with representative examples of Italian literature. Selected topics will include major authors, genres, literary periods, movements, or specific themes.

50. Studies in Italian Cinema (I) Canon 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 Cultures

98. Directed Group Study (1-5) I, II. The Staff Primarily intended for lower division students. (P/NP grading only)

Upper Division Courses

101. Advanced Conversation, Composition, and Grammar (I). The Staff Lecture—3 hours; weekly essays. Prerequisite: course 9 or consent of instructor.

102. Advanced Conversation, Composition, and Grammar (II). The Staff Lecture—3 hours; weekly essays. Prerequisite: course 101 or consent of instructor.

104. Italian Translation and Style (I). Dutschke Lecture/discussion—3 hours; two research papers; term paper. Prerequisite: course 101 or consent of instructor. Practice in translation from Italian to English and English to Italian, using literary and non-literary texts of different styles. Analysis of linguistic problems and elements of style contained in the translation material.

107. Survey of Italian Culture and Institutions (I, II). Foscari Lecture—3 hours; term paper. Assessment of the impact of regional autonomy on Italian cultural life from the Middle Ages to the present. Special emphasis will be placed upon achievements in literature, the arts, philosophy, and socio-political institutions. To be taught in English.

109. The Image of Man in the European Renaissance (I). The Staff Lecture—3 hours; term paper or oral presentation. Prerequisite: course 9 or consent of instructor. Process of progressive naturalization of the concept of man and humanism upon different perspectives of human autonomy, self-determination and scientific "curiosity." In three parts: (a) Renaissance man and his environment; (b) philosophical thought: the adversary evaluation of the concept of Man; (c) prose and poetry.

112. Medieval and Renaissance Poetry: St. Francis to Petrarch (I). Dutschke Lecture—2 hours; discussion—1 hour; term paper. Prerequisite: course 9 or consent of instructor. Study of the origins of Italian religious and secular poetry of the 13th and 14th centuries. A diversified poetry is illustrated in works of St. Francis, Dante, Cavalcanti, Petrarch, Boccaccio, Sassetta, the New Venetian Poets, and other authors.

113. Dante Alighieri, Divina Commedia (Inferno, Purgatorio, Paradiso) (I). Dutschke Lecture—2 hours; discussion—1 hour; term paper. Prerequisite: course 9 or consent of instructor. Study of Dante Alighieri's Divina Commedia, and its role in the development of Italian language and literature. Emphasis will be placed on reading Dante's major poem within the historical context of the Middle Ages.

114. Boccaccio, Decameron, and the Renaissance Novella (I). Dutschke Lecture—2 hours; discussion—1 hour; term paper. Prerequisite: course 9 or consent of instructor. Study of the development of the short story in Italy, as exemplified in Giovanni Boccaccio's Decameron, in his predecessors and Renaissance followers.

115A. Italian Literature of the Renaissance and the Baroque: from Humanism to Machiavelli (I). The Staff Lecture/discussion—3 hours; term paper. Prerequisite: course 9 or consent of instructor. Development of the Renaissance ideal of man and the subsequent loss of faith in this ideal is depicted in the work of Lorenzo de' Medici, Poliziano, Arlando and Machiavelli.

115B. Italian Literature of the Renaissance and the Baroque: from Cellini to Marino (I). The Staff Lecture/discussion—3 hours; term paper. Prerequisite: course 115A. Continued examination into the loss of an ideal. Emphasis on the conflicts in Michelangelo and Sacco leading to Marino, with an excursion on Gellio's role in the formation of a modern literary standard.

118. Italian Literature of the Eighteenth Century (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 Goldeni, Battinelli, Barreti, Parisi, Affieri and Vico.

119. Italian Literature of the Nineteenth Century (I). The Staff Lecture/discussion—3 hours; term paper. Prerequisite: course 9 or consent of instructor. Romanticism in Italy. Manzoni, Verdi, and Verri.

120A. Italian Literature of the Twentieth Century: The Novel (I). Foscari Lecture/discussion—3 hours; term paper. Prerequisite: course 9 or consent of instructor. Development of the novel from Svevo to the present. Emphasis on the work of Ivo, Levi, Moravia, Pasolini, and Visconti.

120B. Italian Literature of the Twentieth Century: Poetry and Drama (I). Foscari Lecture/discussion—3 hours; term paper. Prerequisite: course 9 or consent of instructor. Italian poetry with emphasis on Hermeticism; the theater of Luigi Pirandello and its role in the development of contemporary Italian drama.

139B. Italian Literature in English: Boccaccio, Petrarch and the Renaissance (I). Dutschke Lecture/discussion—3 hours; term paper. Petrarch and Boccaccio and the Italian Ages and the Renaissance; the Renaissance, with particular attention to the works of Lorenzo de' Medici, Leonardo da Vinci, Machiavelli, Ariosto, Michelangelo and Tasso.

139C. Italian Literature in English: Modern Italian Literature (I). Foscari Lecture/discussion—3 hours; term paper. The Romantic Movement in Italy in its relationship to European Romanticism with emphasis on Tosco, Leopardi, and Manzoni (offered in even-numbered years); nineteenth-century Italian authors: differing emphasis according to the needs of the students.


142. Masterpieces of Modern Italian Narrative (I). Foscari Lecture—1 1/2 hours; discussion—1 1/2 hours; term paper. Prerequisite: either English 3, Comparative Literature 2, or History 4C. Analysis of major works of Italian narrative fiction from unification of Italy to present. Students will learn to use representational methods and concepts which guide literary scholarship. Consideration of works within European social and cultural context. Offered in alternate years. General Education credit: Civilization and Culture/Non-Introductory. Recommended GE preparation: English 3, Comparative Literature 2, History 4C.

145. Special Topics in Italian Literature (I, II, III). The Staff Lecture—3 hours; discussion—1 hour. Prerequisite: course 9 or consent of instructor. Study of special topics and themes in Italian literature, such as comic literature, epic poetry, eighteenth century theater, fascism, futurism, women and literature, and the Image of America, etc. May be repeated for credit when topic changes.

192. International Internship (1-3) I. The Staff (Instructor in charge) Internship—3-36 hours. Prerequisite: upper division standing and consent of chairperson of Italian Department. Participation in government and business activities to gain work experience and to develop a better knowledge of Italian language and culture. (P/NP grading only).

194. Special Study for Honors Students (5) I, II, III. The Staff Prerequisite: open only to honors students. Guided research leading to an honors paper.

197T. Tutoring in Italian (1-4) I, II, III. The Staff Prerequisites: upper division standing and consent of instructor. Tutoring in undergraduate courses, including leadership in small voluntary discussion groups affiliated with departmental courses. May be repeated for credit for a total of 6 units. (P/NP grading only).

197TC. Community Tutoring in Italian (1-5) I, II, III. The Staff Prerequisite: discussion—1-2 hours; laboratory—2-4 hours. Prerequisite: consent of instructor. Field experience as Italian tutors or teacher's aides. May be repeated for credit for a total of 10 units. (P/NP grading only).

198. Directed Group Study (1-4) I, II, III. The Staff (Director in charge) Prerequisite: consent of instructor. (P/NP grading only)
Japanese
See Chinese and Japanese

Land, Air and Water Resources
(College of Agricultural and Environmental Sciences)
Ph.D., Chairperson of the Department
Ph.D., Vice Chairperson of the Department
Department Office, 139 Hoagland Hall
(916-752-1406)

Faculty

Hoagland Hall Faculty Office
139 Hoagland Hall (916-752-1406)

Carol S. Bladace, Ph.D., Associate Professor (Soil Science)
Francis E. Broadbent, Ph.D., Professor Emeritus (Soil Microbiology)
Richard G. Bure, Ph.D., Professor (Soil Science, Environmental Toxicology)
John C. Carroll III, Ph.D., Professor (Meteorology)
William H. Casey, Ph.D., Assistant Professor (Soil Science)
Kenneth L. Couin, Ph.D., Professor Emeritus (Soil Microbiology)
Randall A. Dall, Ph.D., Professor (Soil Science)
C. V. Delwicke, Ph.D., Professor Emeritus (Geology)
Emanuel Epple, Ph.D., Professor Emeritus (Plant Nutrition, Botany)
Robert G. Fiochini, Ph.D., Professor (Resource Sciences)
Richard D. Grogol, Ph.D., Associate Professor (Soil Science)
Gordon L. Huntington, Ph.D., Lecturer Emeritus (Soil Morphology)
Andre E. Lutich, Ph.D., Professor (Plant Nutrition)
Donald N. Munro, Ph.D., Professor Emeritus (Soil Science)
Leonard G. Myrup, Ph.D., Professor Emeritus (Soil Science)
Terence R. Nathan, Ph.D., Assistant Professor (Soil Science)
Khaw Lai Pham, Ph.D., Associate Professor (Soil Science)
H. Michael H. Reisenauer, Ph.D., Professor Emeritus (Soil Science)
Victor R. Reiser, Ph.D., Professor Emeritus (Soil Science)
James H. Richards, Ph.D., Assistant Professor (Soil Science)
James R. Rider, Ph.D., Professor (Soil Science)
Roger H. Shaw, Ph.D., Professor (Soil Science)
Wendy Kuhn, Ph.D., Professor (Soil Science)
Michael J. Singletary, Ph.D., Professor (Soil Science)
Charles D. Snyder, Ph.D., Lecturer (Soil Science)
Su-Tzao Soong, Ph.D., Associate Professor (Soil Science)
Randall S. South, Ph.D., Associate Professor (Soil Science)
Harry C. Walker, Ph.D., Senior Lecturer Emeritus (Soil Science)
Bryan C. Weare, Ph.D., Professor (Soil Science)

Lynn D. Whitting, Ph.D., Professor Emeritus (Soil Science)
Robert Zeeb, Ph.D., Associate Professor (Soil Science)
Velmeyer Hall Faculty Office
113 Velmeyer Hall (916-752-0453)
James W. Bigger, Ph.D., Professor (Soil Science)
Robert H. Burg, M.S., Professor Emeritus (Soil Science, Civil Engineering)
Graham E. Fogg, Ph.D., Associate Professor (Soil Science)
David A. Good, Ph.D., Lecturer (Soil Science)
Stephen Gratton, Ph.D., Professor (Soil Science)
Donald W. Grimes, Ph.D., Lecturer (Soil Science)
Mark E. Grisley, Ph.D., Associate Professor (Soil Science, Civil Engineering)
Robert M. Haggan, Ph.D., Professor Emeritus (Soil Science)
Blaine R. Hanlon, Ph.D., Lecturer (Soil Science)
Deborah W. Henderson, Ph.D., Professor Emeritus (Soil Science)
Jan W. Holmecs, Ph.D., Assistant Professor (Soil Science)
Theodore C. Hino, Ph.D., Professor (Soil Science)
Allan W. Knight, Ph.D., Professor (Soil Science)
Miguel A. Maino, Ph.D., Professor (Soil Science, Civil Engineering)
Edward A. McBean, Ph.D., Professor (Soil Science)
Donald F. Nelsen, Ph.D., Professor (Soil Science, Civil Engineering)
Marc B. Parish, Ph.D., Assistant Professor (Soil Science)
Terry L. Prichard, M.S., Lecturer (Soil Science)
William D. Pruit, Jr., Ph.D., Lecturer (Soil Science)
Carlos E. Puente, Ph.D., Assistant Professor (Soil Science)
Frank E. Robinson, Ph.D., Lecturer (Soil Science)
Verne H. Scott, Ph.D., Professor Emeritus (Soil Science, Civil Engineering)
Lawrence J. Schub, Ph.D., Lecturer (Soil Science)
Kenneth T. Taniguchi, M.S., Professor (Soil Science)
Wesley W. Wallander, Ph.D., Associate Professor (Soil Science, Agricultural Engineering)

Land, Air and Water Resources is a multidisciplinary department with faculty who specialize in atmospheric, plant, resource, soil and water science, hydrology, and water engineering. Teaching and research focus on both agricultural and environmental science. The faculty contribute to numerous other undergraduate and graduate programs in the Colleges of Letters and Science, Engineering, and Agricultural and Environmental Sciences.

Major Programs. Undergraduate programs in the department major in Atmospheric Science, Resource Sciences, and Soil and Water Science.

Advising Center is located in 122 Hoagland Hall (916-752-1669).

Graduate Study. Four graduate programs in Atmospheric Science, Earth Sciences and Resources, Resource Sciences, and Water Science are offered by Land, Air and Water Resources.

Courses. See courses listed under Atmospheric Science, Earth Sciences and Resources, Resource Sciences, Soil Science, and Water Science. Additional information can be obtained from graduate advisors for these areas and the Graduate Annunciation.

*Course not offered this academic year.

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 with 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.

Preparatory Requirements. Students are admitted to the landscape architecture major after submitting a portfolio for review and selection by the faculty. Contact the Environmental Design Advising Center or the Landscape Architecture major advisor 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 excellent preparation for graduate school or career development in a wide range of environmental and design-related fields.

B.S. Major Requirements:
For convenience in program planning, the usual courses taken to satisfy the requirements are shown in parentheses where possible. Equivalent or more comprehensive courses are acceptable. Courses shown without parentheses are required.

| English Composition Requirement | 6-8 |
| Preparatory Subject Matter | 50-58 |
| Biological sciences (Biological Sciences 1A, 1B) | 4-5 |
| Biological Sciences 1C | 3-4 |
| Chemistry (Chemistry 1A, 1B) | 4-5 |
| Physics (Physics 1A, 5A, 10) | 3-4 |
| Two-dimensional design (Art 16, Design 21, Engineering 4) | 3-4 |
| Three-dimensional design (Art 5, 12A, 12B, 12C, 135, 150, 180C) | 3-4 |
| Earth sciences (Geography 1, Geology 1, Soil Science 10) | 3-4 |
| Economics (Economics 1A, 1B, Agricultural Economics 147) | 4-5 |
| Computer science (Agricultural Science and Management 21, Engineering 5, Computer Science Engineering 10, 10) | 3-4 |
| Mathematics (Mathematics 16A, 16B, 16C, Statistics 13, Agricultural Science and Management 150) | 3-4 |
| Social science (Anthropology 2, Geography 2, Psychology 5, Sociology 11) | 3-4 |
| Humanities elective | 3 |

Depth Subject Matter
| Introduction to landscape architecture | 70-74 |
| Landscape architecture studio: introduction, recreational open space, site plan- | 3 |
Landscape Architecture 253

40. Introduction to Landscape Architecture (3) I, II. Schenker and staff
Lecture—3 hours. History, theory, philosophy, tech-
niques and applications of landscape architecture and the
analysis, planning, design, and management
of outdoor spaces.

Upper Division Courses

111. Landscape Studio: Analysis, Function, and
Process (4) I. Thayer and staff
Lecture—6 hours. Prerequisite: course 111. Studio
problems in the analysis of site and functional rela-
tionships leading to landscape development.
Emphasis on inventory and analysis of natural and
Regulated preparation of production drawings and restruc-
cultural site features, microclimate effects, pedestrian
construction implementation documents. Limited enrol-
(6) and basic social needs and uses of outdoor space.

112. Landscape Architecture Studio: Landscape
Form, Design, and Art (4) II. Schenker and staff
Lecture—discussion—2 hours, laboratory—6 hours;
field trips. Prerequisite: course 111; major in Land-
scape Architecture. Studio problems in design of
landscapes and outdoor places which rely on visual,
spatial, aesthetic, and symbolic characteristics.

113. Landscape Architecture Studio: Site Plan-
ning (4) III. The Staff
Study—8 hours; two all-day field trips. Prerequisite:
course 112. Open to Landscape Architecture majors
only. Studio problems in analysis, planning, and
design of large-scale landscapes of development.
Projects involving the siting of structures, design of cir-
culation systems, parking, open spaces, and out-
door facilities. Emphasis on residential, institutional,
and commercial site planning for solar/energy con-
servation.

120. Computer Graphics for Landscape Archi-
tects (4) I. McNeill
Study—8 hours. Prerequisite: course 21. Introduc-
tion to computer-aided equipment and soft-
ware applications, including computerized drafting,
cut and fill calculations, road alignment, site engi-
neering and landscape analysis.

121. Landscape Graphic Communication (4).
II. The Staff
Study—8 hours; two all-day field trips. Prerequisite:
course 111. Studio work in graphic representation of
landscapes and architectural plans. Introdu-
case in photography, drafting, lettering, shad-
ing techniques related to the professional practice of
landscape architecture. Limited enrollment.

122. Advanced Communication for Landscape
Architecture (4) III. The Staff
Study—8 hours; two all-day field trips. Prerequisite:
course 121. Open to Landscape Architecture majors
only. Advanced concept in multimedia and graphic
presentation of landscape architecture projects, to
include preparation of proposals, reports, audio-visu-
al productions, and mixed-media presentations. Lim-
ited enrollment.

131. Landscape Architecture: Principles of Prac-
tice (3) I. Thayer
Lecture—3 hours. Prerequisite: course 31. Exposure
to the legalities, expectations, and ethical standards
of the profession of Landscape Architecture. Subject
matter covers the legal, office management, liabil-
ity, licensing, contracts and specifications, profes-
sional skills and project management.

132. Landscape Construction: Site Engineering
(4) II. Owens and Staff
Study—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, sections and
profiles and cut and fill calculations. Limited enrol-
ment.

133. Landscape Construction: Details (4) III. The
Staff
Study—8 hours; two all-day field trips. Prerequisite:
course 132. Open to Landscape Architecture majors
only. Advanced study of materials and methods in
landscape construction. Emphasis on studio design
and integration of details and specifications. Limited
enrollment.

134. Landscape Construction: Drawings (4) I. The
Staff
Study—8 hours; two all-day field trips. Prerequisite:
course 133. Technical solution of an intensive land-
scape architectural design problem with emphasis
on preparation of production drawings and construc-
tion implementation documents. Limited enrollment.

140. History of Landscape Architecture (3) III.
McNeil, Schenker
Lecture—3 hours. History of landscape architecture
as an art form, technology, and profession. Empha-
sizes design of gardens and outdoor spaces from
prehistoric civilizations to the present. General Edu-
cation credit: Civilization and Culture/Non-Introduct-
y. Recommended GE preparation: Art 1A, 1B, or
Hist 3.

155. Plants in the Cultural Environment (3) II, III.
The Staff
Lecture—3 hours. Prerequisite: Biological Sciences
10. Cultural parameters of selecting plants for use in
environmental design. Contemporary themes in climate, energy and resource conserva-
tion, low maintenance, aesthetics, ediblce landscap-
es, historic preservation, native plants, special-
ized gardens, and computerized plant selection.

156. Landscape Planting Design (4) I. The Staff
Study—8 hours. Prerequisite: course 111, 155, Envi-
ronmental Horticulture 105. Application of aesthetic,
functional, and horticultural principles to the compos-
tion of the planted landscape and the development of
planting plans.

159. Public Garden Management (3) III. The Staff
Lecture—3 hours. Prerequisite: Biological Sciences
1C, Plant Science 2, or Environmental Horticulture
6. Management of the collections, facilities and pro-
grams of public gardens. Emphasis is placed on
management skills and operational techniques uti-
ized in public gardens.

161. Landscape Architecture Studio: Planning
and Analysis (4) I. The Staff
Study—8 hours; two all-day field trips. Prerequisite:
course 111. Landscape architecture studio to
include the solution of large-scale landscape archi-
tectural problems with emphasis on landscape plan-
ning and analysis methods and environmental con-
nect. Limited enrollment.

162. Landscape Architecture Studio: Urban and
Community Design (4) II. Owens
Study—8 hours; two all-day field trips. Prerequisite:
course 161. Solution of community and urban land-
scape design problems with emphasis on community
and social processes, participatory design methods,
and comprehension of behavioral factors relating to
urban open space. Limited enrollment.

163. Landscape Ecology (4) I. Dawson
Study—8 hours. Prerequisite: course 113 and Envi-
ronmental Studies 100 or consent of instructor. Prac-
tical exercises in ecological design emphasizing con-
servation, habitat restoration, cultural impacts,
and biodiversity. Emphasis is placed on manage-
ment techniques, restorative methodology, and phys-
cal land use planning.

184. Sustainable Landscape Architecture (4) II.
Thayer
Study—8 hours. Prerequisite: course 113 or consent
of instructor. Planning and design of land areas for
social and environmental stability creating sustain-
able landscapes which conserve water, energy, arable
soil, and biological diversity.

190. Seminar in Landscape Architecture (1).
I, II, III. Schenker, Dawson, Owens
Seminar—1 hour. Lectures and discussion of critical
issues in landscape architecture. May be repeated
twice for credit. (PRM grading only.)
192. Internship in Landscape Architecture (1-12) II, III, Internship. Prerequisite: senior standing in Landscape Architecture major. Professional field experience in landscape architecture. May be repeated for a total of 12 credits. (P/NP grading only)

193. Senior Project in Landscape Architecture (1-5) II, III, Dawson, Owen. Prerequisite: senior standing in Landscape Architecture major. Directed design/research of a significant landscape architectural project under supervision of instructor. May be repeated for credit. (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 (3) IV, Francis. Seminar—4 hours. Prerequisite: course 140 or the equivalent; graduate standing or consent of instructor. Examines the major theories of environmental design. Epistemology of design serves as framework to examine modern landscape architecture, architecture, urban design and planning, Normative theories of design are reviewed along with the social and environmental sciences. Offered in alternate years.

202. Methods in Design and Landscape Architecture (3) IV, McBeth. Seminar—4 hours. Prerequisite: Statistics 102 or the equivalent; graduate standing or consent of instructor. Explores many of the research and advanced design methods employed in landscape architecture. Exercises provide the student with a vehicle for designing independent landscape research and creative activities. Lectures provide an historical overview of research methodology. Offered in alternate years.

203. Environmental Perception and Aesthetics (3) IV, Thayer. Seminar—4 hours. Prerequisite: Psychology 144 or the equivalent; graduate standing or consent of instructor. Examines the perceptual and aesthetic response of humans to the physical environment and discusses the means by which intervention by design can affect human perception, cognition, aesthetic response, and, ultimately, human behavior. Offered in alternate years.

204. Case Studies in Landscape Design and Research (3) IV, Dawson. Laboratory—4 hours. Prerequisite: contact department for prerequisite courses; graduate standing or consent of instructor. Case studies in landscape design and research have as their primary goal the exposure of the student to real-world, designed-environment situations where creative activity is basic research is the primary product. Offered in alternate years.

210. Advanced Landscape Architecture Studio (4) IV, III, The Staff. Laboratory—5 hours. Prerequisite: course 113 or the equivalent; graduate standing or consent of instructor. Exposes students to real-world, designed-environment situations where creative activity is primary. Advanced landscape problems will be utilized at the site, urban or rural scale. Offered in alternate years.

220. Public Space and Culture (3) IV, Francis. 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 response to this culture evaluated. Typology is used to identify spaces. Offered in alternate years.

240. Rural Landscape Planning and Design (3) II, Michal. Seminar—3 hours. Prerequisite: course 181 or the equivalent; graduate standing or consent of instructor. Addresses physical planning issues facing rural communities, commercial zones, and small communities in their challenge of economic and social change. Concern is with roadway growth, shrinking populations, shifting economies, and lack of public funding. Offered in alternate years.

250. Technology and Sustainable Landscape (3) III, The Staff. Seminar—3 hours. Prerequisite: course 184 or the equivalent; graduate standing or consent of instructor. Explores the relationship between technology and landscape quality. Typology of technological landscape adaptations is presented and impacts of these technologies are discussed. Emphasizes a theoretical understanding of technological landscape adaptations and a practical approach to sustainable technologies. Offered in alternate years.

280. Landscape Conservation (3) II, Dawson. Seminar—3 hours. Prerequisite: contact department for prerequisite courses; graduate standing or consent of instructor. Focus is on land planning, design, and management techniques to further the goal of resource conservation. Examines current critical theory in the development and management of conservation areas. Offered in alternate years.

290. Graduate Seminar in Landscape Architecture (3) I, II, III, The Staff. Seminar—2 hours. Prerequisite: graduate standing or consent of instructor. Seminar on selected topics in landscape architecture research, analysis, planning, design, communication, or education. May be repeated for credit. (S/U grading only)

297. Practicum in Landscape Architecture (1-10) I, II, III, The Staff. Independent study—1-10 hours. Prerequisite: graduate standing or consent of instructor. Opportunity for students to work directly in the field with architects or with professionals in an office setting. Provides experience beyond the confines of campus and allows direct interaction with the community. (S/U grading only)

299. Group Study (1-5) I, II, III, The Staff. Prerequisite: graduate standing or consent of instructor. (S/U grading only)

299. Directed Individual Research for Graduate Students (1-5) I, II, III, The Staff. Prerequisite: graduate standing or consent of instructor. (S/U grading only)

Latin

See Classics

Latin

Latin, School of

Ellen R. Jordan, J.D., Dean
Edward H. Redin, LL.B., Associate Dean (Academic Affairs and Research)
Martha S. West, J.D., Associate Dean (Administration and Student Affairs)
Judy James, J.D., Acting Director (Law Library)
Dean's Office, 1011 Martin Luther King, Jr. Hall (916-755-2242)

Faculty
Homer G. Angelo, J.D., LL.M., Professor Emeritus
John D. Ayer, J.D., LL.M., Professor Emeritus
Edward L. Barrett, Jr., Professor Emeritus
Florian Bartosic, S.C.L., LL.M., Professor Emeritus
Antonia E. Bernhard, J.D., Lecturer
Edgar Bodenheimer, J.U.D., LL.B., Professor Emeritus
Alan E. Brownstein, J.D., Professor Emeritus
Carol S. Bruch, J.D., Professor Emeritus
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Robert Frahm, J.D., Lecturer
Arturo Gandara, J.D., Acting Professor Emeritus
Michael J. Glennon, J.D., Professor Emeritus
Gary Goodpaster, J.D., Professor Emeritus
Sarah D. Gray, Ph.D., Professor Emeritus
Robert W. Hillman, J.D., Professor Emeritus
Eugene W. Hogan, LL.B., Professor Emeritus
Edward J. Inwinkelsid, J.D., Professor Emeritus
Leslie G. Jacobs, Lecturer
Ellen T. Jordan, J.D., Professor Emeritus
Margaret Z. Johns, J.D., Lecturer and Director of Legal Writing
Kathleen M. Johnson, J.D., Acting Professor Emeritus
Friedrich K. Jueger, J.D., Professor Emeritus
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John W. Poulenc, J.D., Professor Emeritus
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Morris E. Schwab, J.D., LL.M., Lecturer
Erich J. Schwartz, J.D., LL.M., M.S., Professor Emeritus
Daniel L. Simmons, J.D., Professor Emeritus
James F. Smith, J.D., Lecturer
Martha S. West, J.D., Professor Emeritus
Sidney Wolinsky, LL.B., Lecturer
Bruce A. Wolk, J.D., Professor Emeritus
Richard C. Wyckoff, LL.B., Professor Emeritus

Courses in Law

Professional Curriculum

First Year Courses

200. Introduction to Law (1): Love 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 doctrine of reasoning by courts and attorneys, and the fundamentals of statutory interpretation. (S/U grading only)

201. Property (4) II, Dobbs, Kirkland Discussion—4 hours. Study of doctrines and concepts of property law with primary emphasis on real property. Course coverage includes the estates in land system, the landlord-tenant relationship, conveyancing, and private and public land use control.

202A-202B. Contracts (3-3) II, Ayer, Gandara Discussion—3 hours. Course examines the sorts of promises that are enforced and the nature of protect given promissory obligations in both commercial and noncommercial transactions. Inquiry is made into the means by which traditional doctrine applies or fails to apply—to changing social demands. (Deferred grading only, pending completion of sequence)

203. Civil Procedure (5) I, Hogan, Johnson, Oakley, Perschbach Discussion—5 hours. Study of the fundamental and
rrecurrent problems in civil actions including the methods used by federal and state courts to resolve civil disputes. Among the topics covered are the relation between federal and state courts; the power of courts over persons, property, and subject matter (jurisdiction); the scope of litigation (joinder of claims and parties); preparation for trial through pleading, discovery, and pretrial conferences; resolving actions and issues before and during trial; functions of judge and jury; and the finality of the trial courts' dispositions.

204A-204B. Torta (3-2-1) Brownstein, Kurtz, Jenkins
Discussion—3-2 hours. Course in tort law is designed to familiarize the students with the legal concepts which apply to actions brought by litigants who seek relief for injury. It is concerned with intentional and unintentional invasions of privacy and property. More specifically, the course seeks to analyze civil actions based upon wrongs such as assault, battery, false imprisonment, negligence, strict liability, defamation, invasion of privacy, and misrepresentation. Alternatives to the present tort compensation system are also considered. (Deferred grading only, pending completion of sequence.)

205. Constitutional Law I (4) Glennon, Poulos
Discussion—4 hours. Ethical principles, doctrines, and controversies regarding the basic structure of, and division of powers in, American government. In particular, it treats judicial review, jurisdiction, standing to sue, federal and state powers and immunities, and the separation of powers between branches of the federal government. It also begins an examination, continued in course 218, of procedural and substantive constitutional rights and the limits they place on governmental action. Economic substantive due process, procedural due process, and rights of privacy and personal autonomy will also be addressed.

206. Criminal Law (3) Goodpaster, Poulos
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. (c) Individual and Group Study: 288, 256, 340, 156, 141, 141, 189

207. Legal Research (1) Bernard
Discussion—laboratory—1 hour. Description of the sources of law and secondary authority. Instruction in their location and use. Graded on basis of weekly self-teaching research drills. No final examination.

208. Legal Writing (2) Bernard, Jacobs, Johns
Lecture—2 hours. Instruction in the form and substance of legal writing. All assigned materials will be discussed and drafted. An experience in oral advocacy will be included. Graded on the basis of the writing and advocacy assignments. No final examination.

Second and Third Year Courses
The second- and third-year courses fall into subject areas as shown here

(a) General courses: 209, 250, 256
(b) Agricultural Law: 222
(d) Constitutional Law: 217, 218, 286
(e) Consumer Law: 224, 253
(f) Labor Law: 227, 239, 276, 290
(g) Estate Planning: 221, 223, 294
(h) Family Law: 225, 230, 234, 272, 273, 281
(i) International Comparative and Foreign Law: 243, 246, 250, 256, 280, 290
(j) Labor Law: 251, 260, 271, 279
(k) Procedure and Jurisdiction: 242, 246, 283, 295
(l) Property and Environmental Law: 232, 256, 264, 268, 282, 286, 287, 289,
(m) Real Property: 232, 236, 281, 293
(n) Skills and Litigation: 211, 219, 239, 263B, 278, 297, 410A, 410B, 413, 414
(o) Taxation: 220, 236, 245, 247, 254
(p) Topical Courses: 212, 226, 229, 240, 244, 252, 254, 266, 267, 288, 280, 286, 298, 292, 296

209. Legal Imagination (2)
Discussion—2 hours. Papers. Intended for students interested in extensive thinking and writing about the legal system as it applies to the concerns of society in the real world. Students will be expected to write short, weekly papers and engage in weekly group discussion of their work. Limited enrollment with preference given to third-year students. (SU grading only)

210. Business Reorganization (2)
Discussion—2 hours. Prerequisite: course 243 recom- mended. Focus is on businesses trying to survive when they are In substantial debt, to explore the structure of relief available 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. Negotiation and Dispute Resolution (2) I, II
Goodpaster
Seminar—2 hours. Course teaches negotiation, mediation, arbitration skills, and theories. Students will do five or more practice negotiations, mediations, or arbitrations to develop skills, perception, and personal development. Negotiation and theory development are based on these exercises. Limited enrollment. (SU grading only)

212. Law, Medicine, and Ethics (2)
Discussion—2 hours. Legal, moral and economic analysis of policies, laws and regulations, and ethical stimula- tion of the brain: (2) genetic engineering: (3) amplification of human powers and faculties by artifici- al means, including organ transplantation, man-machine symbiosis, and genetically-induced enhancement of mental functioning: (4) death and dying; and (5) regulation of experimentation with human subjects. In each area, discussion will include problems in distributive justice posed by lim- ited availability of biotechnological commodities, as well as issues arising from enforced treatment.

213. Business Organizations I (3) Fessler
Discussion—3 hours. Courses in public issues of the corporation. Both statutory and judge-made legal principles of state corporate law, and federal regulation of the corporation will be studied. Corporate governance and the proxy voting system, insider trading, suits against boards of directors, the sale of securities and distribution of dividends, and the merger and acquisition of corporations will be covered.

214. Business Organizations II (3) Johnson
Discussion—3 hours. Course will explore the develop- ment of the public issue corporation in course 213. This course centers on the legal problems of a business owned by a few persons each of whom may seek to play an active role in the enterprise. Included within the survey are the problems of the "close corporation" and the alternatives to incorporation for persons in quest of profit. These alternatives include sole proprietorship, general and limited partnerships, and joint ventures. Related agency concepts are integrated into this material.

215. Business Associations (4) I. Hillman
Discussion—4 hours. Course provides a broad survey of the legal principles 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 covered include the formation of business transactions, the process of incorporation, the financing of corporations, the role of management and shareholders, the federal securities laws, and social responsibility.

216. Commercial Law: Article 9 (3) I. Ayer
Discussion—3 hours. Prerequisite: course 243 recom- mended. Course covers security interests in per- sonal property.

217. Constitutional Law I (3) Glennon, Poulos
Discussion—3 hours. This is a two-semester course. The first semester covers the principles, doctrines, and controversies regarding the basic structure of, and division of powers in, American government. In particular, it treats judicial review, jurisdiction, standing to sue, federal and state powers and immunities, and the separation of powers between branches of the federal government. Also begun is an examination, continued in the second semester, of procedural and substantive rights and the limits they place on governmental action.

218. Constitutional Law II (3) I. Brownstein, II. Poulos
Discussion—3 hours. Course principally covers the First Amendment and the Equal Protection Clause. The First Amendment study involves an examination of freedom of speech and assembly, focusing on the various kinds of speech the courts have identified and their constitutional significance: political speech, commercial speech, offensive speech, obscenity, fighting words, and speech constituting a clear and present danger. Attention will also be directed to issues involving the form in which speech occurs: prior restraint, overbreadth, vagueness doctrine, and the protection provided symbolic expression. The equal protection study will examine suspect class discrimination involving the basic rights of race, gender, alienage, and other characteristics, affirmative action, the problem of "innocuous motives," state action, and the extent to which the equal pro- tection clause prevents the states from eliminating the exercises of fundamental rights. If time permits, the Establishment Clause and the Free Exercise Clause will also be considered.

219. Evidence (4) I. Minnowediat; II. Wylick
Discussion—4 hours. Examination of 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 exam- ination and impeachment of witnesses, the opinion rule, constitutional and statutory privileges.

220. Federal Income Taxation (4) I. Simmons; II. Wolk
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) I. Dobris; II. Kirkland
Discussion—3 hours. Study of the law of wills and trusts. Course coverage includes: intestate succession; family protection and limits on the power of testa- tion; execution, revocation and revival of wills; con- tracts to make wills; substitutes; interest in and testamentary private trusts. Depending on the instructor the course may also cover one or more of the following topics: class gifts; powers of appoint- ment; 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. Agricultural Law (3)
Discussion—3 hours. The consumption and utilization of agricultural products will be covered, including tariffs, quotas, and non-tariff barriers, the General Agreement on Tariffs and Trade (the GATT), United States trade legislation (escape clause, and anti-dumping and countervailing duties) and the General System of Preferences. The trading regimes of America’s major agricultural trading partners, the European Community, Canada (the agricultural aspects of the Free Trade Agreement), and Mexico will be analyzed.

223. Estate Planning (2) I. Dobris
Seminar—2 hours. Prerequisite: course 221. Select- ed topic(s) in the estates and trusts area. Class pre- sentation and research paper will satisfy the legal writing requirement. Limited enrollment.
224. Consumer Transaction (3)
Discussion—3 hours. Study of selected consumer law problems. A survey of state and federal regulatory efforts. Course coverage may include the following: common law and statutory approaches to fraudulent or deceptive practices, disclosure of information, consumer protection, equal credit opportunity legislation, qualified written statement, enforcement by the creditor, consumer remedies, and attorney fees for representing consumers.

225. Marital Property (3) I. Bernhard; II. Jacobs
Discussion—3 hours. The California community property system including rights of spouses and treatment of property during marriage; characterization, valuation, and division of property upon termination of marriage by dissolution, nullity, or death; and premarital contractual agreements. Also covered are nonmarital cohabitation, creditor's rights, and spousal support.

226. Mass Media Law (2) II. Kurtz
Discussion—2 hours. Course 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 trial, and cable television, and the effect of the new technology on the law.

227. Criminal Procedure (3) I. Parnas; II. Poulos
Discussion—3 hours. The police function: arrest, search and seizure, electronic surveillance, entrapment, police interrogation and confessions, lineup, the exclusionary rule, and collateral order counsel.

228. Business Planning (3) II. Discussion—3 hours. Prerequisite: courses 220, and either courses 213 and 214 or course 215. Consideration of selected problems in business planning.

229. Regulation of Foods, Drugs, Devices, and Cosmetics (2)
Discussion—2 hours. Will examine FDA's elaborate regulatory framework for foods, drugs, devices, and cosmetics. Shows that the regulation products will be addressed. The adequacy of the regulations to release the safety of the food supply will also be covered with emphasis on development in state law such as California's Proposition 65. Current food topics such as the marketing of foods with health claims will be visited. The practice of law in these areas will be discussed.

230. Family Law (Short Course) (2)
Discussion—2 hours. Survey of history, current law, and policy regarding marriage, divorce, and their consequences. Consideration of personal relationships, individual and family privacy is the overriding policy issue. Role of the family lawyer is the key practical issue. Among subjects covered are constitutional framework of marriage regulation, spousal abuse, juvenile court overview, divorce, support, custody, and adoption confidentiality. (Conflict of laws and marital property not included).

231. Legislative Process (3)
Discussion—3 hours. Course covers fundamental elements of the legislative process, including legislative procedure, the legislature as an institution; the legislative investigatory power; lobbying; legislative-executive relations; and the legislature's constitutional powers and limitations.

232. Real Estate Finance (4) II. Rabkin
Discussion—4 hours. Examination of the problems involved in the acquisition, financing and development of real estate and of lender remedies and debtor protection in the event of debtor default. Course is strongly oriented toward current California law, and toward practical application of legal doctrines.

233. International Human Rights (2)
Seminar—2 hours. Selected topics pertaining to the protection of individual human rights and norms of customary international law. Specifically, the seminar will explore problems such as the extent to which national courts are required to uphold such rights; how the U.N. can create human rights norms; the investigation and prosecution of human rights enemies 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. Written paper will satisfy the advanced legal writing requirement.

234. Family Law Practice (3) I. Lannon, Fitzmaurice Seminar—2 hours; clinical—1 hour. Prerequisite: course 220 or 272 (concurrently) recommended. Combination of lectures and clinic to provide marital/legally counseling under the direct supervision of the instructor. Clinical participation required twice during semester. Students also participate in weekly 2-hour class to discuss a wide range of topic areas pertaining to family law practice. Limited enrollment. (SU grading only)

235. Administrative Law (3) I. Gandara
Discussion—3 hours. Prerequisite: courses 217. Control of the administrative operations of government will be studied. Federal regulation of business enterprise and of the provision of social services and subsidies provide the principal examples of subjects to be treated. Vagaries of power to administrative agencies and attempts by the judiciary, executive, and legislative branches to control these delegated powers will be studied in some depth. The protection of individuals, as well as groups of employees and recipients of governmental benefits, in the complex administrative state, and the regulation of particular industries, will also be received attention.

236. Securities Regulation I (2) I. Hitman
Discussion—2 hours. Prerequisite: courses 213 and 215, or consent of instructor. Principle focus of this course is the Securities Act of 1933. Topics covered include domestic and international public offerings, and educational opportunities for registration, secondary offerings, liabilities under the 1933 Act, expressed and implied causes of actions, the definition of a security, recapitalizations, and reorganization. Particular attention is devoted to problems of small issuers of securities.

237. Tax of Business Enterprise (4) I. Simmons
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 provides an introduction to the tax rules of partnerships, corporations, and S corporations.

238. Business Law (4) I. Simmons
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 provides an introduction to the tax rules of partnerships, corporations, and S corporations.

239. Sentencing Seminar (2)
Seminar—2 hours. Consideration of sentencing goals, procedure, present alternatives, and suggested changes. Guests. Class presentation and required seminar paper.

240. Law of Elections and Political Campaigns (2)
Discussion—2 hours. Course covers the statutory, administrative, and case law aspects of federal and state elections, including laws relating to primaries, general elections, initiatives, recalls, filing requirements, financial disclosures, and conflicts of interest.

241. Conflict of Laws (Long Course) (4) I. Juenger
Discussion—4 hours. Study of transactions with multistate or international contacts. The topics covered include conflict of laws, sales, laws of contracts, and choice of applicable law. The course deals with problems practitioners frequently encounter in a wide variety of fields, such as commercial law, family law, and personal injury law.

242. Civil Procedure (4)
Discussion—3 hours. Study of the rules and obligations of debtors in trouble, and of their creditors. Most of it concerns proceedings under the Bankruptcy Code. In the first part of the course, an examination of how and why debtors are permitted to get a "fresh start," wiping out their obligations. Later, considerations of how bankruptcy protects creditors. Study of the bankruptcy system as it applies to both individuals and corporations.

244. Basic Human Physiology (2) II. Gray
Discussion—2 hours. Several basic medical or science faculty lectures on the anatomy and physiology functioning of the organ systems; basic word roots which underlie medical/scientific terminology are emphasized. Several clinical faculty give lectures on how new technologies in medicine and some of the associated legal problems which have arisen. Exams are in the form of simple, simulated medical/legal problems in which students are expected to evaluate medical/scientific data, as well as to determine the kinds of expert witnesses that might be valuable in particular cases. Limited to 25 students. (SU grading only)

245. Estate and Gift Taxation (3)
Discussion—3 hours. Prerequisite: course 220. Study of the federal taxation of gifts, trusts, and estates.

246. Federal Jurisdiction (3) I. Oakley
Discussion—3 hours. Study of the subject matter jurisdiction of federal courts. Review of the provisions for the federal district courts to adjudge civil actions arising under federal law or between parties of different citizenship will be examined in contemporary detail, as well as from the perspective of the Constitution. Federal appellate jurisdiction, federal writs in the nature of habeas corpus, and miscellaneous matters affecting attorneys' decisions to seek a federal forum will also be discussed. In addition to careful study of the fine points of relevant legislation in light of their history, the course will examine and develop the constitutional doctrines of separation of powers and federalism as guides to understanding the Supreme Court's leading opinions on the scope of federal jurisdiction.

247. Advanced Federal Income Taxation of Business Enterprise (3) II. Simmons
Discussion—3 hours. Prerequisite: course 220 and 236. Continuation of course 238. Focuses on the federal income tax considerations involved in the transfer of business entities including corporate liquidation as an asset acquisition technique, corporate reorganizations, divisive reorganizations, and the transfer of corporate attributes in a reorganization transaction. Also examines tax planning for affiliated groups of corporations.

248. International Law (3) I. Glennon
Discussion—3 hours. Prerequisite: course 217 recommended. This Introductory course covers basic international law concepts such as statehood and recognition, treaty law and the United Nations. It will also cover the UN and relevant international law; use of force; human rights and war crimes, expropriation; the relationships between International law and national law, and the jurisprudence of international law.

249. Comparative Law (2) I. Juenger
Discussion—2 hours. Comparison of methods and sources of common and civil law; background and structure of the principal civil codes; analysis and study of problems arising in international transactions.

250. Jurisprudence (2) I. Oakley
Seminar—2 hours. Course considers the relationships between justice and law with special attention to the problem of how judges should decide hard cases where the content of the law is in doubt. To what extent should a judge's personal convictions about justice affect decisions about the legal rights of the parties to a law suit? The topics to be discussed are: interpreting precedent rather than legislation? Introductory readings of a general and synthetic nature will be followed by a sampling of philosophical essays analyzing particular problems of adjudication. Reading will be based on active class participation and on an original paper which meets the standards of the advanced legal writing requirement. Limited enrollment. 

*Course not offered this academic year.*
221. Labor Law (4) I. Bartosic Discussion—4 hours. Survey of the legislative, administrative, and judicial regulation of labor relations. The course will focus on the historical development of labor law, the scope of national legislation, union organization and recognition, the negotiation and administration of collective bargaining agreements, the union's duty of fair representation, legality of strikes, picketing, boycotts, and employer interference with employee-concerted activities. Emphasis will be on labor reform.

225. Gender-Based Discrimination (3) Discussion—3 hours. Course focuses on legal issues raised by legal and social discrimination between men and women. It explores potential remedies drawn from constitutional law, statutory enactments, and common law developments. Subject matter areas include sex-based discrimination in family law, educational opportunity, and criminal law.

233. Products Liability (5) I. Hogan Discussion—3 hours. Civil action for harm to the consumer resulting from dangerous and defective products.

234. Seminar in Legal History (2) Seminar—2 hours. Most students have only a haphazard recollection of events, variations, and concepts that have shaped American law. Thus American lawyers do not share a common cultural heritage that would facilitate communication and shared values. The purpose of this seminar would be to give students an opportunity to consult with the instructor, a particular person, event, or concept to be the subject of his or her paper. Possible topics might include: a biography, together with the student's positive or negative, kind or critical, of an outstanding lawyer or jurist; the historical background and effect of a key judicial decision or statute; the importance and effect of a particular decision of education or legal theory. Each student will be required to prepare and present a paper that would fulfill the legal writing requirement. Each paper, together with its supporting documents, would be a case book of teaching materials that might be published for use in courses in legal history. Limited enrollment.

255. Pension Law (3) II. Wolk Discussion—3 hours. Federal regulation and taxation of private pensions and other forms of deferred compensation and tax-favored retirement savings. The course will focus on the Employee Retirement Income Security Act of 1974 (ERISA) and will deal with each topic of the complex interaction of social security, funding, spousal interests (both during marriage and after divorce), retiree health and welfare plans, and preemption of state law. This course will be aimed at law students, particularly in the area of corporate takeovers and plan investments. Problems surrounding plan terminations will also be considered, including bankruptcy issues. Pension Benefit Guaranty Corporation insurance, and the issue of asset reversions to employers in the case of over-funded plans.

256. Land Use Planning (3) I. Kirkland Discussion—3 hours. Legislative, judicial, and administrative methods used to facilitate the rational use of land. Legal topics considered within this context will include zoning, subdivision regulation, nuisance, eminent domain, general plans, and environmental controls affecting land use.

257. Foreign Relations Law (3) II. Glennon Discussion—3 hours. Prerequisite: course 217 or consent of instructor. Seminar covers subjects such as treaty power, the treaty-making and executive agreements; arms sales and military assistance, the recognition power, the negotiation power, the scope of the appropriations power as a check on executive activities, and other constitutional powers issues generated by the intersection of international law and constitutional law. Class presentation and required seminar paper will satisfy the advanced legal writing requirement.

258. Professional Responsibility (1) I, II. Wyckoff Discussion—1 hour. Study of ethical duties and responsibilities under the American Bar Association Code of Professional Responsibility, the Model Rules of Professional Conduct, and the Code of Judicial Conduct. The seminar will include the comments of all students for graduation. (SU grading only)

259. Disability Rights Law (2) I. Wolinsky Discussion—2 hours. Survey of legal issues involving the rights of disabled persons. (SU grading only)

260. Employment Law in Western Europe Discussion—3 hours. Consideration of employment discrimination based upon race, color, religion, sex, national origin, age, and sexual orientation. Course will focus on Title VII of the Civil Rights Act of 1964, and include coverage of Age Act, 1961, Art. 1983, the Equal Pay and Age Discrimination Acts. State fair-employment laws will also be discussed.

262. Antitrust (3) I. Wyckoff Discussion—2 hours. Study of the federal antitrust laws including price fixing, limits on distribution, tying arrangements, monopolization, and mergers.

263A. Trial Practice (3) I. Iminikin/Irakli; II. Fracchia Discussion—2 hours; laboratory—2 hours. Prerequisite: course 219, introduction to the preparation and trial of cases, featuring lectures, videotapes, demonstrations, assigned readings and forensic drills. Laboratory will be held on Tuesday, Wednesday, or Thursday evening. (SU grading only) Limited enrollment.

263B. Trial Practice—Lawyering and Advocacy Discussion—2 hours. Prerequisite: course 263A. Advanced trial practice and litigation skills course featuring student preparation of and participation in mock trial and mock trial class sessions. (SU grading only) Limited enrollment.

264. Water Law (3) II. Dunning Discussion—3 hours. Property rights in surface waters, including riparianism, prior appropriation and federal reserved rights; water administration institutions, including the federal reclamation program; the law of interstate waters and property rights in ground water. Emphasis is placed upon California water law and policy.

265. Natural Resource Law (2) II. Dunning Seminar—2 hours. An exploration of the origins, contemporary applications and potential of the public trust doctrine. This common law doctrine, long associated with significance to the ownership and use of coastal lands, has recently become very important for California water rights law. Many in the environmental community have suggested applications of the doctrine to air, wildlife and wilderness protection. Students will read materials on the public trust doctrine and on the closely related doctrine of state sovereign ownership and will prepare a seminar paper. The seminar is open to 10 students.

266. 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.

267. Civil Rights Law (2) Discussion—2 hours. Surveys racial patterns in American law. May include the following: history of racial classification in public facilities, voting, the administration of criminal justice, public schools, housing, and employment. In addition, considers the remedies for racial discrimination, including actions under: 42 U.S.C., Title VI; 26 U.S.C. 4258; 28 U.S.C. 2201; Civil Rights Act of 1964; Title VI (programs receiving federal aid); Title VII (employment); the Voting Rights Act of 1965.

268. Seminar in Jewish Law (2) Discussion—2 hours. The term 'Jewish Law' refers to those subjects that would normally be taught in an American law school as they have been approach by the Jewish legal system. This system is based primarily on oral tradition and relies on the Talmud and decisions that are derived from it. Jewish law is of interest to American law students not for its immediate practical value, but because it is a foreign legal system that is one of the few that has faced many of the problems now facing American law. Specifically, although Jewish law is purportedly based on immutably religious law, changing conditions over the centuries have encouraged methods of accommodation that are reminiscent of American constitutional law. Each student will be required to prepare and present a paper that will fulfill the advanced legal writing requirement. Neither a knowledge of foreign language nor a serious exposure to Jewish law is necessary. Limited enrollment.

269. Corporate Finance (3) Discussion—3 hours. Focuses on how businesses raise money. Consists of two parts: a study of elementary financial theory and an examination of how this theory is applied by courts and legislatures.

270. International Business Transactions (2) II. Hillman Discussion—2 hours. Consideration of selected problems in international business transactions.

271. Labor Law Seminar (2) II. Bartosic Seminar—2 hours. Prerequisite: course 251 or consent of instructor. Study of current questions from a critical legal studies perspective, including cases pending before the Supreme Court, impose resolution in the public and private sectors, union authority and individual rights, the rights of the unorganized, the assumptions and myths of American labor law, labor relations of multinational corporations and comparative industrial democracy (codetermination, work councils, Japanese labor relations, and self-management and ownership). Emphasis will be on labor law. Satellites of labor law and writing requirement. Limited enrollment: 12 students.

272. Family Law (Long Course) (3) II. Parnas Discussion—3 hours. Designed for the student with a substantial interest in Family Law. Emphasizes the legal, social, and economic aspects of parent-child relationships, including decisions concerning medical care, neglect, dependency, abuse, foster care, termination of parental rights, adoption, artificial insemination, surrogacy, paternity, legitimacy, surnames, birth control, abortion, child support and child custody. How attorneys, mental health professionals and the judicial process do and should deal with these issues (e.g., interviewing, counseling, and mediation) are also considered.

273. Current Issues in Family and Marital Property (2) Seminar—2 hours. Prerequisite: course 225, course 220 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 seminar will address the 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 original research and a consent 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 trade secrets, patents, trademarks, misappropriation and false advertising, and copyrights.

275. Business Litigation (3) Discussion—3 hours. Focuses on cases that issue that frequently arise in large, commercial litigation. The class will read and discuss materials, including case studies, raising issues of advanced civil procedure, including but not limited to the complexities of litigating class actions, the attorney-client privilege and work product doctrine, discovery and "discovery abuse," and the settlement of multi-plaintiff cases. Although many of these issues are touched on in the first-year civil procedure course, we will delve into them in greater detail and discuss some of the issues currently being litigated. The class will also discuss personal moral dilemmas that attorneys may face in representing corporate clients, such as the decisions attorneys in large law firms must make when assigned a case, or are asked by a client to take action, which, although legal, they believe to be morally objectionable.

*Course not offered this academic year.*
276. The Juvenile Justice Process (2)
Discussion—2 hours. Legal and philosophical basis of a separate juvenile justice process; police investigation, apprehension, and diversion; probation intake and detention; juvenile court hearing and disposition; juvenile correction. Major emphasis will be on the development of policy at each phase of the process. Guest speakers and field trips.

277. American Indian Law (2)
Discussion—2 hours. Study of the distinctive legal doctrines relating to Indians, Indian tribes, and Indian reservations. Major focus will be on the governmental powers of federal, state, and tribal governments over Indians and over non-Indians residing on or doing business on Indian reservations. The law on Indian lands, wild game, fishing and hunting rights will also be emphasized.

278. Pretrial Skills (3) I. Johns
Discussion—3 hours. 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. The course concentrates on client interviewing and counseling, but will also include exercises in witness interviewing, negotiation, drafting of pleadings, discovery, and advocacy of causes. It is an expanded version of the client counseling course. Limited enrollment.

279. Public Sector Labor Law (2) II. Bartoski
Seminar—2 hours. Prerequisite: course 251 or consent of instructor. Analysis of public labor law doctrines to the public sector. Emphasis on the four California public sector statutes and the impact of constitutional law on public employees. Class presentation and seminar paper will satisfy advanced legal writing requirement. Limited enrollment.

280. Advanced Legal Writing Seminar (2) II.
Wydick
Seminar—2 hours. Law 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)

281. Children and the Law (2)
Discussion—2 hours. Prerequisite: course 230 or 272 or consent of instructor. Course will consider the child in relationship to the family and society. Attention will be given to such topics as parens patriae and legitimacy; custody, foster care, and adoption; juvenile court proceedings; rights to support, health care, and education; legal capacity and emancipation.

282. Energy Law (2)
Discussion—2 hours. Prerequisite: course 235. Introduction to the regulation of the energy sector. Topics to be covered include: ownership of natural monopoly, 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.

283. Remedies (3) I. Jacobs
Discussion—3 hours. Study of common law remedies: damages, specific performance, injunctions, and restitutionary relief. Focus of course will be on the efficiency and effectiveness of the alternative remedies available to the practitioner and the court.

284. Advanced Criminal Procedure (2) II. Parnas
Discussion—2 hours. Essential to those who wish to handle criminal cases. In particular, it treats bail, prosecutorial discretion, plea bargaining, trial by jury, and sentencing. Advanced legal writing requirement may be satisfied at the discretion of the instructor.

285. Environmental Law (3) I. Dunning
Discussion—3 hours. Introduction to the law dealing with environmental impact, particularly the National Environmental Policy Act, and to pollution control law. Particular emphasis is given to the Clean Water Act and various statutes on toxics in the environment. An introduction to the Clean Air Act is also provided.

286. Law and Economics (2)
Discussion—2 hours. Course will examine a number of legal issues using economic analysis. Possible topics include the economic consequences of liability law, the history of public law, the theory of the firm and basic economics of corporate law and antitrust, the theory that the common law is efficient, and economic interpretations of basic concepts of Anglo-American law such as rights, property, harm, and equality. Prior background in economics is welcome but not necessary.

287. Public Land Law (3)
Discussion—3 hours. Legal aspects of federal land management, including the history of public land law, authority over federal lands and specialized law dealing with particular natural resources and uses found on federal lands (mining, timber, range, wildlife, recreation and preservation). Limited enrollment: 12 students.

288. Advanced Constitutional Law Seminar (2) II.
Brownstein
Seminar—2 hours; paper; explores in-depth selected topics or problems in constitutional law and theory. Topics may include public choice theory, the public/private distinction, community-based theories of constitutional order, theories of judicial review, theories of the public interest, constitutional law, rhetoric, etc. Problem areas may include separation of powers, freedom of speech, substantive due process, equal protection, affirmative action, and constitutional litigation. Satisfies advanced legal writing requirement. Limited enrollment.

289. Torts (2) II. Dunning
Discussion—2 hours. Government efforts to regulate the release of toxic chemicals to the environment and to clean up existing toxic dumps sites. "Torturous"—personal injuries related to toxic in the environment—are included.

290. Criminal Justice Administration Seminar (2) I.
Parnas
Seminar—2 hours. Consideration of current reform efforts in criminal justice administration. Emphasis will be on the pre-trial process. Specified topics will include bail reform and pre-trial detention, criminal discovery, and the charging process. Class presentation and required seminar paper will satisfy the advanced legal writing requirement.

291. Mexican-American Legal Relations (3) II.
Smith
Discussion—3 hours; final examination or research paper on approval by instructor. Course will include a description and/or analysis of the differences and similarities of the legal and political systems of both countries; the legal aspects of doing business in Mexico; foreign investment; Mexico's external debt; trade (including imports and exports, oil, the GATT, technology transfers, etc.); relations with bilateral and multilateral treaties, executive agreements and regional international law. Satisfies advanced legal writing requirement.

292. Immigration Law and Procedure (3) I. Smith
Seminar—3 hours. Course will survey a broad history of U.S. immigration and policy and compare the policies of other countries; use of primary and secondary sources of immigration law; federal agency Interrelationship (Justice and State Department); entry of nonimmigrant (temporary visitors and immigrants into the United States); the world-wide quota and preference systems; family and employment relationship criteria; approved immigrant status; deportation procedures; discretionary relief available to persons otherwise subject to deportation; available defenses to deportation and exclusion proceedings; refugee and asylum law; administrative appeals; federal and state judicial relief; citizenship and naturalization. Students may also participate in mock deportation and asylum hearings.

293. Public Interest Law Seminar (2) I. Smith
Seminar—2 hours. Discussion of various aspects of public interest litigation and practice. Includes a survey of legal techniques and problems common to public interest practice.

294. Problems in Fiduciary Administration (2)
Seminar—2 hours. Prerequisite: course 221. Selective topics in the area of fiduciary administration of estates and trusts. Required class presentation and research paper. Satisfies advanced legal writing requirement. Limited enrollment.

295. Securities Regulation II (2) I. Hillman
Discussion—2 hours. Prerequisites: course 213 or 215, or consent of Instructor; course 236 recommended. Principal focus is on the Sarbanes-Oxley Act of 1934 and the regulation of securities markets. Topics include the evolution of securities markets, market efficiency, continuous reporting, institutional investors, shareholder voting and going-private transactions, regulation of securities markets and securities professionals, responsibilities of securities lawyers, transactional securities fraud, and enforcement of securities laws.

296. Copyright and Entertainment Law (3) I. Kurtz
Discussion—3 hours. First half of course will involve a detailed consideration of the law of copyright, with emphasis on its application to motion pictures, music, television, and theatre. Second half of course will involve a study of other legal problems in the entertainment industry, including misappropriation, protection of titles and characters, and the rights of privacy in the public eye.

297. Client Interviewing and Counseling (2) II.
Smith
Discussion—2 hours. 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. Course concentrates on client interviewing and counseling but also includes exercises in witness interviewing, negotiation, and drafting of pleadings. Limited enrollment.

298. Group Study (1-4) I. II. The Staff
Groups of students (not fewer than 4 or more than 10) with common interest in studying a stated legal problem may plan and conduct their own research and systematic analysis in a group, 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 normely will be approved only after the semester is involved; (5) group members must conduct a weekly seminar session to be arranged by them; (6) each member of the group must submit an individual paper or an approved alternative growing out of the research 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) I. II.
The Staff
Students may receive credit for individual research projects, subject to the following regulations: (1) the project may extend over no more than two semesters; (2) each project will be under the supervision of a faculty member (normally, no faculty member will be permitted to supervise more than five students working on individual programs during any semester); (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) student must submit an individual paper or approved alternative to the supervising faculty member; (SU grading only)

Professional Courses
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 may not enroll in 410B. Class meets twice a week and will be graded on a pass/fail basis. Limited enrollment. (SU grading only)

410B. 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 410B may not enroll in 410A. Class meets twice a week and will be graded on a pass/fail basis. Limited enrollment. (SU grading only)
410B. Appellate Advocacy (Moot Court) (1-2).
Prerequisite: course 410A. Continuation of course 410A. Development and writing of an appellate brief and argument. May be taken after completion of course 410A. Students may move to the second year of the program after completion of the first year and with the permission of the faculty advisor. (SU grading only.)

413. Interschool Competition (1-3) I, II. The Staff
Prerequisite: consent of appropriate faculty advisor. Participation in interschool moot court and lawyering skills competitions. Enrollment is limited to students accepted for the interschool School in the interschool competitions. Competition must be authorized by the appropriate faculty advisor. The faculty advisor may condition the award of academic credit for any particular interschool competition on the performance of additional work as may be reasonably necessary to justify the credit. May satisfy advanced legal writing requirement. (SU grading only.)

414. Moot Court Board I (1-2) I. The Staff
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 I (1-2) I. Members of the Trial Practice Honors Board administer the Trial Practice II course. Students may receive one credit for each semester of service. Credit awarded upon approval of faculty advisor. (SU grading only.)

416. Law Review Writer (1-2) I and II or III.
Writing of an editorial 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 one full-time academic year preceding membership in satisfactory standing as a member of the Law Review, and that the student have written an article for the book, including the assignment to the Law Review. Students may receive one credit for each semester of service as an editor, up to maximum of two. (SU grading only.)

417. Law Review Editor I (1) I, II. The Staff
Editors must have completed an editorial article and must perform editorial duties requiring a substantial time commitment. Credit is awarded only after certification by Editor-in-Chief of the Law Review and approval of the faculty advisors to the Law Review. Editors of the Law Review may receive two units for each semester of service as an editor, up to maximum of two. (SU grading only.)

418. Environ Environs Editor I (1) I, II. The Staff
The Editor-in-Chief of Environ may receive one credit for each semester of service. Credit must be approved by the faculty advisor to Environ. Only one person may receive this credit in any one semester. (SU grading only.)

419. Advanced Writing Project (1-4) I, II. The Staff
Completion of a writing project under the active and regular supervision of a faculty member in satisfying the legal writing requirement. Writing project must be an individually authored work of rigorous intellectual effort of at least 20 typewritten, double-spaced pages, excluding footnotes. Project may take any of several forms, for example, a brief, a memorandum of law, a proposed statute, a statutory scheme or set of administrative regulations (with explanatory comments), a will or agreement (with explanatory comments). Advanced writing project may also be undertaken in connection with another course or seminar to satisfy the legal writing requirement. Number of units for the writing project shall be approved by the faculty supervisor and depend upon the scope of the writing effort. (Grading may be on S/U or letter grade basis at the faculty supervisor's discretion.)

420. Individual Clinics (2-12) I, II. The Staff
Individual Clinical Programs—4 hours (1 unit) to full time (12 units). Prerequisites: to be arranged with practicing attorneys and public agency of student's choice with approval of Clinical Committee and under supervision of the faculty advisor. Course 420 is designed to be of substantive and procedural courses recommended. Clinical must be under appropriate legal supervision and designed to maximize educational benefits. Students arranging individual clinical placement must be advised by Formal Clinical Programs (e.g., criminal justice, employment relations, legislative, immigration) must enroll in the Formal Clinical Program and attend the required seminars (see courses 224, 440, 455, 470). With exception of a clinical semester away, students may enroll in no more than 6 units in any one semester or any one clinical placement. With a full time clinical placement, one course may be taken in conjunction with course 420 with consent of Dean (14 semester units maximum total). For complete description of policies and procedure governing the design, approval, requirements and limitations of individual clinical, see "Clinical Guidelines" obtainable from Dean's Office or clinical office. (SU grading only.) (Completed application and confirming letter from clinical placement must be submitted to Clinical Office one month prior to beginning of semester in which credit is requested.)

425. Judicial Clinics (2-12) I, II. The Staff
Clinical Program—to be arranged. Prerequisites: relevant substantive course credit recommended. Students may arrange individual judicial clerkship programs with state and federal judges of their choice with the approval of the Clinical Committee and a faculty advisor. An introductory orientation seminar is required. Otherwise, the requirements for the program are the same as for Individual Clinicals (course 420). (SU grading only.)

440. Clinical Program in Immigration Law (2-12) I, II. Smith
Discussion—2-12 hours. Client clinic course will include a seminar on immigration law practice, individual weekly client conferences with faculty supervisor and assigned immigration law cases. Students may represent clients in administrative law hearings in San Francisco. Minimum units for the course are 4 and maximum is 12. Each unit assumes four hours work per week, including participation in the seminar, conference, and case research and development. Students who have completed course 292 may take the clinic for a minimum of 2 units. Limited enrollment. (SU grading only.)

450. Clinical Program in Environmental Law (2-12) I. Dunning
Clinical Program. Practical experience in environmental law. Students will spend the direct supervision of a government or private lawyer engaged in some form of environmental law work for a minimum of 8 office hours per week. (For purpose of this course, "involvement in land use control by publics.") Students will also be required to prepare a bi-weekly journal, noting, commenting upon, and reflecting upon their clinical experience, and to participate in occasional meetings of students enrolled in program. (SU grading only.)

455. Clinical Program in Employment Relations (2-12) I, II. Bartosic
Clinical Program. Prerequisites: prior or concurrent enrollment in course 251 or 260 or consent of instructor. Practical experience in employment relations: private and public sector labor law, or employment discrimination. Students will work under the direct supervision of a government or private lawyer and will have the opportunity to participate in a range of activities associated with their specific office, with emphasis on observation and participation in activities of investigation, interviewing, drafting of pleadings, and attendance at hearings. Weekly journals and attendance at monthly small group meetings required. (SU grading only.)

465. Clinical Program in Administrative Law (2-6) I, II. Gandara
Clinic—2-6 hours. Prerequisites: course 235 (may be taken concurrently) or consent of instructor. For students interested in a work experience in an administrative law setting, students will work under the direct supervision of an administrative law judge, hearing officer, or government attorney. Placement assistance for students interested in a work experience in an administrative law setting will be provided by the instructor. A goal of this clinical will be a breadth of experience in the areas of formal adjudication, informal adjudication, rulemaking, and judicial review. Students will be required to meet monthly as a group to share experiences and maintain observational journals. (SU grading only.)

470. Clinical Program in Criminal Law (2-12) I, II. The Staff
Clinical program. Prerequisites: courses 219, 227 and 263A recommended. This program affords students the opportunity to gain practical experience working full-time or part-time in a District Attorney's or Public Defender's office in one of several surrounding counties. Minimum of 12 hours work per week. Students enrolled in the program engage in full range of activities associated with their specific office with emphasis on observation and participation in factual investigation, interviewing, counseling, negotiating, motion practice, and trials under State Bar rules. Journals and seminar attendance are required. Limited enrollment. May be repeated for a total of 12 units. (SU grading only.)

480. Clinical Program in Prison Law (2-6) I, II. Clinical Program. Provides practical experience in providing legal services to real clients who have various problems related to their incarceration in state prisons. The services are provided in accordance with Constitutional Law, state statutory law, agency regulations, and the rules of professional responsibility. Students will work under the direct supervision of the Prison Law clinical faculty and will assume a portion of the director's case load. Students will be required to follow the law office procedure of the clinic and employ skills such as interviewing, research, writing, negotiating, and possibly, the preparation of legal documents to be filed in court. (SU grading only.)

495. Instruction in Legal Research and Writing Skills (1-2) I. Bernard; II. Bernard, Jacobs, Johns
Participates will assist in instructing legal research and writing for first-year cases and legal research and writing for first-year cases and will participate in the direction of the legal research and writing instructors. Approval of the research and writing instructors is required for enrollment. Participation may consist of any time in the legal research program and once in the legal writing program. One unit will be given in the fall semester for legal research instruction and two units in the spring for legal writing instruction. (SU grading only.)

Linguistics

(College of Letters and Science)
—Program Director
Program Office, 922 Spraul Hall (916-752-9533)

Committee in Charge
Wilbur A. Benware, Ph.D., Associate Professor (Chairman)

Diane Brentner, Ph.D. (Linguistics)
Patrick Farrell, M.A. (Linguistics)
Caroline Henton, D.Phil. (Linguistics)
Marie I. Maneu-Manolou, Ph.D. (French)
Almerindo E. Cipeta, Ph.D. (Linguistics)
Lawrence A. Timm, Ph.D. (Linguistics)
Maximo Torreblanca, Ph.D. (Linguistics)
David P. Willkins, Ph.D. (Linguistics)
Aram Yengoyan, Ph.D. (Anthropology)

Faculty
Wilbur A. Benware, Ph.D., Associate Professor (Chairman)
Diane Brentner, Ph.D., Assistant Professor
Nina F. Drorkner, Ph.D., Assistant Adjunct Professor
Linnea C. Ehrl, Ph.D., Professor (Education)
M. A. M. A. (Linguistics)
James Gallant, Ph.D., Associate Professor (Russian)
Caroline Henton, D.Phil., Assistant Professor
Marie I. Maneu-Manolou, Ph.D., Professor (French)
Barbara J. Merino, Ph.D., Associate Professor (Education)
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.

UNITs

LINGUISTICS

LINGUISTICS 1, 109, 139, and 140, 169, 170, or 172...24

Additional units of upper division linguistics courses chosen in consultation with an adviser..8

Minor Adviser: Same as Major adviser.

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

Lower Division Courses


Lecture—3 hours; discussion—1 hour. Introduction to the study of language: its nature, diversity, and structure. General Education credit: Civilization and Culture/Introducory.

10. Elementary American Sign Language (5) I. The Staff

Recitation—4 hours; discussion—1 hour. Prerequisite: course 1 recommended. Introduction to American Sign Language and its vocabulary, with emphasis on conversational skills.

11. Elementary American Sign Language (5) II. The Staff

Recitation—4 hours; discussion—1 hour. Prerequisite: course 12. Continuation of course 10.

12. Elementary American Sign Language (5) III. The Staff

Recitation—4 hours; discussion—1 hour. Prerequisite: course 11. Continuation of course 11.

13. Intermediate American Sign Language (5) I. The Staff

Recitation—4 hours; discussion—1 hour. Prerequisite: course 12. Grammar review and vocabulary development; enhancement of conversational skills.

14. Intermediate American Sign Language (5) II. The Staff

Recitation—4 hours; discussion—1 hour. Prerequisite: course 13. Emphasis on classifier and numeral systems in American Sign Language; conversational practice.

15. Advanced American Sign Language (5) III. The Staff

Recitation—4 hours; discussion—1 hour. Prerequisite: course 14. Study of American deaf culture through conversation and narratives; dialectics of American Sign Language; deaf education.

Upper Division Courses

100. Languages of East Asia (4) II. Wallacker

Lecture—3 hours; discussion—1 hour. Prerequisite: course 1. Survey of languages and language families of East Asia, their nature and distributions.

102. Historical Linguistics (4) III. Benware

Lecture—3 hours; discussion—1 hour. Prerequisite: courses 1 and 109. Description and methods of the historical study of language; sound change, morphological change, syntactic change, semantic change.

108. Phonetics (4). I. Henton

Lecture—3 hours: discussion—1 hour. Prerequisite: course 1. Introduction to articulatory phonetics with some attention to the fundamentals of acoustic phonetics.

113. Language, Gender and Society (4) II, Timm, Henton

Lecture—3 hours; discussion—1 hour. Prerequisite: course 1. Investigation of real and putative (stereotypical) sex-linked differences and their 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. General Education credit: Contemporary Societies/Non-Introductory. Recommended GE preparation: Linguistics 1 or Anthropology 4.

115. Chicano Sociolinguistics (4) I. Timm

Lecture—3 hours; term paper. Prerequisite: course 1 and Spanish 289, or the equivalent. Topics covered include the linguistic features of Chicano Spanish, Spanish-English code-switching, regional and social diversity in Chicano Spanish, Chicano English, the acquisition of bilingual choice and use, attitudes about Spanish and English, Spanish language maintenance and shift, Chicano bilingualism and education. Offered in alternate years.

116. The Spanish Language in the United States (4) III. Turrill

Lecture—3 hours; term paper. Prerequisite: Spanish 28 or the equivalent, and course 1 or Spanish 132. The linguistic features of the varieties of the Spanish language spoken throughout the United States: phonology, morphology, syntax, vocabulary. The main focus is the relationship between United States Spanish and other world varieties of Spanish, within a historical framework.

123. Aborigines (4) I. Ojeda

Lecture—3 hours; discussion—1 hour. Prerequisite: course 1 or consent of instructor. Introduction to the study of meaning: the nature of the linguistic sign, the structure of the lexicon, and the semantics of sentences.

135. Introduction to Psycholinguistics (4) I.

Lecture—3 hours; discussion—1 hour. Prerequisite: courses 1 and 109 recommended. Introduction to psychological issues relating to language and to the implications of research in psychology for linguistic theory.

139. Language Development (4) III.

Lecture—3 hours; discussion—1 hour. Prerequisite: course 1 or consent of the instructor. Theory and research on children's acquisition of their native language including the sound system, grammatical structure, basic semantic categories, and social aspects of usage.

139. Phonological Analysis (4) II. Henton, Brentari

Lecture—3 hours; discussion—1 hour. Prerequisite: course 109. Introduction to and application of phonological theory.

140. Grammatical Analysis (4) I. Farrell

Lecture—3 hours; discussion—1 hour. Prerequisite: course 1. Introduction to syntactic analysis; survey of types of syntactic and semantic phenomena in natural languages. Emphasis on developing skills and data analysis, rather than on investigating formal aspects of the theoretical work to be employed.

164. Introduction to Phonological Theory (4) III, Brentari

Lecture—3 hours; discussion—1 hour. Prerequisite: course 139. Introduction to contemporary phonological theory, emphasis on autosegmental, metrical, and lexical theory.

165. Introduction to Syntactic Theory (4) II. Farrell

Lecture—3 hours; discussion—1 hour. Prerequisite: course 140. Introduction to syntactic theory, primarily through a study of a major theory of syntax, emphasizing theoretical reasoning, argumentation, and theory building.

169. Current Theories of Syntax (4) III. Ojeda, Farrell

Lecture—3 hours; discussion—1 hour. Prerequisite: course 165. Examination of major contemporary theories of syntax.

170. Language Universals and Typology (4) III.

The Staff

Lecture—3 hours; term paper. Prerequisite: course 465 (may be taken concurrently). Introduction to common features of all human languages and the classification of languages in terms of their structural features; theories of universal grammar; detailed discussion of a non Indo-European language and comparison with English.
172. Language Structures (4) Ill. The Staff
Lecture—3 hours; term paper. Prerequisite: course 102, 119, 140. In-depth study of the structure of a particular language or members of a language family or area. May be repeated for credit.

175. Biological Basis of Language (4) Ill. Dronkers, Lec—3 hours per semester—1 hour. Prerequisite: course 1 or consent of instructor. Overview of issues in the field of neurolinguistics and techniques used to explore representation of language in the human brain.

182. Internship in Linguistics (1-12) I, II, III, The Staff (Timm in charge)
Internship—3-36 hours; two written reports. Prerequisite: course 4 or the equivalent. Internship among linguists at a fieldwork project in areas such as media, law, or industry. In approved organizations or institutions. Maximum of 4 units applicable toward major. (P/NP grading only.)

184H. 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, leading to a senior honors thesis. (P/NP grading only.)

197T. Tutoring in Linguistics (1-4) I, II, Ill. The Staff (Chairperson in charge)
Preparation: upper division standing with Linguistics major and consent of Department Chairperson. Leading of small voluntary discussion groups affiliated with one of the Department’s regular courses. May be repeated for credit. (P/NP grading only.)

198. Directed Group Study (1-5) I, II, III. The Staff (Chairperson in charge)
Prerequisite: senior standing in Linguistics. (P/NP grading only.)

199. Special Study for Advanced Undergraduates (1-5) I, II, III, The Staff (Timm in charge)
Graduate Courses

202. Principles of Historical Linguistics (4) III. Manea-Manoliu
Lecture—3 hours; term paper. Prerequisite: course 102. Advanced treatment of the theory and methods of historical linguistics. Offered in alternate years.

209. Advanced Phonetics (4) II. Henton
Lecture—3 hours; discussion—1 hour. Prerequisite: course 109. Exploration of the physiological basis of speech sound production and an introduction to acoustic phonetics. Offered in alternate years.

210. Advanced Semantic Theory and Analysis (4) II. Ojeda
Lecture—3 hours; term paper. Prerequisite: course 120. Advanced critical exploration of contemporary theories of linguistic semantics. Offered in alternate years.

220. Romance Linguistics (4) II, III. Manea-Manoliu
Seminar—3 hours; term paper. Prerequisite: one course from the following: courses 102, 120, 139. The development of the major Romance languages from Proto-Romance to the modern era. Selected topics in the structure of modern Romance languages. Option on focus on phonology, syntax, or historical linguistics.

225A. Modern Linguistic Theory: Structuralism (4) II. Manea-Manoliu
Lecture—3 hours; term paper. Prerequisite: courses 139, 140. Survey of the development of structural linguistics from de Saussure to the 1950s. Offered in alternate years.

225B. Modern Linguistic Theory: Generative Grammar (4) III. Ojeda
Lecture—3 hours; term paper. Prerequisite: courses 139, 165. Survey of the development of generative grammar and its offspring from the 1950s to the present. Offered in alternate years.

250A. Critical overview of current phonological theories. Methods and Techniques of Linguistics Research. (4-4-4) I, II, III. The Staff
Seminar—2 hours; laboratory—1 hour. Prerequisite: graduate standing and consent of instructor. Introduction to current research in various aspects of the voice system, speech perception, and phonetics.

255. Advanced Syntactic Theory and Analysis (4) III. Farrell
Lecture—3 hours; term paper. Prerequisite: course 145. Critical survey of contemporary theories of syntax, with concentration on functionalist theories. 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 different disciplines—psycholinguistics, sociolinguistics, and cognitive psychology—to English as a second language instruction.

281. Research on Second Language Acquisition (4) II. Merino
Lecture—2 hours; laboratory—1 hour. Prerequisite: upper division or graduate standing. Analysis of theory and research on language acquisition. Topics include: contrast of L1/L2 acquisition; current theories of L2 such as the nature and logicality of input hypotheses, as well as effects of individual variation. Emphasis on research on L2; research design and basic statistical analyses.

282. Individual and Social Aspects of Bilingualism (4) III. Tirm
Lecture—3 hours; term paper. Broad overview of bilingualism, focusing on the theoretical and descriptive research; topics covered range from language processing in bilinguals to code-switching to language as political issues in multi-galitarian societies.

297. English as a Second Language Teaching (3-1-3) I, III, III. The Staff (Director in charge)
Prerequisite: course 200. Course 300, English 302 and 303 (may be taken concurrently). Teaching ESL for graduate students in the UC Davis ESL and CIBI programs. Emphasis on listening, reading, writing, etc.; blending the ESL and undergraduate composition classes; nurturing foreign graduate student TAs in pronunciation; observing and critiquing off-campus ESL classes. Does not fulfills requirements toward the M.A. May be repeated for credit. (SU grading only.)

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

300. The Teaching of English as a Foreign Language (4) I, II, III. The Staff (SU grading only.)
Lecture—3 hours; laboratory—3 hours. Prerequisite: course 105A or course 109 or consent of instructor. Methods of teaching English to non-native speakers, stressing particularly recent linguistic methodology and techniques.

Linguistics
(A Graduate Group)
Ph.D., Chairperson of the Group (916-752-2999)
Group Office, 822 Sproul Hall (916-752-9935/1219)
Faculty, The Group includes faculty from eleven 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 centered on applied linguistics and TESOL, and the other on general linguistics. Within the general linguistics track, the following areas are emphasized:

(a) Theoretical linguistics, (b) sociolinguistics, (c) child language development, (d) neurolinguistics, and (e) linguistic description (contemporary or historical) of a particular language or group of languages.

In general, the M.A. in Linguistics at UC Davis is intended to serve as preparation for advanced graduate work at the Ph.D. level, or to lead to studies in related fields—especially anthropology, psychology, philosophy, the various languages, or as a major component in the training for a professional career (such as TESOL, speech pathology, and foreign language teaching). The program is structured so as to place considerable emphasis on interdisciplinary studies, thereby increasing the breadth of the candidate's knowledge, and providing a wider and more flexible variety of options to pursue thereafter.

Preparation. Applicants to the M.A. program who do not have a bachelor's degree in Linguistics must complete the following courses in Linguistics from the undergraduate program: 109 (phonetics), 102 (historical linguistics), 120 (semantics), 139 (phonological analysis), 140 (grammatical analysis), and 165 (introduction to syntactic theory).

Requirements. The requirements for the two tracks differ. The track in applied linguistics and TESOL operates under Plan II. Thirty-two units of upper division and graduate course work above and beyond the prerequisite courses listed under Preparation (above) are required. Plan II, and at the end of the course work a student must pass a written comprehensive examination. The track in general linguistics falls under the Plan I set of requirements. Thirty units of upper division and graduate course work above and beyond the prerequisite courses must be completed, and a thesis is required. Students in both tracks must pass a foreign language reading examination.

Graduate Adviser: A. E. Ojeda (Linguistics).

Literature in Translation
The following courses are open to students throughout the campus. The readings can be in English. Refer to departmental listing for the course description.

Chinese
10. Modern Chinese Literature
11. Great Books of China
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
109A-I. Topics in Chinese Literature (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 History: From The Iliad to the Bible
2. Great Books of Western Civilization: From Faith to Reason
3. Great Books of Western Civilization: The Modern Crisis
4. The Short Story and Novella
5. Fairy Tales, Fables and Parables
6. Myths and Legends
7. Literature of Fantasy and the Supernatural
8. Utopias and Utopianism
10-A-N. Master Authors of World Literature
12. Introduction to Women Writers
13. Dramatic Literature
Italian
25. Italian Literature in Translation
138A. Early Italian Literature and Dante Alighieri
138B. Boccaccio, Petrarch and the Renaissance
138C. Modern Italian Literature

Japanese
10. Masterworks of Japanese Literature (in English)
115. Introduction to Traditional Japanese Culture
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. 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)
182. Special Topics in Native American Literacy Studies

Russian
41. Survey of Nineteenth-Century Russian Literature
42. Survey of Twentieth-Century Russian Literature
119. Children's Literature in Russia
121. Nineteenth-Century Russian Prose
122. Twentieth-Century Russian Prose
126. The Russian Theater
130. Contemporary Soviet Culture
131. Literature of Revolution
132. Nature and Culture in the Soviet Union
140. Dostoevsky
141. Tolstoy
142. Russian Culture
151. Soviet Writers and Censorship
154. Russian Folklore
166. Representations of Sexuality in Russian Literature

Scandinavian
110. Masterworks of Scandinavian Literature in Translation
111. Swedish Film as Narrative

Spanish
34. Mexico in Its Literature
35. Survey of Mexican Culture
140. Latin-American Literature in Translation
150. Masterpieces of Spanish Literature

Management, School of
Robert H. Snively, Ph.D., Dean
School Office, 308 Voorhis Hall (916-752-7362)

Faculty
Brad Barber, Ph.D., Assistant Professor
Nico1le B. Biggart, Ph.D., Associate Professor (Management, Sociology)
George Bittlmgay, Ph.D., Associate Professor
David Bunch, Ph.D., Assistant Professor
Richard P. Castenaz, Ph.D., Associate Professor
Peter Clark, Ph.D., Professor
Scott Davis, Ph.D., Assistant Professor
Richard C. Dorr, Ph.D., Professor (Management, Electrical and Computer Engineering)
Paul A. Griffin, Ph.D., Professor
Michael Hagerty, Ph.D., Associate Professor
Michael Maher, Ph.D., Professor
Alexander F. McCulla, Ph.D., Professor (Agricultural Economics)
Arthur M. O'Sullivan, Ph.D., Associate Professor (Management, Economics)
Donald Palmer, Ph.D., Associate Professor
David M. Rocke, Ph.D., Professor
Jerome J. Searl, B.S., Ph.D. (Hon.), Senior Lecturer (Management, Electrical and Computer Engineering)
Donald M. Topkis, Ph.D., Professor
Chih-Ling Tsai, Ph.D., Associate Professor
Gary M. Walton, Ph.D., Professor (Management, Economics)
David Woodruff, Ph.D., Assistant Professor

Courses in Management

Lower Division Course
100. Introduction to Financial Accounting (3)
Griffin
Lecture—3 hours. Prerequisite: no prior knowledge of accounting is required. Course is open to all upper division undergraduate and graduate students, except those in the Graduate School of Management. Introduction to accounting, 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)
201A. Financial Accounting and Reporting (3)
Griffin
Lecture—3 hours. Introduction to the basic principles of accounting, financial reporting and policy, with special attention to the preparation, analysis, and evaluation of published corporate financial statements. Topics include income measurement and valuation, assets and liabilities, owner's equity and intercorporate investments.

201B. Management Accounting and Control (3)
Maher
Lecture—3 hours. Prerequisite: course 201A. Provides an introduction to the preparation, analysis, and evaluation of data provided by cost accounting for management planning and control, budgeting, performance evaluation, and investment decision making.

202. Organizational Behavior (3)
Bittlmayer
Lecture—3 hours. Prerequisite: graduate standing or consent of instructor. Introduction to social processes within organizations. Topics include group dynamics, informal relations, leadership theories, socialization processes, power and conflict, goal setting, decision making, and organizational culture. Consideration of alternative theoretical models.

203. Organization Theory (3)
The Staff
Lecture—3 hours. Prerequisite: graduate standing or consent of instructor; course 202. Analysis of structural properties of organizations including differentiation, integration, and alternative structural configurations. Examination of technological and sociotechnical constraints on organizations. Organization-environment relations, organizational change.

204. Economic Analysis I (3)
O'Sullivan
Lecture—3 hours. Prerequisite: graduate standing or consent of instructor; course 202. Continuation of course 204. Analysis of forces behind the supply of capital and labor. Examination of market efficiency, externalities, market failure, and public-policy responses to market failure.
206. Evaluation of Policies and Programs (3) The Staff
Lecture—3 hours. Prerequisite: graduate standing or consent of instructor. Quantitative procedures for assessing the efficiency, effectiveness of policies and programs. Methodologies employed include experimental, quasi-experimental design, time series analysis, multivariate analysis and limitations of various kinds of evaluation methods through case studies.

207. Financial Theory and Policy (3) Castanias
Lecture—3 hours. Prerequisite: graduate standing or consent of instructor; courses 205, 206. Intertemporal allocation of scarce resources by individuals, firms, and society when alternatives are risky. Factors which affect the valuation of risky short, long-run real, and financial assets. Financial policy, financial planning for profit-seeking, and not-for-profit organizations.

208. Marketing Management (3) Hagerty
Lecture—3 hours. Prerequisite: graduate standing or consent of Instructor. Marketing management process, analysis of market opportunities, elements of market research, development of marketing strategies, market planning, implementation, and control systems. Consumer and industrial markets, marketing segmentation, pricing strategies, distribution channels, costs, benefits, processing and handling methods. Studies use of computer in organizations, emphasis on managerial aspects of computing. Topics include standard and nonstandard use of data files, centralization versus decentralization of computing, office automation, computer security.

210A. Statistics for Management (3) The Staff
Lecture—3 hours. Prerequisite: graduate standing or consent of instructor; course 209. Introduction to statistical analysis methods: Descriptive statistics, sampling, statistical inference, hypothesis testing.

210B. Statistics for Management (3) The Staff
Lecture—3 hours. Prerequisite: graduate standing or consent of instructor; courses 210A and 210A. Regression analysis and time series. Stresses applications of the techniques to problems in public and private administration.

211. Quantitative Analysis for Decision Making (3) Blumen
Lecture—3 hours. Prerequisite: graduate standing or consent of instructor; courses 210A and 210A. Quantitative analysis and decision analysis. Mathematical modeling of complex decision processes. Linear programming, optimization and simulation. Stresses applications of decision analysis in public and private administration.

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.

220. Public Budgeting and Finance (3) O'Sullivan
Lecture—3 hours. Fiscal role of government in a mixed economy and democratic society; economics and policies of taxation and resource allocation; inter-governmental financial relations; budgeting activities of local government.

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, personnelization, 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, employer-employee negotiations, contracts, and litigation. Worker and management rights, and collective bargaining in the public and private sectors will be explored.

228. Statistical Quality Control and Productivity Improvement (3) The Staff
Lecture—3 hours. Prerequisite: courses 210A and 210B or the equivalent. Introduces concepts of quality and productivity improvement as applied to service and manufacturing industries and the public sector. Methods covered include statistical quality control techniques such as control charts and acceptance sampling, reliability, and graphical tools.

232. Urban Policy and Planning (3) The Staff
Lecture—3 hours. An analysis of urban policy in an urban setting, focusing on the efficiency effects of such policies. Topics include urban spatial structure, growth-management policies, housing, transportation, environmental quality, local government finance, and urban planning.

233. Regulation and Policy in Agriculture (3) The Staff
Lecture—3 hours. Implications for management of regulation and policy on agricultural production choices, processing, and marketing; influences on management strategy, organization, business practices, and resource productivity; trends in regulation and policy and their potential for management. The effects of regulation on agricultural policy.

240. Management Policy (3) Suran
Lecture—3 hours. Integrative examination of managing the total organizational enterprise. Missions, objectives, strategies, policies, measurements and controls; cases.

241. Managerial Decision Making (3) Bunch
Lecture—3 hours. Develops analytical skills for evaluating decisions and solving problems in various management settings. The decision making process, decision analysis, and implementation. Course examines individual decision situations, group processes, and organizational decision making.

244. New and Small Business Ventures (3) Dorf
Lecture—3 hours. Emphasizes developing 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.

248. Marketing Strategies (3) Hagerty
Lecture—3 hours. Examines process by which organizations develop strategic marketing plans. Includes definition of products, market, marketing mix, marketing mix, marketing plan, and marketing planning. Emphasis on new products, sales and marketing efforts. Marketing research applications.

249. Marketing Research (3) Hagerty
Lecture—3 hours. Course addresses the managerial issues and problems of systematically gathering and analyzing information for making public and private marketing decisions. Covers the cost and value of information, research design, information collection, measuring instruments, data analysis, and marketing research applications.

250. Technological Management (3) Dorf

251. Management of Innovation (3) Suran
Lecture—3 hours. Managing innovative enterprises in changing and uncertain environments. Covers technology forecasting, organization, innovation, information, organization and control, financial management, regulation, and ethics.

252. Production and Operations Management (3) Woodruff
Lecture—3 hours. Explores methods of increasing operational efficiency in production and service organizations through planning and scheduling, materials management, inventory control, quality control, and distribution. Methodologies employed include such techniques as programming, simulation, systems analysis, queuing, and network models.

260. Financial Management (3) Bittlingmayer
Lecture—3 hours. Focuses on raising capital, managing a company's financial resources, raising and managing a company's financial resources. Includes discussion of financial aspects of mergers and other forms of reorganization; analysis of investment, financial, and dividend policy; and theories of optimal capital structure.

261. Investment Analysis (3) Barber
Lecture—3 hours. Examines modern asset pricing theory and the implications of that theory for the analysis and management of stocks, bonds, and other financial securities. Factors influencing the value of stocks, bonds, options, warrants, and other securities are discussed from the perspective of a portfolio fund manager.

262. Money and Security Markets (3) Bittlingmayer
Lecture—3 hours. Examines how money and securities markets are organized; how public agencies, businesses, others obtain and invest funds in those markets; financial intermediaries, monetary policy, government's role in improving capital markets, approaches to assessing changes in regulation in specific markets.

263. Options and Futures Markets (3) Clark
Lecture—3 hours. Studies principles of options and futures markets; how public agencies, businesses, others use those markets. Studies nature of various strategies involving options, commodity, financial futures contracts. Price determinants in options and futures markets is also examined.

264. Business Taxation (3) The Staff
Lecture—3 hours. Analysis of the impact of business taxation on investment, production, and financial decision making. Discussion of relationships 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.

270. Corporate Financial Reporting (3) Griffin
Lecture—3 hours. Analyzes and evaluates contemporary issues in financial reporting and develops implications of those issues for financial decision makers, investment managers, and accounting policy makers.

271. Accounting and Budgeting for Management Control (3) Maher
Lecture—3 hours. Examines concepts and techniques of accounting and budgeting for management decision making in the private sector. Topics include cost control, capital budgeting, performance evaluation, and the effects of uncertainty in achieving management objectives.

272. Evaluation of Financial Information (3) Griffin
Lecture—3 hours. Studies how investors, creditors, others use accounting and other information in making rational investment, lending decisions. Emphasis is placed on the analysis of financial information in a variety of contexts. Where applicable, recent research findings and behavioral issues are discussed.

273. Accounting and Reporting for Governmental and Nonprofit Entities (3) The Staff
Lecture—3 hours. Concepts, methods, and uses of accounting and financial reporting by governmental and nonprofit entities. Introduction to budgeting and performance evaluation, and accounting for entities such as hospitals, universities, and welfare agencies.

274. Auditing, Internal Control, and Public Accounting (3) The Staff
Lecture—3 hours. Concentrates on role of the inde-
Mathematics

(College of Letters and Science)

Arthur J. Krener, Ph.D., Chairperson of the Department

R. J. B. Wets, Ph.D., Vice-Chairperson of the Department (Graduate Matters)

Sherr..n K. Stein, Ph.D., Vice-Chairperson of the Department (Undergraduate Matters)

Department Office, 565 Kerr Hall (916-752-0327)

Faculty

Henry L. Adler, Ph.D., Professor
Hubert A. Arnold, Ph.D., Professor Emeritus
George A. Baker, Ph.D., Professor Emeritus
Dallas O. Banks, Ph.D., Professor
David W. Barnette, Ph.D., Professor
David J. Barsky, Ph.D., Assistant Professor
Donald C. Benson, Ph.D., Professor Emeritus
Carlos R. Borges, Ph.D., Professor
Robert J. Buck, Ph.D., Associate Professor
Albert C. Burdette, Ph.D., Professor Emeritus
Gulban..k,inker, Ph.D., Professor Emeritus
Amanda L. Edelson, Ph.D., Professor
Alice Fiolowski, Ph.D., Associate Professor
Curtis M. Fulton, Ph.D., Professor Emeritus
Robert D. Glauze, Ph.D., Professor
Jan Hasek, Ph.D., Associate Professor
Charles A. Heyes, Jr., Ph.D., Emeritus Professor
Fredrick A. Hovey, Ph.D., Professor
John K. Hug, Ph.D., Professor Emeritus
Kurt Kreisel, Ph.D., Professor
Arthur J. Krener, Ph.D., Professor
Melvin R. Krum, Ph.D., Professor
Gary J. Kurose, Ph.D., Professor Emeritus
Robert D. Glauze, Ph.D., Professor
E. O. Ml..llon, Ph.D., Professor
Mot'ohl..k Musa, Ph.D., Visiting Associate Professor
Donald A. Norton, Ph.D., Professor Emeritus
Washelk Pfeffer, Ph.D., Professor

E. Gerry Puckett, Ph.D., Assistant Professor
Edward B. Roostailer, Ph.D., Professor Emeritus
G. Thomas Sallee, Ph.D., Professor
Evelyn M. Silvia, Ph.D., Professor
Sherman K. Stein, U.D.D. (hon.), Professor
Robert W. Stringall, Ph.D., Professor Emeritus
Takayuki Tamura, D.Sc., Professor Emeritus
J. Blake Tran, Ph.D., Professor
Abigail Thompson, Ph.D., Assistant Professor
Craig A. Tracy, Ph.D., Professor
Edward J. Tulli, Jr., Ph.D., Associate Professor
Howard J. Weber, Ph.D., Professor
Roger J. Wets, Ph.D., Professor

The Major Programs

Mathematics is the study of abstract structures, space, change, and the interrelations of these concepts. It also is the language of the exact sciences.

The Program. Students majoring in mathematics may follow a program leading to either the Bachelor of Arts or the Bachelor of Science degree. After completing basic introductory courses such as calculus, students plan an upper-division program in consultation with a faculty adviser. This individualized program can lead to graduate study in pure or applied mathematics, to elementary or secondary level teaching, or to other professional goals. It can also reflect a special interest such as computer science, statistics, or applied mathematics, or may be combined with a major in science or another field.

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

Mathematics 11 (or high school equivalent)...

Mathematics 21A, 21B, 22A, 22B...

Mathematics 22C or 36...

Computer Science Engineering 30 or Engineering 5...

Physics 5A...

Additional Non-Mathematics courses chosen from natural sciences...

Core Requirements...

Mathematics 108...

Mathematics 127A, 127B...

Mathematics 150A, 150B...

Course one Track 1, the following two...

Track 1: Secondary Teaching...

Mathematics 115A...

Mathematics 141...

Additional upper division units...

Recommended: Mathematics 115B, 115C, 116, 117, 118, Mathematics 111, 115A or Statistics 131A...

131B or Statistics 130A-130B; Computer Science Engineering 110, 112...

Track 2: General Mathematics...

Additional upper division units...

Total Units for the Major...

B.S. Major Requirements:

Preparatory Subject Matter...

Mathematics 11 (or high school equivalent)...

Mathematics 21A, 21B, 21C, 22A, 22B...

Computer Science Engineering 30 or Engineering 5...

Mathematics 22C or 36 (Tracks 3 and 4 only)...

Physics 9A, 9B, 9C (Tracks 3 and 4 only)...

Statistics 130 or 132 (Track 4 only)...

*Course not offered this academic year.
Core Requirements .................................. 45
Mathematics 108 .................................. 4
Mathematics 127A, 127B ......................... 8
Mathematics 150A, 150B ...................... 8
Choice of (110, 112) from the following four 25

Track 1: Preparation for Graduate Study in Mathematics
Mathematics 127C .................................. 4
Mathematics 150C .................................. 4
One course from Mathematics 125, 128, 129 4
128C .................................................. 3

Additional upper division units .................. 14
Recommended: Mathematics 118A, 118B, 119, 125, 126, 141, 147, 185A, 185B

Track 2: Applied Mathematics
Mathematics 167 .................................. 3
Two courses from Mathematics 128A, 128B, 128C, 129 ......................... 8

Additional upper division units .................. 14
Recommended: Mathematics 118A, 118B, 119, 125, 141, 147, 185A, 185B, 168A, Statistics 131 or Mathematics 131A, Computer Science Engineering 110, 112, up to 8 units of courses outside the mathematics department related to area of interest

Track 3: Mathematics for Secondary Teaching
Mathematics 115A .................................. 3
Mathematics 141 .................................. 3

Additional upper division units .................. 19
Recommended: Mathematics 115B, 115C, 167, 168, Statistics 130A, 130B, or 131 and Statistics 131B or Statistics 131A, 131B, Computer Science Engineering 110, 112, up to 8 units of courses outside the mathematics department related to area of interest

Track 4: General Mathematics
Additional upper division units .................. 25

Total Units for the Major ...................... 73-84

Recommended Language Preparation
Bachelor of Science degree candidates are advised, but not required, to satisfy the same language requirement as that for a Bachelor of Arts degree candidate, and to fulfill in French, German, or Russian.

Depth Subject Matter Requirements
Certain mathematics courses given by other departments may be admissible in partial satisfaction of the above mentioned 36- or 45-unit requirements with prior departmental approval. In general, more available and varied course offerings are not appropriate for application towards this requirement; and any exceptions must be approved by the Department's Undergraduate Program Committee.

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 Mathematics 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 should a mathematics level should consult an adviser immediately upon arrival.


Information for Undergraduates. Assistance in planning an undergraduate major program in mathematics should be obtained from a major adviser. In addition, students seeking information pertaining to the applications of mathematics to the biological or social sciences or computer science may contact the appropriate special area adviser.

Students desiring preparation towards an A.B. degree for secondary teaching or general mathematicians, 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 is a prerequisite for a course which has already been completed with a grade of C- or better.

Minor Program Requirements:

UNITS
Mathematics ........................................... 20
Upper division units in mathematics (exclusive of Mathematics 192, 197TC, 198, 199)
Three of these units could be from Mathematics 36.

Teaching Credential Subject Representative. G. T. Sallee. See also under Teacher Education Program.

Graduate Study. The Department offers programs of study and research leading to the M.A., M.A.T., and Ph.D. degrees in mathematics. Detailed information regarding graduate study may be obtained by writing to the Graduate Adviser, Department of Mathematics.


Courses in Mathematics

Lower Division Courses

B. Elementary Algebra (no credit) I. The Staff Lecture—3 hours. Basic concepts of algebra, including polynomials, factoring, equations, graphs, and inequalities. Offered only if sufficient number of students enroll. Not open to Concurrent student enrollment. (P/NP grading only). (There is a fee of $15.)

C. Trigonometry (no credit) I. The Staff Lecture—3 hours. Basic concepts of trigonometry, including trigonometric functions, identities, inverse functions, and solutions. Offered only if sufficient number of students enroll. Not open to Concurrent student enrollment. (P/NP grading only). (There is a fee of $15.)

11. Analytic Geometry (3) I, II. The Staff (Chairperson in charge) Lecture—3 hours. Prerequisites: two years high school algebra, plane geometry, plane trigonometry; and obtaining required score on Precalculus Qualifying Examination. Analytic geometry in two dimensions; elementary functions. (Not open to students who have completed courses 16A-16B-16C or 21A-21B-21C.)

12. Precalculus (3) I, II, III. The Staff Lecture—3 hours. Prerequisites: two years high school algebra, plane geometry, plane trigonometry; and obtaining required score on Precalculus Qualifying Examination. Topics selected for their use in calculus, including functions and their graphs, slope, zeros of polynomials, exponential, logarithmic and trigonometric functions, sketching surfaces and solids. (Not open to students who have completed courses 16A-16B-16C or 21A-21B-21C.)

(Notes: 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. Prerequisites: one and one-half years of high school algebra, plane geometry, plane trigonometry, and obtaining required score on Precalculus Qualifying Examination. Limits; differentiation of algebraic functions; analytic geometry; applications, in particular to maxima and minima prob-
lems. Not open 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 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 to students who have received credit for course 21C.

21A. Calculus (4) I, II, III. The Staff Lecture/discussion—4 hours. Prerequisite: two years of high school algebra, plane geometry, plane trigonometry, and analytic geometry or course 11, and obtaining required score on Precalculus Qualifying Examination. Functions, limits, continuity, slope and derivative. Differentiation of algebraic and transcendental functions. Applications to motion, natural growth, and extremum of a function. Differentials. L'Hôpital's rule. Only two units of credit will be allowed to students who have credit for course 16A. (Not open to students who have completed course 16B) (CAN Math 19)

21AH. Honors Calculus (4) I. The Staff Lecture/discussion—4 hours. Prerequisite: a Precalculus Qualifying Examination score significantly higher than the minimum for course 21A is required. More intensive treatment of material covered in course 21A.

21B. Calculus (4) I, II, III. The Staff Lecture/discussion—4 hours. Prerequisite: course 21A or 21AH. Continuation of course 21A. Definition of definite integral, fundamental theorem of calculus, techniques of integration. Application to area, volume, arc length, average of a function, improper integrals, surface of revolution. Only two units of credit will be allowed to students who have received credit for course 16B or 16C.

21BH. Honors Calculus (4) I, II. The Staff Lecture/discussion—4 hours. Prerequisite: a grade of B or better in course 21A or 21AH. More intensive treatment of material covered in course 21B. Students completing 21BH can continue with course 21CH or the regular 21C.

21C. Calculus (4) I, II, III. The Staff Lecture/discussion—4 hours. Prerequisite: course 21A 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 and optimization of plane and solid regions in various coordinate systems. Applications to physical systems.

21CH. Honors Calculus (4) I, II. 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.

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. (Courses 22A, 22B, 22C may be taken in any order. However, if enrolled in Physics 9 sequence, 9B-9C, 9B courses should be taken in reverse order, 22C, 22B, 22A). (CAN Math 26)

22B. Differential Equations (3) I, II, III. The Staff Lecture—3 hours. Prerequisite: course 21C. Solutions of elementary differential equations. (CAN Math 24)


36A. Fundamentals of Mathematics (3) I. The Staff Lecture—3 hours. Fundamentals of mathematical ideas selected from the principal areas of modern mathematics. Properties of the primes, the fundamental theorem of arithmetic, properties of the
rational and irrational, binary and other number systems. Not open to those who have received credit for course 106. Recommended for non-math majors.

63. Survey of Advanced Mathematics (3) I. The Staff
Lecture—3 hours. Prerequisite: obtaining required score on Precalculus Qualifying Examination. Survey of various areas of mathematics for the prospective mathematics major. Topics selected from algebra, analysis, geometry, topology, combinatorics, logic, and applications, with emphasis on techniques of proof, problem solving, and exposition. Not open to students who have taken course 108.

71A-71B. Explorations in Elementary Mathematics (3-3) II. The Staff (Chairperson in charge)
Lecture—2 hours; laboratory—3 hours. Prerequisite: two years of high school mathematics. Weekly explorations of mathematical ideas related to the elementary school curriculum will be carried out by cooperative learning groups. Lectures will provide background and synthesize the results of group exploration. (Deferred grading only, pending completion of sequences.)

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

Upper Division Courses

106. Introduction to Abstract Mathematics (4) I, II, III. The Staff
Lecture—3 hours; discussion—1 hour. Prerequisite: course 21C. Rigorous treatment of abstract mathematics with the emphasis on developing ability to understand and present mathematics arguments.

114. The Theory of Convex Sets (3) III. The Staff
Lecture—3 hours. Prerequisite: courses 21C, 22A, 106, or consent of Instructor. Topics selected from the theory of convex bodies, convex functions, geometric inequalities and geometric and topological properties. Offered in alternate years.

115A. The Theory of Numbers (3) I. Alder
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. Alder
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. Alder
Lecture—3 hours. Prerequisite: course 108. Continued fractions, partitions. Offered in alternate years.

116. Metric Differential Geometry (3) III. The Staff
Lecture—3 hours; laboratory—2 hours. Prerequisite: courses 22A, 22B, or consent of Instructor. Vector analysis, curves and surfaces in three dimensions. Offered in alternate years.

118A. Partial Differential Equations: Elementary Methods (3) I, III. The Staff
Lecture—3 hours. Prerequisite: courses 22A, 22B, 22C. Derivation of partial differential equations; separations of variables; equilibrium solutions and Laplace equation; Fourier series; method of characteristics for the one-dimensional wave equation; solution of nonhomogeneous equations.

118B. Partial Differential Equations: Eigenfunction Expansions (3) II. The Staff
Lecture—3 hours. Prerequisite: course 118A. Sturm-Liouville Theory; self-adjoint operators; mixed boundary conditions; partial differential equations in two and three dimensions; Eigenvalue problems in circular and polar co-ordinates, Sturm-Liouville problems and the method of eigenfunction expansions; Polson’s Equations.

118C. Partial Differential Equations: Green’s Functions and Transformations (3) II. The Staff
Lecture—3 hours. Prerequisite: course 118A. Green’s functions for one-dimensional problems and Polson’s equation; Fourier Transforms; Green’s Functions for time dependent problems; Laplace transform and solution of partial differential equations.

119. Theory of Ordinary Differential Equations (3) III. The Staff
Lecture—3 hours. Prerequisite: courses 22A, 22B. Existence and uniqueness of solutions of ordinary differential equations, matrix solutions of linear systems, linearization of nonlinear equations, local behavior near a critical point and stability theory.

121A-121B. Advanced Calculus for the Sciences (3-3) I-II. The Staff
Lecture—3 hours. Prerequisite: courses 22A, 22B, 22C. Multidimensional calculus, Fourier series, calculus of variations, special functions, distributions, integral transforms, matrix inequalities, intended primarily for students majoring in science, engineering, and applied mathematics.

125. Introduction to Mathematical Logic (3) I. Kron
Lecture—3 hours. Prerequisite: course 108. Propositional calculus, predicate calculus, normal forms, completeness. Offered in alternate years.

125. Introduction to the Theory of Sets (3) III. The Staff
Lecture—3 hours. Prerequisite: course 108 or consent of Instructor. 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—3 hours; extensive reading and problem solving. Prerequisite: courses 22A, 22C, course 108 (may be taken concurrently with consent of Instructor). Real number system, continuity, differentiation and integration on the real line; vector calculus and functions of several variables; theory of convergence.

128A. Numerical Analysis (4) I. The Staff
Lecture—3 hours; term project. Prerequisite: course 21C. Knowledge of a programming language such as Pascal, FORTRAN or BASIC. Error analysis, approximation, interpolation, numerical differentiation and integration.

128B. Numerical Analysis in Solution of Equations (4) II. The Staff
Lecture—3 hours; term project. Prerequisite: course 21C and 22A; knowledge of a programming language such as Pascal, FORTRAN or BASIC. Solution of nonlinear equations and nonlinear systems. Mini-mization of functions of several variables. Simultaneous linear equations. Eigenvalue problems.

128C. Numerical Analysis in Differential Equations (4) III. The Staff
Lecture—3 hours; term project. Prerequisite: courses 22A, 22B, and knowledge of a programming language such as Pascal, FORTRAN or BASIC. Difference equations, operators, numerical solution of ordinary and partial differential equations.

131. Methods of Mathematical Probability (4) II. The Staff
Lecture—4 hours. Prerequisite: courses 21C and 22A. Probability space, event, combinatorics; discrete, continuous distributions; random variables; joint, marginal conditional densities; transformation; expectation; sums and moments; inequalities; laws of large numbers; central limit law; probability models and decision tables. Students who have had Statistics 131A may not receive credit for this course.

132A-132B. Introduction to Stochastic Processes (3-3) III-I. The Staff
Lecture—3 hours. Prerequisite: course 131 or Statistics 131A. Markov chains, Pólya process, birth and death processes, renewal theory, queueing theory. Brownian motion, stationary processes. Course 132B is offered in even-numbered years.

141. Euclidean Geometry (3) II. The Staff
Lecture—4 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 106, 127A. Background of point-set and combinatorial topology. Offered in alternate years.

150A-150B-150C. Introduction to Abstract Algebra (4-4-4) I-II-III. The Staff
Lecture/discussion—4 hours. Prerequisite: course 108. Basic concepts of group, ring and field. Emphasizes the techniques used in the proofs of the ideas (Lemmas, Theorems, etc.) developing these concepts. Develops precise thinking, precise writing, and the ability to deal with abstracts.

Lecture—3 hours. Prerequisite: course 108 and familiarity with one high-level computer language. The relational model; relational algebra; relational calculus; normal forms; functional and multivalued dependencies. Separability. Cost benefit analysis of physical database design and reorganization. Performance via analytical modeling, simulation, and queuing theory. Block accesses; buffering; operating system contention; CPU intensive operations.

164. Mathematical Foundations of Fifth Generation Computing (3) II. Milton
Lecture—3 hours. Prerequisite: course 108 and a modern high-level computer language. Study of the uses of predicate and various logics in knowledge-based systems. Resolution and non-resolution deduction, forward and backward deduction systems, logic programming languages, integration of problem solving strategies, functions in search strategies, mathematical treatment of uncertainty in expert systems.

167. Linear Algebra and Applications (3) II. The Staff (Chairperson in charge)
Lecture—3 hours. Prerequisite: course 22A. Introduction to linear algebra: linear equations, orthogonal projections, similarity transformations, quadratic forms, eigenvalues and eigenvectors. Applications to physics, engineering, economics, biology and statistics.

168. Mathematical Programming (3) III. The Staff
Lecture—3 hours. Prerequisites: courses 21C, and 22A or 167; knowledge of a programming language. Linear programming, simplex method. Basic properties of unconstrained nonlinear problems. descent methods, conjugate direction method. Constrained minimization.

169. Special Topics: Pure and Applied Mathematics (3-3) I, II, III. The Staff
To be arranged by students and instructor. Prerequisites: courses 22A and 22B or consent of instructor. Special topics from various fields of pure and applied mathematics. Topics selected based on mutual interest of students and faculty. May be repeated for credit in different subject areas.

185A. Functions of a Complex Variable with Applications (3) III. The Staff (Chairperson in charge)
Lecture—3 hours. Prerequisite: course 22C. Complex number systems, analyticity and the Cauchy-Riemann equations, elementary functions, complex integration, power and Laurent series expansions, residue theory.

185B. Functions of a Complex Variable with Applications (3) III. The Staff (Chairperson in charge)
Lecture—3 hours. Prerequisite: course 185A or consent of instructor. Analytic functions, elementary functions and their mapping properties, integrations of Cauchy's integral theorem, conformal mapping, and applications to heat flow and fluid mechanics. Offered in alternate years.

192. Internship in Applied Mathematics (3) I-III. The Staff (Chairperson in charge)
Internship: final report. Prerequisite: upper division standing; project approval by faculty sponsor prior to enrollment. Supervised work experience in applied mathematics. May be repeated for credit for a total of 10 units. (P/NP grading only)
Graduate Courses

210A. Topics in Algebra (3) I, II, III. The Staff
Prerequisite: consent of Instructor. Indispensable research seminars for supervision of a faculty member. Student will submit written report in thesis form. May be repeated with consent of Vice Chairperson. (P/NP grading only)

197TC. Tutorial Mathematics in the Community (1-5) I, II, III. The Staff (Chairperson in charge)
Seminar—1–2 hours; laboratory—2–4 hours. Prerequisite: upper division standing and consent of Instructor. Special projects in mathematical education which involve development of techniques for mathematics instruction and tutoring on an individual or small group basis. (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)

1A. Real and Complex Analysis (4-4-4) I-II-III. The Staff
Lecture—3 hours; discussion or paper (Instructor’s option). Prerequisite: course 127C or 203C. Abstract Integration, Lebesgue measures, LP-spaces, complex measures, holomorphic functions, Cauchy’s theorem, Riemann mapping theorem, and analytic continuation.

201D. Real and Complex Analysis (4) I. The Staff
Lecture—3 hours; discussion—1 hour. Prerequisite: course 201C. Riemann mapping theorem and analytic continuation.

202A. Functional Analysis (4) I. The Staff
Lecture—3 hours; term paper. Prerequisite: course 201D. Introduction to topological vector spaces. Metricization, Banach–Steinhaus theorem, the open mapping theorem, the closed graph theorem, the Hahn–Banach theorem. Duals and convexity. Weak topologies. Applications. Offered in alternate years.

202B. Functional Analysis (4) II. The Staff (Chairperson in charge)
Lecture—3 hours; discussion—1 hour. Prerequisite: course 202. One of the following topics will be covered: (a) distributions and Fourier transforms and their applications to partial differential equations; (b) theory of bounded and unbounded linear operators and their spectral decomposition; (c) non-linear functional analysis. Offered in alternate years.

203A-203B. Modern Applied Analysis (3-3) I-II. 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.

203C. Modern Applied Analysis (3) III. The Staff
Lecture—3 hours. Prerequisite: course 203B. 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.

210A. Topics in Geometry (3) I. The Staff (Chairperson in charge)
Lecture—3 hours. Prerequisite: bachelor’s degree in mathematics or consent of Instructor. Topics in advanced geometry related to curriculum at all levels. Required for M.A.T. degree program for prospective teachers. May be repeated for credit with prior consent of Instructor.

210AL. Topics in Geometry: Discussion (1) I. The Staff (Chairperson in charge)
Lecture-discussion—1 hour (to be arranged). Prerequisite: course 210A (concurrently); consent of Instructor. Special topics related to course 210A which are of special interest to teachers and candidates for M.A.T. degree program. May be repeated for credit.

210B. Topics in Algebra (3) II. The Staff (Chairperson in charge)
Lecture—3 hours. Prerequisite: bachelor’s degree in mathematics or consent of Instructor. Topics in advanced algebra related to curriculum at all levels. Required for M.A.T. degree program for prospective teachers. May be repeated for credit with prior consent of Instructor.

210BL. Topics in Algebra: Discussion (1) II. The Staff (Chairperson in charge)
Lecture-discussion—1 hour (to be arranged). Prerequisite: course 210B (concurrently); consent of Instructor. Special topics related to course 210B which are of special interest to teachers and candidates for M.A.T. degree program. May be repeated for credit.

210C. Topics in Analysis (3) III. The Staff (Chairperson in charge)
Lecture—3 hours. Prerequisite: bachelor’s degree in mathematics or consent of Instructor. Topics in advanced analysis related to curriculum at all levels. Required for M.A.T. degree program for prospective teachers. May be repeated for credit with prior consent of Instructor.

210CL. Topics in Analysis: Discussion (1) III. The Staff (Chairperson in charge)
Lecture-discussion—1 hour (to be arranged). Prerequisite: course 210C (concurrently); consent of Instructor. Special topics related to course 210C which are of special interest to teachers and candidates for M.A.T. degree program. May be repeated for credit.

212A-212B-212C. Stochastic Dynamics and Applications (3-3-3) I-II-III. The Staff
Lecture—3 hours. Prerequisite: course 210C or 235C or equivalent. Stochastic processes including Gaussian, Markov and stationary processes. Diffusion, Markovian, stochastic differential equations. Applications and advanced topics. Offered in alternate years.

215A-215B-215C. Topology (4-4-4) I-II-III. The Staff (Chairperson in charge)
Lecture—3 hours; discussion—1 hour or paper (Instructor’s option). Prerequisite: course 215A. Topics selected from point-set topology, homotopy theory, and homology theory. Offered in alternate years.

219A-219B. Partial Differential Equations (3-3) I-II. The Staff
Lecture—3 hours. Prerequisite: courses 22A, 127C. Topics from the theory of partial differential equations and integral equations. Offered in alternate years.

219A-219B. Ordinary Differential Equations (3-3) I-II. The Staff
Lecture—3 hours. Prerequisite: courses 22A, 127C. Ordinary differential equations in the real and complex domains; existence and uniqueness theorems; linear systems; analysis of singular points; Sturm–Liouville theory; asymptotic expansions. Offered in alternate years.

221A-221B. Mathematical Fluid Dynamics (3-3) I-II. The Staff
Lecture—3 hours. Prerequisite: course 115B. Dynamics of fluid motion, perfect fluids, rotational and irrotational motion, two-dimensional and three-dimensional axisymmetric flows, compressible and incompressible viscous fluids. Offered in alternate years.

222A-222B-222C. Mathematical Methods (3-3-3) I-II-III. The Staff
Lecture—3 hours. Prerequisite: course 222B. Conformal mapping and theorems of complex function theory. Other advanced topics. Offered in alternate years.

229A-229B-229C. Numerical Solution of Differential Equations (3-3-3) I-II-III. The Staff

229A-229B. Numerical Methods in Linear Algebra (3-3-3) I-II. The Staff
Lecture—3 hours. Prerequisite: consent of Instructor.


235A-235B-235C. Probability Theory (3-3-3) I-II-III. The Staff
Lecture—3 hours. Prerequisite: course 127C and 235A or equivalent. Measure theoretic foundations, abstract integrations, modes of convergence, limit theorems, independence, laws of large numbers, characteristic functions, central limit theorems, conditional distributions, characteristic functions, extreme value distributions, Markov and stationary processes, ergodic theory, Brownian motion, weak convergence, Wiener and Poisson processes. (Same course as Statistics 235A-235B-235C.)

240A-240B-240C. Differential Geometry (3-3-3) I-II-III. The Staff (Chairperson in charge)
Lecture—3 hours. Prerequisite: course 116 or consent of Instructor. Introduction to differentiable manifolds, the tangent bundle, tensor fields, differential forms. DeRham cohomology, connections, Lie groups, Riemannian geometry. Offered in alternate years.

250A-250B-250C. Algebra (4-4-4) I-II-III. The Staff (Chairperson in charge)
Lecture—3 hours; discussion—1 hour or paper (Instructor’s option). Prerequisite: graduate standing in Mathematics or consent of Instructor. Theory of groups, rings, and fields. Offered in alternate years.

257. Topics in Optimization (3) III. The Staff
Lecture—3 hours. Prerequisite: graduate standing. Advanced topics in the calculus of variations and numerical aspects of optimization and its applications, such as: linear and nonlinear systems theory; stochastic programming; 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, game theory, etc. Offered in alternate years. (Same course as Electrical Engineering 257B.)

258A. Optimization I (3) III. The Staff
Lecture—3 hours. Prerequisite: knowledge of FORTRAN or C. Modeling optimization problems existing in engineering design and other applications, optimality conditions, linear programming and constrained optimization (gradient, Newton, conjugate directions and minimax algorithms), convergence and rate of convergence, selected topics. Offered in alternate years. (Same course as Electrical 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 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; maximum principle; Euler equation; sufficient conditions of optimality, Hamilton–Jacobi–Belman equation, linear quadratic regulator problem; algorithms for unconstrained and constrained optimal control of linear systems, offered in alternate years. (Same course as Electrical Engineering 259.)

270. Foundations of Optimization (3) I. The Staff
Lecture—3 hours. Prerequisite: course 203 or 127. Theory of linear and nonlinear programming: convexity, optimality conditions, duality, approximations, subdifferentiability. Goal is to acquaint student with the basic tools to derive optimality (and equivalence) for optimization problems in finite dimensions. Offered in alternate years.

271. Dynamical Optimization (3) II. The Staff
Lecture—3 hours. Prerequisite: course 203 or 127
Medical Microbiology
See Medicine, School of

Medical Pharmacology and Toxicology
See Medicine, School of

Medicine, School of

Hibberd E. Williams, M.D., Dean of the School
James J. Castles, M.D., Executive Associate Dean
John R. Eliot, Assistant Dean
Edward J. Hurley, M.D., Associate Dean
Ernest L. Lewis, M.D., Associate Dean
Frank J. Leno, M.B., Associate Dean
Donal A. Walsh, Ph.D., Associate Dean
Dean's Office, Medical Sciences 1C (916-752-3331)

Faculty

Charles F. Abildgaard, M.D., Professor (Pediatrics)
Deborah S. Ablin, M.D., Assistant Professor of Clinical Radiology (Radiology)
Judith A. Geiger, Ph.D., Assistant Professor (Human Anatomy)
Hannoudi Al-Bander, M.D., Ph.B., Assistant Professor in Residence (Internal Medicine)
Timothy Albertson, M.D., Ph.D., Associate Professor (Internal Medicine, Pharmacology)
Robbie Allen, M.D., Assistant Professor of Clinical Internal Medicine (Internal Medicine)
Eugenio A. Amparo, M.D., Associate Professor in Residence (Pediatrics)
Ezra A. Armoni, M.D., Professor (Internal Medicine)
Neil C. Andrews, M.D., Professor Emeritus (Surgery)
Russell Andrews, M.D., Assistant Professor in Residence (Internal Medicine)
Len H. Andrus, M.D., Professor Emeritus (Family Practice)
Thomas Aoki, M.D., Professor (Internal Medicine)
Joel A. Aron, M.D., Assistant Professor (Family Practice)
C. Robert Ashmore, Ph.D., Professor (Physical Medicine and Rehabilitation)
Alexander Barry, Ph.D., Professor Emeritus (Human Anatomy)
Stephen Bartlett, M.D., Associate Professor in Residence (Surgery)
Blaine L. Bean, Ph.D., Professor (Medical Microbiology and Immunology)
Carol Beatty, M.D., Assistant Professor of Clinical Radiology (Radiology and Surgery)
Charles J. Beauchamp, Ph.D., Associate Professor of Clinical Pediatrics (Clinical Pediatrics)
James J. Beaumont, Ph.D., Assistant Professor in Residence (Internal Medicine)
Dennis J. Beckley, M.D., Assistant Professor of Clinical Neurology (Clinical Neurology)
Mahmoud Benbarka, M.D., Assistant Professor (Internal Medicine, Neurology and Rehabilitation)
John R. Benfield, M.D., Professor (Surgery)
William F. Bennek, Ph.D., Professor (Biological Chemistry)
Elli Benjami, Ph.D., Professor (Medical Microbiology and Immunology)
Henry Bennett, Ph.D., Associate Professor of Clinical Anesthesiology (Anesthesiology)
Daniel R. Benson, M.D., Professor (Orthopaedic Surgery)
Hansert Berko, M.D., Professor in Residence (Surgery)
Ilan Berman, M.D., Ph.D, Associate Professor in Residence (Dermatology)
Edmund M. Barna, M.D., Professor (Physical Medicine and Rehabilitation)
Kiaa D. Bertallia, M.D., Associate Professor (Family Practice)
Kay H. Blacker, M.D., Professor of Clinical Psychiatry (Psychiatry)
F. William Blasdel, M.D., Professor (Surgery)

James E. Bogdani, M.D., Associate Professor (Neurological Surgery)
Hugo G. Bogren, M.D., Professor (Radiology, Internal Medicine)
Robert J. Bolt, M.D., Professor Emeritus (Internal Medicine)
William J. Bonar, M.D., Associate Professor of Clinical Internal Medicine (Internal Medicine)
Anne Bonham, M.D., Associate Professor in Internal Medicine, Pharmacology
Nanfa T. Borhais, M.D., Professor (Community Health, Internal Medicine)
Larry W. Bowen, M.D., Assistant Professor (Otolaryngology)
Stephan Boyers, M.D., Associate Professor (Otolaryngology)
E. Morton Bradbury, M.D., Professor (Biological Chemistry)
James Brant, M.D., Assistant Professor in Residence (Ophthalmology)
William Brant, M.D., Associate Professor of Clinical Radiology (Diagnostic Radiology)
Michael Bunning, M.D., Ph.D., Assistant Professor in Residence (Radiology)
Margaret S. Burns, Ph.D., Adjunct Professor (Ophthalmology)
Peter M. Cala, Ph.D., Professor (Human Physiology)
Edward J. Callahan, Ph.D., Professor (Family Practice)
Robert A. Cannon, M.D., Associate Professor (Pediatrics)
Robert D. Cartwright, M.D., Ph.D., Professor (Pathology)
George H. Carlin, M.D., Ph.D., Professor (Physical Medicine and Rehabilitation)
Richard C. Carle, Ph.D., Professor (Human Physiology)
James R. Carlson, Ph.D., Associate Professor in Residence (Pathology, Internal Medicine)
Marion A. Carnes, M.D., Professor Emeritus (Anesthesiology)
Cameron Carter, M.D., Assistant Professor (Psychiatry)
Gregory Carter, M.D., Associate Professor of Clinical Physical Medicine and Rehabilitation (Physical Medicine and Rehabilitation)
Evan Eason, Ph.D., Associate Adjunct Professor (Ophthalmology)
James J. Castles, Jr., M.D., Professor (Internal Medicine)
Willard R. Centerwell, M.D., Professor Emeritus (Pediatrics)
R. Jeffrey Chang, M.D., Associate Professor (Gastroenterology)
Robert S. Chang, M.D., D.O., Professor (Medical Microbiology and Immunology, Family Practice)
Jane Chapman, M.D., Ph.D., Associate Professor of Clinical Internal Medicine (Internal Medicine)
Loring F. Chapman, Ph.D., Professor (Psychiatry)
Michael W. Chapman, M.D., Professor (Orthopaedic Surgery)
Bahrman Chehrizai, M.D., Professor (Neurological Surgery)
Lee-Jung Chong, Ph.D., Associate Adjunct Professor (Internal Medicine)
Anthony Cheung, Ph.D., Adjunct Professor (Pathology)
Richard A. Chong, M.D., Ph.D., Professor (Otolaryngology)
Michael Choy, M.D., Assistant Professor in Residence (Pediatrics)
Ronald C. Chuang, Ph.D., Associate Professor in Residence (Pharmacology)
Kent Cochran, D.V.M., Associate Adjunct Professor (Surgery)
Stuart T. Cohen, M.D., Associate Professor in Internal Medicine
Matthew H. Connors, M.D., Associate Professor (Pediatrics)
James K. Cooper, M.D., Associate Professor of Clinical Internal Medicine (Internal Medicine)
Carroll E. Cross, M.D., Professor in Internal Medicine, Human Physiology
Nicholas L. Cross, Ph.D., Associate Adjunct Professor (Obstetrics and Gynecology)
Pitt-Boy E. Curry, Ph.D., Professor (Human Physiology)

*Course not offered this academic year.
Sayed Dandeker, Ph.D., Assistant Adjunct Professor (Internal Medicine)
Robert R. Dardlesson, M.D., Associate Professor (Family Practice)
Russell O. Davis, Ph.D., Assistant Adjunct Professor (Obstetrics and Gynecology)
Arline D. Deitch, M.D., Ph.D., Assistant Professor (Dermatology)
Gerald L. DeNardo, M.D., Professor (Internal Medicine, Pathology, Radiology)
Sally J. DePiper, M.D., Professor (Internal Medicine, Radiology)
Thomas A. Depner, M.D., Associate Professor (Internal Medicine)
Robert W. Doctrow, M.D., Assistant Professor of Clinical Internal Medicine (Internal Medicine)
Jawahar M. Desai, M.D., Assistant Professor of (Internal Medicine, Pediatrics)
Ralph deVere White, M.D., Professor (Pathology)
Paul J. Donald, M.D., Professor (Otolaryngology)
Richard M. Donovon, M.D., Ph.D., Associate Adjunct Professor (Internal Medicine)
Plum M. Dreyfus, M.D., Professor Emeritus (Neurology, Radiology)
Nina Drobnis, Ph.D., Assistant Adjunct Professor (Anesthesiology)
Jonathan Ducote, M.D., Associate Professor in Residence (Pediatrics)
Robert E. Egan, M.D., Professor in Residence (Anesthesiology)
John H. Elsey, M.D., Professor, Anesthesiology, Human Physiology
William G. Ellis, M.D., Professor (Pathology, Radiology)
Allen C. Enders, Ph.D., Professor (Human Anatomy)
Richard K. Enrkin, Ph.D., Associate Adjunct Professor (Physical Medicine and Rehabilitation)
Kent L. Erickson, Ph.D., Professor (Human Anatomy)
Arthur T. Evers, M.D., Assistant Professor in Residence (Obstetrics and Gynecology)
Irvin Feinberg, M.D., Professor in Residence (Psychiatry)
Dennis P. Fitzgerald, M.D., Professor (Internal Medicine)
Paua T. Fitzgerald, M.D., Professor, Anesthesiology, Pharmacology, Physics (Human Anatomy)
Neal Fleming, M.D., Ph.D., Assistant Professor in Residence (Anesthesiology)
Mark P. Fletcher, M.D., Associate Professor (Internal Medicine)
Neil M. Flynn, M.D., Associate Professor of Clinical Internal Medicine (Internal Medicine)
David Follette, M.D., Assistant Professor in Residence (Surgery)
Patrick Ford, M.D., Assistant Professor in Residence (Radiology)
Garrett R. Foulke, M.D., Assistant Professor of Clinical Internal Medicine (Clinical Internal Medicine, Pathology, Radiology)
William M. Fowler, Jr., M.D., Professor (Physical Medicine and Rehabilitation)
John Foy, M.D., Assistant Professor of Clinical Anesthesiology (Anesthesiology)
Edmund H. Frank, M.D., Assistant Professor in Residence (Neurological Surgery)
Fred S. Frey, M.D., Professor in Residence (Surgery)
Dennis Fung, Professor of Clinical Anesthesiology (Anesthesiology)
Andrew J. Gacka, M.D., Ph.D., Professor (Neurology)
David P. Gandara, M.D., Associate Professor in Residence (Internal Medicine)
Murray B. Gardner, M.D., Professor (Pathology)
Michael C. Geokas, M.D., Ph.D., Professor, Emeritus (Internal Medicine, Biological Chemistry)
Eugenic Gorscovich, M.D., Assistant Professor of Clinical Internal Medicine (Radiology)
M. Eric Gershwin, M.D., Professor (Internal Medicine)
Kenneth Gisolf, M.D., Instructor in Residence (Radiology)
Boyd W. Goetsch, M.D., Ph.D., Professor (Pediatrics)
Ellen Gold, Ph.D., Associate Adjunct Professor (Internal Medicine)
Martin Goldman, Ph.D., Professor (Radiology)
David F. Goldsmith, Ph.D., Assistant Adjunct Professor (Internal Medicine)
Elliott Goldman, M.D., Associate Professor (Internal Medicine)
Mark Golub, Ph.D., Associate Professor (Internal Medicine)
Edward C. Gomez, M.D., Ph.D., Professor (Dermatology)
Michael Goodman, Ph.D., Associate Professor (Internal Medicine)
James C. Goode, M.D., Professor of Clinical Surgery (Surgery)
Frederic A. Gorin, M.D., Assistant Professor (Neurology)
Sidney M. Gorin, Jr., M.D., Ph.D., Assistant Professor in Residence (Neurology, Pediatrics)
John Gould, M.D., Ph.D., Associate Professor (Neurology)
Irwin Gollin, D.V.M., Professor (Surgery)
Sarah S. Gray, Ph.D., Professor (Human Physiology)
Jerry C. Green, Ph.D., Professor (Human Physiology)
Jon Green, M.D., Ph.D., Professor in Residence (Internal Medicine)
Adam Greenman, M.D., Professor of Clinical Radiology (Radiology, Orthopaedics)
M.R.C. Greenshaw, M.D., Ph.D., Professor (Internal Medicine)
Gabriel Gregoratos, M.D., Professor of Clinical Medicine (Internal Medicine)
Gregory M. Greiner, M.D., Professor of Clinical Pediatrics (Pediatrics)
Arthur Grin, M.D., Assistant Professor of Clinical Pediatrics (Pediatrics)
Brian Griner, M.D., Assistant Professor of Clinical Anesthesiology (Anesthesiology)
Gerald Gronert, M.D., Professor (Anesthesiology)
James M. Guercy, M.D., Professor in Residence (Obstetrics and Gynecology)
Paul F. Guy, M.D., Professor (Internal Medicine)
Robert A. Gunther, Ph.D., Assistant Adjunct Professor (Surgery)
Georges Guttalt, M.D., Adjunct Professor (Internal Medicine)
Charles H. Haisen, M.D., Professor (Internal Medicine)
Kristen Haisen, M.D., Professor of Clinical Pediatrics (Pediatrics)
Anthony J. Hance, Ph.D., Associate Professor (Anesthesiology, Pharmacology, Physical Medicine and Rehabilitation, Preventative and Rehabilitation Medicine)
Michael Haney, Ph.D., Professor (Biological Chemistry)
Leland Hanwell, M.D., Assistant Professor of Clinical Anesthesiology (Anesthesiology)
Robbin L. Hansen, M.D., Assistant Professor in Residence (Pediatrics)
Frederick W. Hanson, M.D., Professor (Obstetrics and Gynecology, Medical Education, Medical Practice)
David J. Harris, M.D., Assistant Professor in Residence (Pediatrics)
Paul G. Hattersley, M.D., Professor in Residence (Medicine, Internal Medicine, Pediatrics)
Gordon Hawke, Ph.D., Professor Emeritus (Family Practice)
Andrew H. Heflin, Ph.D., Professor (Pediatrics)
Stephen H. Het, M.D., Assistant Professor in Residence (Radiology, Neurological Surgery)
Gary L. Henderson, Ph.D., Associate Professor (Pharmacology)
Andrew G. Hind, M.D., Professor (Human Anatomy)
John W. B. Henley, Ph.D., Professor (Biological Chemistry)
Laurel Knoke, M.S.N., N.P., Lecturer, Family Practice
Steven Hinrich, M.D., Assistant Professor (Pathology)
Calvin Hinrichs, M.D., Assistant Professor in Residence (Internal Medicine)
Leonard Hjelmeland, Ph.D., Associate Adjunct Professor (Pharmacology)
Paul C. Khoe, M.D., Professor (Internal Medicine, Pathology)
James W. Holcroft, M.D., Professor (Surgery)
Michael J. Holton, Ph.D., Professor (Biological Chemistry)
Carmen Hollinger, Ph.D., Professor (Pharmacology)
John D. Hoppin, M.D., Assistant Adjunct Professor (Medical Microbiology and Immunology)

Lydia Howell, M.D., Assistant Professor of Clinical Pathology (Pathology)
Robert L. Hunter, Ph.D., Professor Emeritus (Anatomy)
Arthur C. Hurley, M.D., Associate Professor (Pathology)
Edward J. Hurley, M.D., Professor (Surgery)
Robert R. Isacoff, M.D., Associate Professor (Dermatology)
Ronald J. LaBonte, M.D., Associate Professor in Residence (Physics)
William J. Jagod, M.D., Assistant Professor in Residence (Neurology)
Myra Jennings, Ph.D., Assistant Adjunct Professor (Medical Biochemistry, Physical Medicine and Rehabilitation)
Ryan J. Jones, M.D., Assistant Professor in Residence (Anesthesiology)
George W. Jordan, M.D., Professor (Internal Medicine, Pathology)
Robert M. Joy, Ph.D., Professor (Pharmacology)
Nancy Joyce, M.D., L. Griffin, M.D., Professor (Pathology)
Thomas Jue, Ph.D., Acting Associate Professor (Biological Chemistry)
Norman S. Kahn, M.D., Assistant Professor of Clinical Anesthesiology (Family Practice)
Chulani Kappagoda, M.D., Professor (Internal Medicine)
David Katz, Ph.D., Professor in Residence (Obstetrics and Gynecology)
Marc P. Kaufman, Ph.D., Associate Professor (Internal Medicine, Human Physiology)
George Kayen, M.D., Professor in Residence (Internal Medicine)
Carl Keen, Ph.D., Professor (Internal Medicine)
Paul Kellermans, M.D., Assistant Professor in Residence (Internal Medicine)
Patricia E. Kelly, M.A., M.S., Lecturer, Family Practice
John L. Keltner, M.D., Professor (Pathology, Neurology, Neurological Surgery)
Nguyen Duc Kien, Ph.D., Assistant Adjunct Professor (Anesthesiology)
Wendell W. Kilgore, Ph.D., Professor (Psychiatry)
Eva K. Kiliman, Ph.D., Professor (Pharmacology)
Khalil F. Kiliman, Ph.D., Professor (Pharmacology)
David Kilman, M.D., Assistant Professor of Clinical Physical Medicine and Rehabilitation (Physical Medicine and Rehabilitation)
Burt F. King, Ph.D., Professor (Human Anatomy)
Walter K. Kinney, M.D., Assistant Professor in Residence (Medicine, Human Anatomy)
Robert T. Knight, M.D., Professor in Residence (Neurology)
Gerald J. Kost, M.D., Associate Professor in Residence (Anesthesiology, Physical Medicine and Rehabilitation)
David Krag, M.D., Assistant Professor in Residence (Surgery)
Pesikapo Krener, M.D., Associate Professor (Psychiatry)
Joseph Kroas, M.D., Assistant Professor in Residence (Radiology)
Peter E. Krumpe, M.D., Assistant Professor in Residence (Internal Medicine)
Lindy F. Kumagal, M.D., Professor (Internal Medicine)
Ingred L. Kwee, M.D., Assistant Professor in Residence (Neurology)
Matouza B. Lana, M.D., Professor in Residence (Ophthalmology)
Bo T. Lantz, M.D., Professor (Radiology)
Edward C. Larfond, M.D., Professor in Residence (Internal Medicine)
Lawrence J. Lassett, M.D., Associate Professor of Clinical Internal Medicine (Internal Medicine)
Jerold A. Last, Ph.D., Professor (Internal Medicine, Biological Chemistry)
H. Jeffrey Lawrence, M.D., Associate Professor in Residence (Internal Medicine)

*Course not offered this academic year.
Antolin Raventos, M.D., Professor in Residence (Radiology)
Stanley B. Reich, M.D., Professor in Residence (Radiology)
Ted W. Reid, Ph.D., Professor in Residence (Ophthalmology)
Michael Reinhart, M.D., Associate Professor of Clinical Pediatrics (Pediatrics)
John A. Reitan, M.D., Professor (Anesthesiology)
Michael T. Remler, Ph.D., Professor in Residence (Obstetrics and Gynecology)
Eugene M. Rennick, Ph.D., Professor (Human Physiology)
Kenneth J. Rich, M.D., Assistant Professor of Clinical Internal Medicine (Internal Medicine)
Mack Roach, M.D., Assistant Professor in Residence (Diagnostic Radiology)
Dick L. Robins, M.D., Professor (Internal Medicine)
John A. Robbins, M.D., Associate Professor of Clinical Internal Medicine (Internal Medicine)
Juan J. Rodriguez, M.D., Professor (Orthopaedic Surgery)
Nicholas Rosenlicht, M.D., Assistant Professor in Residence (Psychiatry)
Carl J. Rosequist, M.D., Professor (Radiology)
Alan M. Roth, M.D., Professor (Ophthalmology, Pathology)
Robert B. Rucker, Ph.D., Professor (Biological Chemistry)
Boris Ruebner, M.D., Professor (Pathology)
Lisa Russell, M.D., Assistant Professor (Pathology)
John Rutledge, M.D., Associate Professor in Residence (Residency)
Amin Setwali, M.B.B.C.A., Professor of Clinical Anesthesiology (Clinical Anesthesiology)
Katherine M. Samuel, Ph.D., Associate Adjunct Professor (Pathology)
Ethelena S. Sassenrath, Ph.D., Associate Professor in Residence (Psychiatry)
Marc B. Schenkein, M.D., Associate Professor (Chemistry)
Thomas W. Schneck, Ph.D., Adjunct Professor (Pathology)
Barbara Schneidem, Ph.D., Professor (Internal Medicine)
Phillip Schneider, M.D., Ph.D., Associate Professor in Residence (Psychology)
Scott R. Schulman, M.D., Assistant Professor of Clinical Anesthesiology, Pediatrics (Anesthesiology, Pediatrics)
Ivan Schwartz, M.D., Associate Professor of Clinical Ophthalmology (Ophthalmology, Radiology)
Marshall Z. Schwartz, M.D., Professor (Surgery)
Robert J. Scibilia, M.D., Associate Professor (Medical Microbiology)
Robert P. Scooby, Ph.D., Professor (Human Physiology, Neurology, Ophthalmology)
Sidney A. Sondheimer, M.D., Associate Professor in Residence (Radiology, Neurology)
James A. Seibert, Ph.D., Associate Professor in Residence (Radiology)
Craig W. Sengelaub, M.D., Assistant Professor (Otolaryngology)
Masud Seyfi, M.B.B.S., Associate Professor (Neurology)
Azaad A. Sheik, M.B.B.S., Assistant Professor of Clinical Pediatrics (Pediatrics)
Aidan D. Siefkin, M.D., Associate Professor of Clinical Internal Medicine (Internal Medicine)
Karen A. Sigvant, Ph.D., Associate Adjunct Professor (Neurology)
Joseph Silva, M.D., Professor (Internal Medicine)
Helyane Silver, M.D., Assistant Professor in Residence (Obstetrics and Gynecology)
Robert Stotsnick, M.D., Assistant Professor in Residence (Obstetrics and Gynecology)
Lloyd Smith, M.D., Assistant Professor in Residence (Obstetrics and Gynecology)
Robert E. Smith, Ph.D., Associate Professor (Human Physiology)
Elizabeth M. Smithwick, M.D., Professor (Pediatrics)
J. Stuart Sneed, M.D., Professor (Internal Medicine)
Robert C. Stadeikis, M.D., Professor (Radiology)
Larry G. Stark, Ph.D., Professor (Pharmacology)

*Course not offered this academic year.*
Charles L. Sebbins, Ph.D., Associate Professor in Residence (Internal Medicine, Human Pathology)
David S. Yuster, Ph.D., Assistant Professor in Residence (Orthopaedic Surgery)
Judith Stern, Ph.D., Professor (Internal Medicine)
Thomas Stevenson, M.D., Associate Professor
Margaret S. Stewart, Ph.D., Professor (Psychiatry)
Dennis Stewart, Ph.D., Assistant Adjunct Professor in Residence (Obstetrics and Gynecology)
Elma S. Stewart, F.N.P., Lecturer (Family Practice)
Anthony R. Stone, M.D., Assistant Professor (Urology)
Robert E. Stowell, M.D., Ph.D., Professor Emeritus
Dale Strawn, M.D., Assistant Professor in Residence (Surgery)
Dennis Styne, M.D., Professor (Pediatrics)
Arthur Swislocki, M.D., Assistant Professor in Residence (Internal Medicine)
Glenn T. Syedtelist, M.D., Associate Professor in Residence (Orthopaedic Surgery)
Jonathan Sykes, M.D., Assistant Professor of Clinical Otolaryngology (Otolaryngology)
Michael Syvans, Ph.D., Professor (Medical Microbiology and Immunology)
Robert M. Szabo, M.D., Associate Professor (Orthopaedic Surgery)
C. Robert Tait, Ph.D., Assistant Adjunct Professor in Residence (Internal Medicine)
Jeffrey L. Tanji, M.D., Assistant Professor (Family Practice)
Raymond L. Teplick, M.D., Professor (Pathology)
Herman Tschudy, M.D., Department of Clinical Pathology (Clinical Pathology)
Seth Theiler, M.D., Assistant Professor in Residence (Surgery)
Jenri H. Theis, V.M.D., Ph.D., Professor (Medical Microbiology and Immunology)
James D. Thurston, M.D., Assistant Professor of Clinical Anesthesiology (Anesthesiology)
Duane E. Towsend, M.D., Professor (Obstetrics and Gynecology)
Robert R. Traut, Ph.D., Professor (Biological Chemistry)
Colin R. Treadrea, M.B.B.B., Assistant Professor of Clinical Anesthesiology (Anesthesiology)
John D. Telford, M.D., Professor (Obstetrics and Gynecology)
George Triantafillou, M.D., Associate Professor in Residence (Internal Medicine)
Joan M. Tullier, M.H.S., Lecturer (Family Practice)
Frederic A. Troy III, Ph.D., Professor (Biological Chemistry)
Waite Trudeau, M.D., Professor of Clinical Internal Medicine (Internal Medicine)
Joe P. Tupsin, M.D., Professor (Psychiatry)
C. John Tupper, M.D., Professor Emeritus (Community Health, Internal Medicine, Family Practice)
Judith L. Turner, M.D., Professor (Human Physiology)
Patrick W. Twomey, M.D., Associate Professor in Clinical Internal Medicine (Internal Medicine)
Judith Van der Waer, Ph.D., Lecturer (Internal Medicine)
David W. Vera, Ph.D., Assistant Adjunct Professor (Radiology)
Zakadian Vera, M.D., Professor (Internal Medicine)
Vijaya K. Vijayan, M.D., Ph.D., Professor (Human Anatomy, Neurology)
Anjyo Villajian, M.D., Assistant Professor of Clinical Internal Medicine (Internal Medicine)
John Vogel, M.D., Senior Lecturer (Radiology)
Philip J. Vogt, M.D., Assistant Professor of Clinical Pathology (Clinical Pathology)
Frank C. Wagner, M.D., Professor (Neurological Surgery)
Donal A. Walsh, Ph.D., Professor (Biological Chemistry)
Robert M. Walter, Jr., M.D., Associate Professor (Internal Medicine)
Richard F. Walters, M.D., Professor (Family Practice)
Richard E. Warm, M.D., Professor (Surgery)
Worley Warn, Ph.D., Professor Emeritus (Physical Medicine and Rehabilitation)
Edward J. Watson-Williams, M.D., Professor Emeritus of Clinical Internal Medicine (Clinical Internal Medicine)
Phillip W. Weiler, M.D., Professor of Clinical Community Health (Clinical Community Health)
Jenno Welborn, M.D., Assistant Professor in Residence (Internal Medicine)
Selton W. Wellings, M.D., Ph.D., Professor Emeritus (Pathology)
Richard P. Wesselberg, M.D., Professor (Pediatrics)
William Wener, M.D., Assistant Professor in Residence (Pediatrics)
Robert T. Wertz, Ph.D., Adjunct Professor (Neurology)
Theodore C. West, Ph.D., Professor Emeritus (Pharmacology)
Ronald G. Wheeler, M.D., Associate Professor in Residence (Dermatology)
Mark Wheeler, M.D., Associate Professor in Residence (Pediatrics)
Thomas P. Whichel, M.D., Assistant Professor in Residence (Surgery)
David A. White, M.D., Associate Professor (Anesthesiology)
Lynda L. White, M.H.S., Lecturer (Family Practice)
Richard H. White, M.D., Professor of Clinical Internal Medicine (Internal Medicine)
Connie Whitleake, M.D., Associate Professor of Clinical Internal Medicine (Internal Medicine)
Lynn M. White, M.D., Professor of Clinical Residence (Obstetrics and Gynecology)
Hibbard E. Williams, M.D., Professor (Internal Medicine)
Mark C. Wilson, M.D., Assistant Professor in Residence (Obstetrics and Gynecology)
Lowell D. Wilson, M.D., Ph.D., Professor (Internal Medicine, Biological Chemistry)
Garen Winters, M.D., Assistant Professor (Family Practice)
Wallace D. Whitten, M.D., Ph.D., Professor (Anesthesiology, Pharmacology)
David H. Whitten, M.D., Assistant Professor in Residence (Surgery)
Handan I. White, M.D., Professor in Residence (Internal Medicine)
Bruce M. Wolfe, M.D., Professor (Surgery)
Earl F. Woolman, Jr., M.D., Professor (Surgery)
David L. Woods, Ph.D., Assistant Adjunct Professor (Neurology)
Marcie J. Woolsey, Ph.D., Lecturer (Human Anatomy)
Reen Wu, Ph.D., Associate Professor in Residence (Internal Medicine)
Hiroshi Yamauchi, M.D., Professor Emeritus (Clinical Internal Medicine)
Julian R. Youman, M.D., Ph.D., Professor (Neurology)
Jerome Zeldis, M.D., Associate Professor (Internal Medicine)
Vincent Zibon, Ph.D., Professor (Dermatology, Biological Chemistry)
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
Curriculum for 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, the student is exposed even from the onset to questions of patient management, thus providing a natural transition from the entry preparatory training into the clinical training of the final year.

The first-year program is for three quarters, beginning in the fall. The basic sciences (anatomy, physiology, biochemistry, 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 entering gency medicine. The second-year program is for four quarters, but with the Summer Quarter abbreviated to six weeks. The second quarter involves 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 (biology, microbiology) and are then, from an organ system approach, presented the pathophysiological basis of disease. The clinical clerkship rotations in the clinical specialties: twelve weeks of surgery, twelve weeks of medicine, and eight weeks each of obstetrics/gynecology, pediatrics and psychiatry.

In the fourth year of the M.D. curriculum, flexibility is built in to allow students to begin to individualize their medical career. Twenty-four weeks of flexible clerkships include four weeks of neurology and/or neurosurgery, four weeks of ambulatory care, and sixteen weeks of clerkship activity. Each student is required to take two-week clerkships in physical medicine and rehabilitation, ophthalmology, otolaryngology, and a two-week required experience in responsibilities of medical students (medical ethics, jurisprudence, medical economics). The fourth year curriculum also allows for two weeks of undesignated time.

To satisfy the M.D. degree program, the student must successfully complete the required course work and clerkships. Students who enter the program with advanced training in one of the areas required for the program are permitted to substitute required courses with electives of equal credit. In addition to the fourth-year elective program available, there is some opportunity for selecting electives during the first two years, in particular during the interim period between the first and second years.

First-Year Required Courses

<table>
<thead>
<tr>
<th>Course Title</th>
<th>UNITS</th>
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<tbody>
<tr>
<td>Quarter I</td>
<td>Fall</td>
</tr>
<tr>
<td>Biological Chemistry 410A, molecular and cell biology</td>
<td>4.5</td>
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<tr>
<td>Family Practice 400A, introduction to patient evaluation</td>
<td>2</td>
</tr>
<tr>
<td>Cell Biology and Human Anatomy 400, developmental, gross and radiologic anatomy</td>
<td>3</td>
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<tr>
<td>Psychiatry 401, medicine and the mind</td>
<td>2</td>
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<tr>
<td>Quarter II</td>
<td>Winter</td>
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<tr>
<td>Biological Chemistry 410B, cell biology and metabolism</td>
<td>3.5</td>
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<tr>
<td>Cell Biology and Human Anatomy 402, human microscopic anatomy</td>
<td>3</td>
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<tr>
<td>Human Physiology 400, human physiology</td>
<td>3</td>
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<tr>
<td>Family Practice 400B, introduction to patient evaluation</td>
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Quarter III: Spring

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<tr>
<th>Course Title</th>
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<tr>
<td>Biological Chemistry/Human Physiology 418, mammalian endocrinology and homeostasis</td>
<td>4.5</td>
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<tr>
<td>Human Anatomy/Human Physiology 403, neurobiology</td>
<td>5</td>
</tr>
<tr>
<td>Medical Microbiology 480A, basic and medical Immunology</td>
<td>2.5</td>
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<tr>
<td>Pathology 411, Pathology I</td>
<td>5</td>
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<tr>
<td>Family Practice 400C, introduction to patient evaluation</td>
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Second-Year Required Courses

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<tr>
<th>Course Title</th>
<th>UNITS</th>
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<tr>
<td>Pathology 423, Pathology II</td>
<td>7.5</td>
</tr>
<tr>
<td>Obstetrics and Gynecology/Pediatrics 420, reproduction/genetics/perinatology</td>
<td>2</td>
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<tr>
<td>Dermatology 420, integumentary system</td>
<td>2</td>
</tr>
</tbody>
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Medical Science (core courses)

Professional Courses

430. Required Surgery Clerkship (18) I, II, III, IV.

The Staff
Clinical activity—full time (eight weeks); lecture—eight hours total. Prerequisite: approval by Committee on Student Evaluation and Promotion. Restricted to medical students. Course consists of eight weeks of general surgery specialties and four weeks of orthopedics or urology. Core material is presented through lectures and case studies. Assignments involve the warding and care of surgical patients. The clerkship is given both at UCMC and at Martin VA Hospital.

431. Medicine Clerkship (18) I, II, III, IV. Course Committee Chairperson
Clinical activity—full time (five weeks). Prerequisite: clinical students with consent by Committee on Student Evaluation and Promotion. Two-week period, one each at UCMC Medical Center and at Martin VA Hospital. Direct patient care situations under guidance of full-time or volunteer faculty member. Nights and weekend on-call. Completion of 24 full write-ups on patients for whom student will take special responsibility.

432A. Obstetrics-Gynecology Clerkship (12) I, II, III, IV. Course Committee Chairperson
Clinical activity—full time (eight weeks). Prerequisite: medical students with consent by Committee on Student Evaluation and Promotion. Obstetrics/gynecologic experience in delivery room, nursery wards, operating room, clinic. One-third of time spent in gynecology, two-thirds in pediatrics. Obstetrics, neonatology and continuing care of fetuses emphasized in perinatal period. Seminars and conferences through out.

432B. Pediatric Clerkship (12) I, II, III, IV. Course Committee Chairperson
Clinical activity—full time (eight weeks). Prerequisite: medical students with consent by Committee on Student Evaluation and Promotion. Two-week period, one in Inpatient Rotation (UCM Medical Center or Travis AFB) and one in ambulatory experience (UCM Medical Center). Assumption of appropriate patient care responsibilities; participation in conference rounds; and seminars during ambulatory rotation.

433. Clinical Clerkship in Psychiatry (12) I, II, III, IV. Course Committee Chairperson
Clinical activity—full time (eight weeks). Prerequisite: medical students with consent by Committee on Student Evaluation and Promotion. Students assigned to various mental health clinical settings following intensive orientation program. Focus on treatment of psychiatric problems encountered by physician in practice. Diagnostic, therapeutic, and interpersonal skills emphasized.

440. Responsibilities of Medical Practice (3). Davidson and staff
Lecture/discussion—6 hours total. Prerequisite: approval by Committee on Student Evaluation and Promotion. Students will address nonbiological components of the patient-physician relationship (medical ethics, medical jurisprudence, medical economics, alcoholism and drug abuse, etc.) and critically explore social, ethical, and cultural issues arising in medical practice. (SU grading only)

Fourth Year Requirements

Fourth Year Required Courses
Responsibilities of medical practice ............................................. 2 weeks
Physical Medicine and Rehabilitation clerkships ......................... 2 weeks
Ear, Nose and Throat/Otolaryngology clerkships ......................... 4 weeks
Fourth Year Flexible Clerkships
Neurology and/or Neurosurgery ........................................... 4 weeks
Ambulatory Care .......................................................... 4 weeks
Clinical Electives ....................................................................... 16 weeks

The fourth year curriculum also allows for twelve weeks of undesignated time (electives, interviews, free time, etc.)

Other Medical Sciences Courses

Professional Courses

450. Introduction to UCM Medical Center (1) I, II, III, IV.

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)

480. Insights in Clinical Research (1) I. Walsh
Lecture—1 hour. Prerequisite: medical students in good standing. Clinical research presented by School of Medicine faculty; overview of pertinent issues, including medical ethics, human subject research protocols, case control methods, etc. (SU grading only)

489. Directed Studies (9) IV. Stagy
Independent study—40 hours total. Prerequisite: individual directed studies in extended preparation for National Board Examination, Part I, and/or as required by Promotion Board. Independent studies to be planned and carried out as an individual base. (SU grading only)

Departmental Courses:

Anesthesiology

Upper Division Course
182. Internship in Anesthesiology (1-6) I, II, III, IV.

The Staff (Bennett, Internship—3 to 18 hours; final report. Prerequisite: upper division standing; approval of project prior to period of internships by preceptor. Supervised work experience in anesthesia and related fields. (P/NP grading only)

*Course not offered this academic year.

Professional Courses

420. Case Management Conference (1, 1-5) I, II, III, IV.
The Staff
Discussion—1 hour. Prerequisite: Interns and residents, advanced medical and veterinary students; consent of instructor. In-depth discussion of current hospital case material presented by house officers, students, and faculty. Case material may be presented in advance. Experience, combined with pertinent literature references, is brought to bear on the problems with emphasis on preventative as well as corrective measures.

421. Basic Science Conference (1) I, II, III, IV. The Staff (Whitehead charge)
Discussion—1 hour. Prerequisites: advanced medical, veterinary, and graduate students; consent of instructor. Approved for graduate degree credit. Discussion of basic science applications to anesthesiology, particularly in the areas of physiology and pharmacology. Selected reading assignments are given in advance and utilized by the instructor to encourage discussion. In selected instances, the topics are organized and presented by the students and residents.

460. Anesthesiology Clinical Clerkship (3-10) I, II, III, IV. (Loeb in charge)
Full-time clinical activity (3 full days per week). Prerequisite: third- and fourth-year medical students. Provides experience in total anesthetic management including application of physiologic and pharmacologic principles to preoperative, operative, and postoperative management of patients. Considers choice and management of general and regional anesthesia techniques, resuscitation, artificial ventilation, inhalation and fluid-electrolyte therapy, and pain problems. Students selecting portions of the course for credit must receive consent of instructor. Limited enrollment.

461. Anesthesia Surgical Team Participation
Martinez VA Medical Center (6-9) I, II, III, IV. With Clinical Activity—full time (5-8 weeks). Prerequisite: third- or fourth-year medical student; completion of Medical Sciences 430. Instructed in: (1) pre- and post-anesthesia care, (2) induction and maintenance of anesthesia, (3) hazard and complications of anesthesia, (4) monitoring (including invasive), (5) record keeping, (6) surgery requirements of anesthesiology. All training is under staff direction.

462. Anesthesia and Mechanical Ventilation Management (3) I, II, IV. (Loeb in charge)
Clinical activity—full time (2 weeks). Introduction to mechanical ventilation, techniques of artificial respiration, and weaning from ventilatory support.

466. Anesthesia Techniques (1) I, II, III, IV. Fung
Clinical activity—3 to 9 hours. Prerequisite: first- and second-year medical students with good academic standing. Consent of instructor. Observation of applied anatomy, physiology, and pharmacology; role of the anesthesiologist in the operating room as part of surgical team; preanesthetic and postanesthetic evaluation of patients. May be limited opportunity to be involved in procedures. (SU grading only)

490. Resident Seminar (1) I, II, III, IV. The Staff (Eisele in charge)
Lecture—1 hour. Prerequisite: degree in medicine or veterinary medicine or consent of instructor. Series of lectures covering a spectrum of anesthesia and related topics in depth, primarily clinically oriented but also including relevant research material. Prepared by faculty, residents, and visiting professors. Pertinent reference lists are circulated in advance of seminars.

498. Individual or Group Study (1-5) I, II, III, IV.
Eisele and staff
Discussion—1-5 hours; laboratory—2-10 hours. Prerequisite: intern and residents with consent of instructor. Directed reading and discussion and/or laboratory investigation on selected topics.

499. Anesthesia Research (1-6) I, II, III, IV.
Eisele and staff
Laboratory—12-54 hours. Prerequisite: third- or fourth-year medical students, advanced standing undergraduate and veterinary medicine students; or con-
sent of instructor. Problems in clinical and/or laboratory research. (SU grading only for medical students.)

**Biological Chemistry**

**Lower Division Course**
92. Internship in Biological Chemistry (1-12) I, II, III, IV. The Staff Internship—3-36 hours; final report. Supervised work experience in biological chemistry and related fields. (PFP grading only.)

**Upper Division Courses**
192. Internship in Biological Chemistry (1-12) I, II, III, IV. The Staff Internship—3-36 hours; final report. Prerequisite: upper division standing; approval of project prior to internship by preceptor. Supervised work experience in Biological Chemistry and related fields. (PFP grading only.)

198. Group Study (1-5) I, II, III, IV. The Staff Prerequisite: consent of instructor. For undergraduate students desiring to explore particular topics in depth. Lectures and conferences may be involved. (PFP grading only.)

198. Special Study for Advanced Undergraduates (1-5) I, II, III, IV. The Staff Prerequisite: consent of instructor. (PFP grading only.)

**Graduate Courses**

209. Prostaglandins, Leukotrienes and Related Lectures—2 hours. Prerequisite: Biochemistry 101A-101B or Physiological Sciences 101A-101B or Physiology 100A-100B. Descriptive and quantitative aspects of prostaglandins and endogenous lipid mediators. (Same course as course in Biophysics 1.)

216. Protein Structure (3) II. Benlekke Lecture—3 hours. Prerequisite: Biochemistry 201A or consent of instructor. Course designed to acquaint students at graduate level with currently applied techniques for the determination of protein structure and significant results derived from them. Techniques which will be presented include amino acid sequence analysis, three-dimensional structural determination by X-ray diffraction, and nuclear magnetic resonance spectroscopy. Offered in alternate years. (SU grading only.)

218. Molecular Genetics of Fungi (3) II. Holland Lecture—3 hours. Prerequisite: graduate standing in a biological science; Biochemistry 101A; Genetics 100, 102A; Botany 119; Plant Pathology 130, 215; Microbiology 215 recommended. Advanced treatment of molecular biology and genetics of filamentous fungi and yeasts, including gene structure, organization and regulation; secretion; control of reproduction; molecular evolution; transformation; and gene manipulation. (Same course as Plant Pathology 217.)

222. Mechanisms of Translational Control (2) II. Hershey Lecture—1 hour; discussion—1 hour. Prerequisite: Biochemistry 101C or consent of instructor. Molecular mechanisms of protein synthesis and translational control in eucaryotic cells, with emphasis on mammalian cells and their viruses. An advanced graduate level treatment of topics of current interest, with readings and discussion of primary papers from the literature. Offered in alternate years.

281. Topics in Cellular Biochemistry and Physiology (2) II. Trout, Silliman (Animal Physiologist) Seminar—2 hours. Prerequisite: one course in biochemistry; Physiology 100A or Physiology 121A or 121B. General physiology, cell biology, and molecular biology of living systems, with emphasis on cell form and function. One topic, representing a timely and important area of research, will serve as the focus throughout the course. May be repeated for credit. (Same course as Physiology 291C.)

298. Group Study (1-5) I, II, III, IV. The Staff Prerequisite: consent of instructor. For graduate students desiring to explore particular topics in depth. Lectures and conferences may be involved.

299. Research (1-12) I, II, III, IV. The Staff Prerequisite: consent of instructor. (SU grading only.)

**Professional Courses**

410A. Molecular and Cell Biology (4.5) I. Matthews, Holland Lecture—5 hours. Basic biochemistry of proteins and nucleic acids is presented, followed by molecular genetics, regulation of gene expression, enzymes and structures of prostaglandins and leukotrienes, and the clinical relevance systems are emphasized, particularly sialic acid anaemia, thalassemia, and monoclonal antibodies, oncogenes, cell proliferation control.

410B. Cell Biology and Metabolism (3.5) III. Trout Lecture—4 hours (for 9 weeks). Prerequisite: approval by Committee on Student Evaluation and Promotion. Introduction to transport of small molecules and ions across membranes is followed by study of energy metabolism and biosynthetic processes in humans. Enzymes that are coordinately regulated are considered as they relate to basic metabolic processes. Correlations to human disease are made throughout.

414. Contemporary Medical Biochemistry (1) II. Douglas 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. Mammalian Endocrinology and Homeostasis (4.5) III. Walsh and staff Lecture—4 hours; discussion—1 hour; student presentation. Prerequisite: approval by Committee on Student Evaluation and Promotion. Physiological and biochemical aspects of endocrine systems in both the cellular and systemic level, principles that regulate homeostasis, especially in organ-organ interrelationships, and functions. Reproduction as an endocrine process. (Same course as Human Physiology 418.)

419. Introduction to Clinical Nutrition (3) III. Halsted (Internal Medicine), Tucker, and staff Lecture—6 hours; Lecture/discussion—1.5 hours; laboratory/discussion—0.5 hour (over a 4-week period). Prerequisite: approval by Committee on Student Evaluation and Promotion. A 28-hour course that integrates basic and clinical concepts of human nutrition. The course encompasses nutrients, metabolism, and current perspectives on the role of nutrition in disease. Format is partly lectures, partly discussion, case study. (Same course as Internal Medicine 419.)

497. Tutoring in Biological Chemistry (1-5) I, II, III, IV. The Staff Tutoring—3-15 hours. Prerequisite: advanced standing or consent of instructor. Assist instructor by tutoring medical students in preparation for some of the departmental courses that is a component of the required curriculum of the School of Medicine. (SU grading only.)

498. Group Study (1-5) I, II, III, IV. The Staff (Chairman in charge) Prerequisite: medical students with consent of instructor. (SU grading only.)

499. Research (1-12) I, II, III, IV. The Staff (Chairman in charge)

**Prerequisite:** medical students with consent of instructor. (SU grading only.)

**Cell Biology and Human Anatomy**

**Upper Division Courses**

101L. The Gross and Microscopic Structure of the Human Body (4) I. Patterson Lecture—4 hours. Prerequisite: Biological Sciences 1A or 10; Physiology 2-2L, or Biological Sciences 1B recommended. A study of the microscopic structure of the human body with emphasis on function.

101L. The Gross and Microscopic Structure of the Human Body (2) II. Patterson Laboratory—two 2-hour sessions. Prerequisite: course 101 may be taken concurrently. Laboratory will be taught from projections, models and slides to give students the opportunity to learn structure from direct experience.

192. Internship in Morphology (1-12) I, II, III, IV. The Staff Internship—3-36 hours; final report. Prerequisite: upper division standing; laboratory science experience including some chemistry; approval of project by preceptor prior to period of internship. Experience of supervised internship in research laboratories of members of the department. (PFP grading only.)

197. Tutoring in Cell Biology and Human Anatomy (1-5) II. The Staff Discussion—1 hour; laboratory—6.9 hours. Prerequisite: completion of course 101 with a grade of B or better and consent of instructor. Provides laboratory instruction in gross and microscopic human anatomy, with small groups of undergraduates under the supervision of the instructor. (SU grading only.)

198. Directed Group Study (1-5) I, II, III, IV. The Staff (Chairperson in charge) Discussion—1-10 hours. Prerequisite: consent of instructor. Directed reading, discussion, and/or laboratory experience on selected topics. (PFP grading only.)

199. Special Study for Advanced Undergraduates (1-5) I, II, III, IV. The Staff (Chairperson in charge) Prerequisite: consent of instructor. (PFP grading only.)

**Graduate Courses**

200. Gross Anatomy (8) I. Patterson Lecture—3.5 hours; discussion—1 hour; laboratory—10.5 hours. Prerequisite: graduate student status and consent of instructor. To provide students with a vocabulary of human body structure and to acquaint them with structural relationships through dissection and lecture to introduce them to functional aspects of gross anatomy, particularly as regards anatomical problem solving.

202. Human Microscopic Anatomy (5) II. Meisel Lecture—3 hours; laboratory—6 hours. Examines the normal microscopic structure of the basic cells, tissues, and organs of the body. Lectures emphasize morphology and structure-function relationships. Accompanying laboratory exercises include analysis and identification of sections of material at the light microscopic and ultramicroscopic levels.

203. Neurobiology (6) III. Vijayan Lecture—5 hours; laboratory—3 hours. Prerequisite: consent of instructor. Gross and microscopic anatomy of the central nervous system; motor and sensory pathways; neurophysiology, and cognitive functions.

290. Seminar (1) I, II, III. The Staff Seminar—1 hour. Prerequisite: consent of instructor. (SU grading only.)

290C. Research Group Conference (1) I, II, III. The Staff Discussion—1 hour. Prerequisite: graduate student with research experience (may be taken concurrently); consent of instructor. Discussion of problems, progress and literature relevant to current research undertaken by laboratory groups in Human Anatomy. (SU grading only.)
252. Fertilization and Gamete Literature Critique (1) I, II, III. Melzel Discussion—1 hour. Prerequisite: consent of instructor. Critical discussions of current journal articles dealing with cell biology and biochemistry of gametes and fertilization. Selected papers will be presented and discussed in detail by students and faculty. May be repeated for credit (S/U grading only).

298. Advanced Group Study (1-5) I, II, III. IV. The Staff Prerequisite: consent of instructor.

299. Research (1-12) I, II, III. IV. The Staff Prerequisite: consent of instructor: (S/U grading only)

Professional Courses

402. Developmental, Growth, and Radiologic Anatomy (3) I. Peyer Lecture—8 hours; laboratory—12 hours. Prerequisite: approval by Committee on Student Evaluation and Promotion. Integrated presentation of developmental, gross, and radiologic anatomy. Four students are assigned to a cadaver and dissect the entire body. Embryology and radiology are correlated with the dissections. Embryology is covered from implantation to birth.

404. Human Microscopic Anatomy (5) II. Meisel and staff Lecture—3 hours; laboratory—6 hours. Prerequisite: Approval by committee on Student Evaluation and Promotion. Examination of the normal microscopic structure of the basic cells, tissues, and organs of the body. Lectures emphasize morphology and structure-function relationships. Accompanying laboratories involve analysis and identification of section material at the light microscopic and ultrastructural levels.

403. Neurology (5) I. Wijeyan Lecture—4 hours; laboratory—3 hours. Prerequisite: approval by Committee on Student Evaluation and Promotion. Physiology and anatomy of the normal human nervous system in an integrated format. Focus on gross and microscopic brain structure, functional neuroanatomy, and the physiology, biochemistry, and pharmacology of the nervous system. (Same course as Human Physiology 403.)

4971. Tutoring In Human Anatomy (1-3) I, II, III, IV. The Staff Tutoring—6-15 hours. Prerequisite: advanced standing or consent of instructor. Assistant instructor by tutoring medical students in preparation for one of the departmental courses that is a component of the required curriculum for the School of Medicine. (S/U grading only.)

498. Advanced Group Study (1-12) I, II, III. IV. The Staff Prerequisite: medical student, intern, or resident with consent of instructor. Directed reading and group discussion of laboratory experience on selected topics. (S/U grading only.)

499. Research (1-12) I, II, III. IV. The Staff (Chairperson in charge) Prerequisite: consent of instructor: (S/U grading only.)

Clinical Psychology

Graduate Course

298. 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 Health

Upper Division Courses

101. Perspectives in Community Health (3) I, II, III. Orgren Lecture—3 hours. Prerequisite: undergraduate standing. Covers comprehensively the responsibilities, obligations, roles, and professional activities of various health care disciplines in the community, provides students with perspectives on preventive medicine in society.

160. Health Education (1-5) I, II, III, IV. The Staff (Student Health Center) Lecture—13 hours; laboratory—3-15 hours. Prerequisite: consent of instructor. Preparation for field work in the area of health education. Planning and presentation of programs on health issues. Peer counseling in the areas of sexuality and alcohol/drug abuse. (P/NP grading only)

180. Aging and Health (3) III. Orgren Lecture—3 hours. Prerequisite: upper division standing and consent of instructor. Emphasis on nature and determination of health problems in the elderly. Current social and personal strategies for enhancing and maintaining health in old age.

192. Internship In Community Health Practice (1-5) I, II, III, IV. The Staff Practicum—3-15 hours; field supervision evaluation; written progress report. Prerequisite: open to all senior and graduate students, and consent of instructor. The totality of community health practice is observed and compared to the concepts and theory seen in didactic instruction in this field-oriented course. (P/NP grading only.)

194. Practicum In Community Health Clinics (1-5) I, II, III, IV. Kunagai and staff Clinical activity—3-15 hours; written report. Prerequisite: upper division standing. The under-graduate student, through active participation in the medical aspects of community health clinics, gains knowledge and skill in health education, administration, and problem solving capabilities of these primary care facilities. (P/NP grading only.)

195. International Health Care (1) I, II, III, IV. Orgren Seminar—1 hour. Prerequisite: one or more courses in community health, health policy, sociology, or international relations required or approved. Presentation of current health issues and health care systems in other countries. Topics include health care for refugees, the impact of political strife on health, the role of the health care professional in international settings. May be repeated for credit. (P/NP grading only.)

198. Directed Group Study (1-5) I, II, III, IV. The Staff Discussion-seminars—1-5 hours; occasional visiting lecturer. Prerequisite: senior standing and consent of instructor. Directed group study on selected topics relating to community health. (P/NP grading only.)

199. Special Studies in Community Health (1-5) I, II, III, IV. The Staff Prerequisite: advanced undergraduate standing and consent of instructor. Directed individual study on selected topics relating to community health. (P/NP grading only.)

Graduate Courses

226. Psychiatric Implications of Legal Intervention (2) II. Lefkoff Discussion—2 hours. Prerequisite: consent of instructor. The influence of laws on human behavior, and vice versa, with particular emphasis on youth and juvenile court procedure. (S/U grading only) (Same course as Psychiatry 226.)

249. Practicum in Community Health Clinics (1-5) I, II, III, IV. Kunagai Clinical activity—3-15 hours. Prerequisite: open to all first- or second-year medical students, or graduate students with consent of instructor. Students are assigned to clinical settings which demonstrate ethic, urban, rural, or clinic aspects of clinical community 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 for graduate students.)

289. Group Study In Community Health (1-5) I, II, III, IV. The Staff Prerequisite: medical graduate, or veterinary students, or consent of instructor. Directed readings, discussions, or community investigations in areas or problems in community health. (S/U grading only for graduate students.)

299. Research In Community Health (1-12) I, II, III, IV. Orgren, Weller, Tupper Prerequisite: medical graduate, or veterinary students, or consent of instructor. Directed pursuit and community-based research in selected topics in community health. (S/U grading only for graduate students.)

Professional Courses

407. Foundations of Community Health I: Principles of Preventive Medicine, Epidemiology, and Biometry (2) I. Weller Lecture—2 hours. Prerequisite: consent by Committee on Student Evaluation and Promotion. Lectures and problem-oriented discussions on chronic and infectious disease models, emphasis on principles of preventive medicine, epidemiology, and the impact on the health care system. (S/U grading only.)

408. Foundations of Community Health II: Preventive Medicine, Environmental Health, and Health Care Delivery (1.5) I. III. Tupper and staff Lecture—12 hours total; discussion—6 hours total. Prerequisite: consent by Committee on Student Evaluation and Promotion. Nature and control of environmentally dependent mortality/morbidity in various communityoccupational settings and the nature, organization, financing, and delivery of health care services, and how these affect disease prevention and quality of health care.

421. Principles of Epidemiology, Occupational Medicine, and Geriatrics (2.5) I. Schenker, Weller Lecture—7.5 hours for 4 weeks; discussion—15 hours. Prerequisite: approval by Committee on Student Evaluation and Promotion. Fundamentals of epidemiology and epidemiologic study design, including measures of morbidity, mortality, and risk. Occupa-tional medicine component covers the evaluation of occupational illness, and specific examples of occupational diseases. Geriatrics component covers the comprehensive geriatric assessment, treatment issues, and the long-term care system. (Same course as Internal Medicine 421.)

455. Multidisciplinary Clinical Preceptorship (4.5) I, IV. Orgren Clinical activity—full time (3 weeks). Prerequisite: 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 geriatric care will be emphasized. (S/U grading only.)

460. Geriatrics in Community Health (6-12) I, II, III, IV. Weller 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 programming offered from well elderly to severely infirm. Sites include Voi, Sacramento, and Martinez counties.

461. Group Practice in Community Health (6-18) I, III, IV. Bochani Prerequisite: third- or fourth-year medical students. Clinical preceptorships in two-man private rural group practice. Southern Monterey County Medical Group, King City, California. Group demonstrates "open door" mentality and care for private and indigent farm labor families. (HEW Grant.)

465. Community Analysis and Public Health Practice Preceptorship (6) I, II, III, IV. Weller Discussion—4 hours; preceptorship—full time (4 weeks) community work data analysis and interpretation. (S/U grading only.)

466. Health Care Delivery in the Emergency Service (5-15, 18) I, II, III, IV. Bochani, Smilkenstein Prerequisite: third- or fourth-year medical student. Student participation under faculty supervision in assessment of needs through survey procedures, inventory of alternative resources and evaluation of EMS delivery systems. Course offered jointly with Department of Family Practice.

467. Outreach in Community Health (1-3) I, II, III, IV. Weller Clinical activity—3-9 hours. Prerequisite: first- and second-year medical students in good academic standing; consent of instructor. Introduction to community needs assessment projects. Involved in clinical practice and geriatrics. Participation in multi-disciplinary team conferences and teaching conferences, nursing home rounds, home
Dermatology

Upper Division Courses

192. Internship in Cutaneous Biology (1-4) I, II, III, IV.

Internship—8-20 hours; final report. Prerequisite: upper division standing or consent of Instructor. Approval of project prior to internship by preceptor. Successful completion of course requires involving research on the skin. (PNP grading only)

199. Special Study in Cutaneous Biology (1-4) I, II, III, IV. The Staff (Insofar in charge)

Prerequisite: advanced undergraduate standing and/or consent of Instructor. Special study by individual arrangement of specialized topics in biology of skin. Work may be assigned readings, laboratory research or a combination. (PNP grading only)

Graduate Course

299. Research in Cutaneous Biology (1-2) I, II, III, IV. The Staff (Insofar in charge)

Laboratory—3-36 hours. Prerequisite: consent of Instructor. Independent research in cellular and biochemical mechanisms of cutaneous biology and pathology. (SU grading only)

Professional Courses

420. Integumentary System (2) IV. Huntley and staff

Lecture/discussion—4 hours (for 6 weeks). Prerequisite: approval by Committee on Student Evaluation and Promotion. Covers cell biology, pathology, and physical diagnosis of the skin and is designed to prepare medical students for clinical service. Recognition of normal variations, and common or important dermatoses is emphasized. Patient demonstrations of select conditions are included.

460. Dermatology Clinical Clerkship (6) I, II, III, IV.

Lecture—40 hours. Clinical activity—40 hours for four weeks (Inpatient/Outpatient service). Prerequisite: completion of three years of medical school; or consent of instructor. Inpatient/outpatient service. Observation and participation in dermatology clinical practice and participation in Ward Rounds and Dermatology Clinics at UCD Medical Center, Kaiser, and private practitioner offices. Limited enrollment.

480. Insights in Dermatology (1-3) I, II, III, IV.

Whitbread

Clinical activity—3-9 hours. Prerequisite: first- and second-year medical students in good academic standing; consent of Instructor. Clinical experience limited to observation of delivery of dermatology care at attendance of some conferences. (SU grading only)

498. Special Topics in Clinical Dermatology (1-6) I, II, III, IV. The Staff (Wheatland in charge)

Independent study—3-18 hours. Prerequisite: medical students with consent of Instructor. Individually arranged study of special topics in clinical dermatology determined by student and instructor. Assigned readings and/or clinical examination of selected patients.

499. Research in Cutaneous Biology (1-12) I, II, III, IV. The Staff (Insofar in charge)

Laboratory—3-36 hours. Prerequisite: consent of Instructor. Research, either laboratory or clinical, on ongoing projects within the department under supervision of faculty. (SU grading only)

Family Practice

Lower Division Courses

92B. Health Science Hospital Practice (3-5) I, II, III, IV.

Field work—hospital setting. Prerequisite: interest in health-care delivery and consent of instructor. Field experience course for lower division students. Emphasis is placed upon providing assistance to health professionals including physicians, nurses, therapists, technicians and administrative staff. Introduces many common hospital procedures and current health issues. Students complete CPR certificate. (PNP grading only)

92C. Health Science Clinic Practicum (2) I, II, III, IV.

Field work—hospital setting. Prerequisite: consent of Instructor. Field experience to expose lower division students to health-care delivery including: patient histories and physical examinations; health promotion and disease prevention; diagnosis and treatment of epidemic, acute and chronic illnesses; basic laboratory testing; and appropriate referral and follow-up. (PNP grading only)

Upper Division Courses

192A. Internship in Family Practice (1-12) I, II, III, IV, Davidson

Internship—3-65 hours. Prerequisite: upper division standing and consent of Instructor. Work experience supervised in the Department of Family Practice. Upper-division students provided an opportunity to acquire research experience in a clinical laboratory setting. (PNP grading only)

192B. Health Science Hospital Practicum (3 or 5) I, II, III, IV, Smith (Student Health Center)

Fieldwork—in hospital setting. Prerequisite: interest in health-care delivery and consent of Instructor. Field experience for upper-division students. Emphasizes observation of and providing assistance to health professionals including physicians, nurses, therapists, technicians and administrative staff. INTRODUCED TO MANY COMMON hospital procedures and current health issues. Students complete CPR certificate. (PNP grading only)

192C. Health Science Clinic Practicum (2) I, II, III, IV, Arevalo

Field work—in clinic setting. Prerequisite: upper-division standing and consent of Instructor. Field experience to introduce upper-division students to health-care delivery including: patient histories and physical examinations; health promotion and disease prevention; diagnosis and treatment of epidemic, acute and chronic illnesses; basic laboratory testing; and appropriate referral and follow-up. (PNP grading only)

195. Health Care to Underserved Populations (1) I, II, Neubin

Lecture—1 hour. Prerequisite: sociology, political science, or applied behavioral science background recommended, or registration in medical school. Discusses sociocultural perspectives of underserved population in California Impacting their health; roles of family/neighborhood relationships in making health care decisions; and the clinician's perspectives in treating people of cultures which are unfamiliar and uncomfortable with Western medicine. (PNP grading only)

Professional Courses

The following courses are for students enrolled in the Family Nurse Practitioner/Physician Assistant Program

340A-340B-340C-340D. Clinical Preceptorship for FNP/PAs (3-12) III-I-II-II-IV. Mentink, White

Clinical activity—6-40 hours. Prerequisite: registered student in Family Nurse Practitioner/Physician Assistant Program. Student spends 6-40 hours per week with an approved physician preceptor in patient care to develop clinical skills necessary to assess and manage patients with common medical problems seen in primary care settings. (PNP grading only)

341A-341B-341C-341D. Advanced Clinical Preceptorship for FNP/PAs (3-12) III-I-II-II-IV. Mentink and staff

Clinical activity—6-40 hours. Prerequisite: registered student in Family Nurse Practitioner/Physician Assistant Program, and course 340A-340B-340C. Student spends 8 to 40 hours per week in an approved clinical setting to build on clinical skills in primary care learned in clinical preceptorships. (PNP grading only)

343A-343B-343C-343D-343E-343F. Inpatient Clinical Experience for FNP/PAs Students (5-5-5-5-5-5-5-5) I, II, III, IV. The Staff

Clinical activity—160 hours per quarter. Prerequisite: registered student in Family Nurse Practitioner/Physician Assistant Program; successful completion of course 343A-343B-343C, Student clerkship in the inpatient setting in Family Practice, Surgery, and medical/surgical subspecialty electives at UCSD and/or affiliated institutions. Designed to expose the FNP/PA program student to inpatient management; assistant student with FNP/PA role in inpatient setting. (PNP grading only)

345. Clinical Geriatrics (5) III. Higby

Clinical activity—15 hours. Prerequisite: registered student in Family Nurse Practitioner/Physician Assistant Program. Aims to introduce the geriatric clinical pharmacist into the patient care role. The course provides the geriatric clinical pharmacist with knowledge and skills to work in the hospital setting, nursing home, acute hospital, and community settings that provide services for the elderly, including visits to patients' homes. (PNP grading only)

350. Ethics and Trends in Health Care for FNP/PAs (2) II, Tollerding

Lecture/discussion—2 hours. Prerequisite: registered student in the Family Nurse Practitioner/Physician Assistant Program. Review and discussion of ethical issues in health care, review of the process and policies for ethical decision-making in patient care. These issues, trends, and processes will be related to the role of the Family Nurse Practitioner/Physician Assistant.

351A-351B-351C. Professional Development of the Physician Assistant (1-1) III-I-II. Mentink and staff

Lecture/discussion—1 hour. Prerequisite: registered student in Physician Assistant Program. Study of role of the physician assistant, professional development, and the organizational responsibilities and legal considerations of the physician assistant.

354A-354B-354C. Fundamentals of Primary Health Care for FNP/PAs Students (5-4-4) I-I-I-II. The Staff

Lecture/discussion—4-4.5 hours. Prerequisite: registered student in Family Nurse Practitioner/Physician Assistant Program. Study of anatomy and physiology, pathophysiology, diagnostic criteria, approaches to assess and manage common medical problems seen in primary care settings.

355A-355B-355C. Advanced Principles of Health Care for FNP/PAs Students (4-4-4) I-I-I-II-III. Mentink and staff

Lecture/discussion—4 hours. Prerequisite: registered student in the Family Nurse Practitioner/Physician Assistant Program; course 354A-354B-354C. Study of anatomy and physiology, pathophysiology, diagnostic criteria and approaches to assess and manage patients with complex and/or multiple health care problems in primary care settings, and to learn the management of patients in inpatient settings.

356. Pharmacology for FNP/PAs Students (4) IV-I-II-I-III. The Staff

Lecture/discussion—4 hours. Prerequisite: registered student in the Family Nurse Practitioner/Physician Assistant Program. Principles of pharmacokinetics and pharmacodynamics, the classifications of drugs and representative drugs within each class, and application of these principles to pediatric and geriatric patients, and to pregnant or lactating women.

360A-360B-360C. Ethics and Trends in Health Care for FNP Students (1-1) I-I-II-I-III. Mentink 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 decision-making in patient care. These issues will be related to the role of the Family Nurse Practitioner.

362A-362B-362C. Professional Development of the FNP (1-1) I-I-II-I-III. Mentink and staff

Lecture/discussion—1 hour. Prerequisite: registered student in the Family Nurse Practitioner Program or consent of Instructor. Study of the role of the nurse practitioner and its historical evolution, of the legal considerations, of the implications of case management, and the role of the nurse practitioner in the future. The course will introduce the professional responsibilities of the Family Nurse Practitioner.

Ill. The Staff
Lecture/discussion—2.1-1.1-1.1-1.1 hours. Prerequisite: registration in Family Nurse Practitioner/Physician Assistant Program. Study of communication skills and interviewing techniques, of self-awareness and awareness of others, of assessment of patient's concerns and counseling skills to assist them to gain insight and reach their own solutions, of behavior modification concepts and techniques.

356A-366B-36C-365D. Family Practice and Community Health Atlanta Students (2-2-2-2) I-II-III-IV. Mentink and staff
Lecture/discussion—2 hours. Prerequisite: registered student in the Family Nurse Practitioner/Physicians Assistant Program. Study of family dynamics, growth and development in all age groups including special concerns in pediatrics and geriatrics, health promotion and disease prevention, and cultural and community needs and concerns.

Special Study for Advanced Undergraduates (1-3) I, II, III, IV. Devito
Prerequisite: consent of instructor. Flexibility to develop and pursue research and clinical interests to enhance education in Family Practice. (PnP grading only)

Professional Courses

400A-400B-40C. Introduction to Patient Evaluation (2-2-2) I, II. Callahan, Morgan
Lecture/discussion—18 hours total; clinical activity—6 hours total; conference or laboratory—4-8 hours total. This course is a lecture format and eliminates patients each student will practice dealing with communication problems and learn basic physical examination skills through small group interactions. A continuity preceptorship and introduction to emergent medical medicine will also be deferred. (Deferred grading only, pending completion of sequence.)

401. Preceptorship in Family Practice (1-8) I, II, III, IV. Morgan
Preceptorship—part-time (one 4-day per week day; 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. Mezri
Lecture/discussion—2 hours. Prerequisite: restricted to medical students in good standing. Teaches the vocabulary needed to conduct a basic history and physical examination. (SU grading only).

407. Davis Community Clinic (2) I, II, III, IV. Tanji
Clinical activity—full-time. 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)

434A-434B-43C-43D-43E-43F-43G-43H. Primary Care at Clinics Tepati (3-3-3-3-3-3-3-3) I-II-III-IV-IV-IV-IV. Avelavo
Clinical activity—four 8-hour days; group seminar/discussion—ten 1-hour sessions; training seminar/offices—four 4-hour sessions. Prerequisite: first- and second-year (full-time) medical students with consent of instructor; pre-application processed. Exposure to episodic and acute disease; learn physical examination and taking a complete history; also learn immunization techniques, use of laboratory tests. Limited enrollment. (SU grading only)

435A-435B-43C-43D-43E-43F-43G-43H. Primary Care at Clinics Tepati (3-3-3-3-3-3-3-3) II-II-III-III-III-III-III. Avelavo
Clinical activity—four 8-hour days; group seminar/discussion—ten 1-hour sessions; training seminar/offices—four 4-hour sessions. Prerequisite: third- and fourth-year (full-time) medical students with consent of instructor; pre-application processed. Counseling, diagnosis, and treatment of patients with chronic (long-term) and acute (short-term) disease under supervision of a physician; as well, exposure to other special health-care needs of ethnic groups, and poor people in general. (SU grading only)

440. Ambulatory Medicine Clerkship (6 or 12) I, II, III, IV. Schergen, N. Tanji
Clinical activity—full time (4 to 8 weeks). Prerequisite: third-year medical clerkship. Ambulatory medicine experience in family practice setting. Acquisition of skills to enable them to develop a treatment plan for disorders with common medical problems seen by primary care physicians in the outpatient setting.

445. Sports Medicine from a Primary Care Perspective (6) II, III, IV. Tanji
Clinical activity—full time (4 weeks). Prerequisite: four-year medical student in good academic standing. Students spend full time in outpatient clinic settings in family practice, orthopedic surgery, physical education, Internal medicine, and a community private practice. Students learn principles and practice of sports medicine from a primary care perspective.

452. Family Practice Preceptorship (3-18) I, II, III, IV. Schergen
Clinical activity—full time (3 days per unit). Prerequisite: completion of third year of medical school or medical student with consent of instructor. Preceptors are faculty in a variety of settings. Involvement in direct patient care and daily activities under supervision of physician-preceptor.

453. Selected Readings in Family Practice (1-9) I, II, III, IV. The Staff
Discussion—5-37 hours. Prerequisite: medical student in good academic standing. Increase understanding of family practice through assigned reading and thorough discussion with faculty member.

468. Family Practice in a Foreign Culture (6-18) I, II, III, IV. Schergen
Clinical activity. Prerequisite: completion of third year in medical school. Visit a family practitioner in a foreign country (arranged in advance by Department), accompany, and participate in clinical activities of preceptor and analyze and report characteristics of the practice.

469. Family Practice Clerkship (3-18) I, II, III, IV. Nobeal
Clinical activity—full time. Prerequisite: third- and fourth-year medical students with consent of instructor; third-year students may elect to enroll for second half of spring quarter. Involvement in comprehensive primary medical care of patients in a family setting and observe the team approach to health care.

480. Insights in Family Practice (1-3) I, II, III, IV. Morgan, Schergen
Clinical activity—3 to 9 hours; required readings. Prerequisite: second-year medical students in good academic standing; consent of instructor. Exposure to family practice in outpatient clinical setting. Three to nine hours per week spent with a community physician preceptor who is a member of the clinical faculty. (SU grading only)

490. Directed Group Study in Family Practice (1-9) I, II, III, IV. The Staff
Discussion—3-37 hours. Prerequisite: medical students with consent of instructor. Directed study on selected topics relating to family medicine and primary health care delivery; visits to and written analysis of selected innovative health care programs. (SU grading only)

496. Research (1-12) I, II, III, IV. The Staff
Prerequisite: medical students with consent of instructor. Research in various aspects of the health care delivery system. (SU grading only)

Human Physiology

Upper Division Courses

191. Internship in Human Physiology (1-12) I, II, III, IV. The Staff (Renkin in charge)
Internship—3-38 hours; final report. Prerequisite: upper division standing; approval of project prior to period of internship. Required for students to have experience in physiology and related fields. (PnP grading only)

198. Directed Group Study (1-5) I, II, III, IV. The Staff (Renkin in charge)
To be arranged. Prerequisite: consent of instructor. Directed reading, discussion and laboratory experience on selected topics. (PnP grading only)

199. Special Study for Advanced Undergraduates (1-5) I, II, III, IV. The Staff (Renkin in charge)
Laboratory—3-15 hours; undergraduate research project. Prerequisite: senior standing in Biology, chemistry, physics, psychology, or engineering. (PnP grading only)

Graduate Courses

200. Human Physiology (6) I. Curry, Renkin, 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 endocrine systems in the human.

Lectures concurrent with course 400; research discussion and laboratory/demonstration sessions, and examinations separate.

210. Advanced General Physiology (3) III. Curry, Cole
Lecture—3 hours. Prerequisite: Physiology 100B; Biochemistry 101B; Chemistry 107B; graduate standing and consent of instructor. Physicochemical basis of living systems with emphasis on membrane permeability characteristics at both the cellular and tissue level. Offered in alternate years.

231. Renal Physiology (3) I. Rabkinowitz
Lecture—3 hours. Prerequisite: Physiology 112, 113 or the equivalent; graduate standing. Topics in mammalian renal physiology: osmolality, osmotic and ionic balance, renal tubular function, and pathophysiology of the kidney in man. Offered in alternate years.

250. Circulatory Transport and Fluid Exchange (3) I. Renkin
Lecture—2 hours; discussion—1 hour. Prerequisite: Physiology 112-113-114 or courses 400-403-418 or the equivalent, or consent of instructor. Lectures, assigned reading and discussion of principles of microcirculatory exchange; blood, interstitial fluid and lymph dynamics; regulation of plasma and interstitial fluid volume; disturbances of plasma and interstitial fluid exchange; fluid replacement. Offered in alternate years.

260. Physiological Systems Analysis (5) I. Smith
Lecture—4 hours; discussion—1 hour. Prerequisite: Mathematics 228 and Physiology 113 or consent of instructor. Quantitative analysis of physiological control systems; mathematical models and analytic methods appropriate for the study of different types of physiological control; application of these techniques to investigation of homeostasis. Offered in alternate years.

261. Simulation of Physiological Systems (1-3) I, II, III, IV. Smith
Lecture—3-8 hours. Prerequisite: course 260 or the equivalent; consent of instructor. Selected problems in simulation of physiological control systems. Simulations performed on current microcomputer hardware using high level simulation languages. Problems may be selected from literature or from student's research; experimental testing of the simulation encouraged.

Lecture—3 hours; laboratory—3 hours. Prerequisite: course 480 or the equivalent; consent of instructor. Clinical laboratory; physiological evaluations of pulmonary function. (Same course as 480)

290. Peripheral Circulation (3) III. Gay
Lecture—1 hour; discussion—2 hours. Prerequisite: Physiology 111B, 113, or the equivalent and consent of instructor. Series of lectures and discussion sessions on the physiology of mammalian peripheral circulation including topics on: anatomy, physiology, and pharmacology of vasculature; smooth muscle, regional circuits, microcirculatory control mechanisms, and dynamics of capillary transport. Offered in alternate years.

*Course not offered this academic year.
298. Group Study (1-5) I, II, III, IV. The Staff (Reinick in charge)
Prerequisite: consent of instructor. For graduate students desiring to explore particular topics in depth: Lectures and conferences may be involved.

299. Research (1-2) I, II, III, IV. The Staff (Reinick in charge)
Prerequisite: consent of instructor. (SU grading only)

Professional Courses

400. Human Physiology (6) II, Curry, Reinick, and staff
Lecture—6 hours; laboratory—6 hours. Prerequisite: consent by Committee on Student Evaluation and Promotion. General, cellular and systemic physiology of human cardiovascular, respiratory, gastrointestinal and urinary systems.

403. Neurobiology (5) V. Vijayan
Lecture—4 hours; laboratory—3 hours. Prerequisite: approval by Committee on Student Evaluation and Promotion. Physiology and anatomy of the normal human nervous system in an integrated format. Focus on gross and microscopic brain structure, functional neuroanatomy, and the physiology, biochemistry, and pharmacology of various systems, course code as Cell Biology and Human Anatomy 432.

418. Mammalian Endocrinology and Homeostasis (4.5) III. Walsh and staff
Lecture—4 hours; discussion—1 hour; student presentation. Prerequisite: approval by Committee on Student Evaluation and Promotion. Physiological and biochemical properties of the mammalian endocrine system both at the cellular and systemic level. Principles of regulation of homeostasis, especially in organ interrelationships, metabolites, and minerals. Reproductive endocrinology. (Same course as Biological Chemistry 418.)

450. Pulmonary Function Evaluation (4) I, II, III, Cross
Lecture—4 hours; laboratory—3 hours. Prerequisite: course 400 or the equivalent; consent of instructor. Clinical laboratory, physiological evaluations of pulmonary function. (Same course as 286.)

497T. Tutoring In Human Physiology (1-05) I, II, III, IV. Reinick
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.)

488. Directed Reading and Group Study (4-1) I, II, III, IV. Ferguson and staff
Discussion—2-8 hours. Prerequisite: medical student. Directed reading and discussion on selected topics in human physiology. (SU grading only.)

499P. Research (1-6) I, II, III, IV. Reinick and staff
Prerequisite: medical students with consent of instructor. Laboratory investigation on selected topics. (SU grading only.)

Internal Medicine

Upper Division Courses

192. Internship in Internal Medicine (1-12) I, II, III, IV. The Staff
Internship—3-36 hours; final report. Prerequisite: upper division standing. Supervised work experience in internal medicine and related fields. (PAP 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. (PAP grading only)

Graduate Courses

255. Introduction to Clinical Research Design and Epidemiology (3) I. Schenker, Hirsch, Facovsky, Division of General Medicine
Lecture—1 hour; discussion—2 hours. Prerequisite: open to clinicians and those interested in gerontological and epidemiological research. Post-graduate standing; consent of instructor; introductory statistics

298. Group Study (1-5) I, II, III, IV. The Staff (Reinick in charge)
Prerequisite: consent of instructor. For graduate students desiring to explore particular topics in depth: Lectures and conferences may be involved.

299. Research (1-2) I, II, III, IV. The Staff (Reinick in charge)
Prerequisite: consent of instructor. (SU grading only)

Professional Courses

400. Human Physiology (6) II, Curry, Reinick, and staff
Lecture—6 hours; laboratory—6 hours. Prerequisite: consent by Committee on Student Evaluation and Promotion. General, cellular and systemic physiology of human cardiovascular, respiratory, gastrointestinal and urinary systems.

403. Neurobiology (5) V. Vijayan
Lecture—4 hours; laboratory—3 hours. Prerequisite: approval by Committee on Student Evaluation and Promotion. Physiology and anatomy of the normal human nervous system in an integrated format. Focus on gross and microscopic brain structure, functional neuroanatomy, and the physiology, biochemistry, and pharmacology of various systems, course code as Cell Biology and Human Anatomy 432.

418. Mammalian Endocrinology and Homeostasis (4.5) III. Walsh and staff
Lecture—4 hours; discussion—1 hour; student presentation. Prerequisite: approval by Committee on Student Evaluation and Promotion. Physiological and biochemical properties of the mammalian endocrine system both at the cellular and systemic level. Principles of regulation of homeostasis, especially in organ interrelationships, metabolites, and minerals. Reproductive endocrinology. (Same course as Biological Chemistry 418.)

450. Pulmonary Function Evaluation (4) I, II, III, Cross
Lecture—4 hours; laboratory—3 hours. Prerequisite: course 400 or the equivalent; consent of instructor. Clinical laboratory, physiological evaluations of pulmonary function. (Same course as 286.)

497T. Tutoring In Human Physiology (1-05) I, II, III, IV. Reinick
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.)

488. Directed Reading and Group Study (4-1) I, II, III, IV. Ferguson and staff
Discussion—2-8 hours. Prerequisite: medical student. Directed reading and discussion on selected topics in human physiology. (SU grading only.)

499P. Research (1-6) I, II, III, IV. Reinick and staff
Prerequisite: medical students with consent of instructor. Laboratory investigation on selected topics. (SU grading only.)

420A. Hematology (4) I. Weilborn
Lecture—4 hours for five weeks; laboratory—6 hours; discussion—2 hours. Prerequisite: approval by Committee on Student Evaluation and Promotion. Topica include normal hematopoiesis and basic dis- orders of blood cells, cell morphology, transfusion therapy, immunoglobulin disorders, and hemostasis. Laboratory exercises cover normal and abnormal blood cells and the interpretation of common laboratory tests and results in hematological pathology.

420B. Gastrointestinal System (3.5) III. Lawson, Zeldis
Lecture/discussion—38 hours (over a 4-week period). Prerequisite: consent by Committee on Student Evaluation and Promotion. Basic pathophysiologic principles of digestive diseases on which clinical concepts and judgments can be developed. Emphasis on pathophysiologic basis of gastrointestinal and liver disease, with case discussions and sympotms presented to exemplify basic principles.

420C. Respiratory System (4) III. Lillington
Lecture—38 hours; discussion—10 hours (48 total hours). Prerequisite: post-graduate standing; consent of instructor; introductory statistics

and small group case discussions of respiratory pathophysiology. Includes review of certain clinical aspects of respiratory anatomy, physiology and pathology; introduction to principles of respiratory physiology; and description of the major respiratory diseases.

420D. Cardiovascular System (3.5) III. Laslett and staff
Lecture—36 hours; discussion—8 hours (36 total hours). Prerequisite: medical student and content of Committee on Student Evaluation and Promotion; or graduate student and Animal Physiology 118, Human Physiology 200, or the equivalent, and consent of instructor. Introduction to principles of epi- tology, mechanisms, diagnosis and management of the major diseases of the cardiovascular system, including ischemic, valvular, hypertensive, cardiomyopath- ic, valvular, and electrical disorders. Lectures and small group discussions are employed.

420E. Nephrology (3.5) III. Gulyassy
Lecture—18 hours total; discussion—12 hours total; laboratory—2 hours total (32 hours total over a 4-week period). Prerequisite: approval by Committee on Student Evaluation and Promotion. Basic understanding of pathophysiological processes in organs and tissues primarily involved in metabolic regulation and sufficient fact base so that clinical and laboratory findings, diagnosis, and elementary management of patients with endocrinologic disorders can be rationalized.

421. Principles of Epidemiology, Occupational Medicine, and Geriatrics (2.5) I. Schenker, Schwab
Lecture—7.5 hours for 4 weeks; discussion—1.5 hours. Prerequisite: approval by Committee on Student Evaluation and Promotion. Fundamentals of epidemiology and occupational study design, including measures of morbidity, mortality, and risk. Occupational medicine component covers the evaluation of occupational illness, and specific examples of occupational diseases. Geriatrics component covers the comprehensive geriatric assessment, treatment issues, and the long-term care system. (Same course as Community Health 421.)

440. Ambulatory Medicine Clerkship (8 or 12) I, II, III, Ferguson and staff
Clinical activity—full time (4 or 8 weeks). Prerequisite: third-year medicine clerkship. Four- or eight-week ambulatory medicine experience in an internal medicine setting. Acquire skills in evaluation and develop a treatment plan for patients with common medical problems seen by primary care physicians in the outpatient setting.

461. Problems in Internal Medicine (6 or 8) I, II, III, IV. Weing
Clinical activity—full time (4 or 6 weeks). Prerequisite: satisfactory completion of third year of medical school; consent of instructor. Study of patients hospitalized on Medical Service. Experience in Internal Medicine at Woodland Clinic and Hospital. Daily rounds, morning with instructor, Monday through Thursday; afternoon’s patient discussions. Teaching conferences and combined radiology-pathology medicine seminars. Weekly allied specialty conferences.

462. Externship in Medicine (1-2) I, II, III, IV. Ferguson and staff
Externship—full time (4, 8, or 12 weeks). Prerequisite: Medical Sciences 431; demonstrated ability to accept responsibility; consent of instructor. Student assumes role of acting intern and will be primary physician in medical care of patients under the direction of medical resident and staff. Responsibility for patients admitted to acting intern and take call every fourth night. Also taken at Children’s S.F. Hospital. Limited enrollment.

*Course not offered this academic year.
463. Acting Internship in Medicine Intensive Care Unit (MICU) (6) I, II, III, IV. Albertson Clinical activity—full time. Prerequisite: Completion of third year in medical school; consent of Director of MICU, UCD Medical Center, student must be acting intern on MICU service under direction of medical resident and staff. Responsibility for patients admitted to MICU. On call in hospital every third night for limited enrollment.

465. Internal Medicine and Subspecialties in Outpatient Clinic—VA Outpatient Clinic (6-18) I, II, III, IV. Guercu and staff Clinical activity—full time (5 to 12 weeks); includes clinical experience. Prerequisite: completion of third year of Medical School. Participation with members of specialty (Internal Medicine) and subspecialty (cardiology, gastroenterology, endocrinology, pulmonary and immunology/ Allergy) in the clinical evaluation, work-up, management and follow-up of patients in outpatient clinical setting. Limited enrollment.

469. Group Study in Internal Medicine (1-18) I, II, III, IV. The Staff (Silva in charge) Prerequisite: consent of instructor. Special study for medical students which may involve laboratory or library research, ambulatory or inpatient care responsibilities on campus, at UCD Medical Center, or off campus by specific arrangement. (S/U grading only.)

Internal Medicine—Cardiology

Upper Division Course
192. Internship in Cardiology (1-12) I, II, III, IV. Longhurst and staff Internship—3-36 hours; final report. Prerequisite: upper division standing; approval of project by preceptor prior to internship. Supervised work experience in cardiology. May be repeated for credit up to 12 units. (P/NP grading only.)

Graduate Course
220. Basic Science in Cardiology (1) I. Kaufman Lecture—1 hour, Prerequisite: graduate or medical student status. Fundamentals underlying cardiovascular medicine. Including hemodynamics, neural control of the circulation, biochemistry and some experimental design and statistics. Experts in each of these fields will give current information in their areas. Offered in alternate years. (S/U grading only.)

Professional Courses
401. Clinical Cardiology Clerkship: Kaiser (3-18) I, II, III, IV. The Staff Clinical activity—4 weeks; 8-12 hours per week (hospital); 1-5 hours (clinics). Prerequisite: third and fourth year medical students with advance approval by Division of Cardiology. Emphasis placed on history taking and physical examination of pediatric and adult patients with congestive and acquired cardiovascular disease. Hospital rounds in C&V and elsewhere. The roles of ECG, PCG, and cardiac fluoroscopy, etc., in office cardiology will be evaluated. May be repeated for credit. Limited enrollment.

402. Cardiology Clinical Clerkship: Consult Service (3-18) I, II, III, IV. The Staff Clinical activity—8-12 hours outpatient service—full time (40 hours for 4 weeks). Prerequisite: third and fourth year medical students with advance approval by Division of Cardiology. Participation with members of subspecialty consultation service in initial clinical evaluation, work-up, management, and follow-up of patients with cardiological disorders. May be repeated for credit. Limited enrollment.

410. Management of Coronary Artery Disease: Cardiac Catheterization (inpatient and outpatient service)—full time (4 weeks). Prerequisite: completion of second year of medical school and advance approval by Division of Cardiology. Participation 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 medical approach to therapy, both medical and surgical, based on pathophysiologic mechanisms. May be repeated for credit. Limited enrollment.

463. Cardiology Clinical Clerkship: Martinez VA Hospital (3-18) I, II, III, IV. Lecture—12-25 hours; discussion—6 hours; seminar—2 hours; clinical consultation—20-25 hours. Prerequisite: third and fourth year medical students with advance approval by Division of Cardiology. Martinez VA Hospital, and consent of instructor. Clinical evaluations in cardiology under supervision of a medical resident and attending physician. Active participation in seminars and conferences. Limited enrollment.

464. Preventive Cardiology (8) I, II, III, IV. Amsterdam Seminar—4 weeks (4 weeks); clinical activity—full time (4 weeks). Prerequisite: completion of third year of medical school. Clinical experience, weekly seminars 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.

466. Insights in Cardiology (1-3) I, II, III, IV. The Staff Clinical activity—4-5 weeks. Prerequisite: medical student in good academic standing and approval by Division of Cardiology. Students attend one or more cardiovascular medicine clinics: general hyper tension, arrhythmias, introduction to the diagnosis/treatment of common cardiovascular problems. (S/U grading only.)

468. Special Group Study: EKG Unit (1-12) I, II, III, IV. The Staff (Chairperson in charge) Special study—1-8 weeks. Prerequisite: medical students with advance approval by monthly attending staff. Special group study in cardiology for medical students in EKG unit. May include lectures, directed reading, and/or discussion. May be repeated for credit. (S/U grading only.)

499. Research (1-12) I, II, III, IV. The Staff Prerequisite: approval by Division of Cardiology. (S/U grading only.)

Internal Medicine—Clinical Nutrition and Metabolism

Upper Division Course
192. Internship in Clinical Nutrition (1-12) I, II, III, IV. Halsted, Phinney, and staff Internship—3-36 hours; final report. Prerequisite: upper division standing; approval of project by preceptor prior to internship. Supervised work experience in nutrition. May be repeated for credit up to 12 units. (P/NP grading only.)

Graduate Course
290C. Clinical Nutrition Research Conference (1) I, II, III, Halsted, Phinney, Meredith, Davis Seminar—1 hour. Weekly seminar presented by a graduate student, taking the form of research completed or in progress, topic review or journal review from current journal. (S/U grading only.)

Professional Courses
461. Clinical Nutrition Clerkship (3-18) I, II, III. Halsted, Phinney, and staff Lecture—2 hours; clinical activity—full time (2 to 12 weeks), in-depth experience in assessment and monitoring of malnourished patients at UCD Medical Center whose illnesses are complicated by malnutrition, and of patients attending the Nutrition Clinic with problems in undernutrition due to various illness. (S/U grading only.)

466. Insights in Clinical Nutrition (1-3) I, II, III, IV. Halsted, Phinney, and staff Clinical activity—3-4 hours. Prerequisite: student in good standing; consent of instructor. Students will attend weekly clinical nutrition consultation rounds (4 evenings) and Nutrition Clinic (1 day). Introduction to diagnosis and treatment of common nutritional problems. (S/U grading only.)

489. Research in Nutrition (3-18) I, II, III, IV. Halsted, Phinney, Davis Prerequisite: medical student in good standing; consent of instructor. Participation in on-going clinical or basic nutrition research. Student may devise own project depending upon time commitments.

Internal Medicine—Emergency Medicine

Upper Division Course
192. Internship in Emergency Medicine (1-12) I, II, III, IV. Derlet and staff Internship—3-36 hours; final report. Prerequisite: upper division standing; approval of project by preceptor prior to internship. Supervised work experience in emergency medicine. May be repeated for credit up to 12 units. (P/NP grading only.)

Professional Courses
460. Emergency Medicine Clerkship (3-18) I, II, III, IV. Derlet and staff Clinical activity—full time (2 to 4 weeks). Prerequisite: third or fourth year medical student; satisfactory completion of an Emergency Medicine Clerkship or Emergency Medicine clerkship; consent of Instructor. Clinical work at UCD Medical Center or other area hospitals' emergency departments will be supervised by didactic sessions. Students will be assigned appropriate emergency patients and will examine diseases and treat those patients.

485. Acting Internship in Emergency Medicine (6-12) I, II, III, IV. Derlet Clinical activity—full time (4 to 8 weeks). Prerequisite: satisfactory completion of course 460. Acting internship provides clinical experience in emergency medicine. Students are assigned to the regular Emergency Department intern schedule and under the supervision of the faculty, and evaluated. Emergency Room (ER) patients with responsibility assigned to an intern.

499. Research (1-12) I, II, III, IV. Derlet Laboratory—40 hours; research—full time (4 to 12 weeks). Prerequisite: consent of instructor. Elective where topics may be selected in either basic or clinical research areas of emergency and/or Critical Care Medicine. The goals will be tailored to each individual student. Enrollment requires prior discussion and consent of instructor.

Internal Medicine—Endocrinology and Metabolism

Upper Division Course
192. Internship in Endocrinology (1-12) I, II, III, IV. Walter and staff Internship—3-36 hours; final report. Prerequisite: upper division standing; approval of project by preceptor prior to internship. Supervised work experience in endocrinology. May be repeated for credit up to 12 units. (P/NP grading only.)

Graduate Course
299. Research (1-12) I, II, III, IV. The Staff (Water in charge) Prerequisite: consent of instructor. Endocrinology research. (S/U grading only.)

Professional Courses
460. Endocrinology Clerkship (3-18) I, II, III, IV. Walter and staff Clinical activity (inpatient-outpatient service)—full time (3 days per week). Prerequisite: Medical Sciences 451 and/or consent of instructor. Participation with members of subspecialty service in the initial evaluation, work-up, management and follow-up of patients with endocrinologic disorders. Both inpatient and outpatient experience. Limited enrollment.

465. Endocrinology Clinical Clerkship (9-18) I, II, III, IV. Villar Lecture/descussion/seminar; clinical consultation—20-25 hours. Prerequisite: fourth-year medical student; consent of instructor. Clinical consultations in endocrinology at Martinez VA Hospital under
supervision of medical resident and attending physician. Participation in seminars and conferences.

480. Insights in Endocrinology (1-3) I, II, III, IV, and V. 

Clinical activity—3-9 hours; oral presentation. Prerequisite: student in good academic standing and consent of instructor. First- or second-year students observe in morning Endocrine and Diabetes clinic and in medical and bariatric afternoon endocrine conferences. They also give brief endocrine physiology oral presentation to the endocrine group. (SU grading only.)

495. Research (1-12) I, II, III, IV. The Staff (Walter in charge). Prerequisite: consent of instructor.

Internal Medicine—Gastroenterology

Upper Division Course 192. Internship in Gastroenterology (1-12) I, II, III, IV. Trudea and staff.

Internship—3-38 hours; final report. Prerequisite: upper division standing; approval of project by preceptor prior to Internship. Supervised work experience in gastroenterology. May be repeated for credit up to 12 units. (P/NP grading only)

Graduate Course 250. Frontiers in Basic Gastrointestinal and Liver Research (1-15) I, II, III, IV. Tsais/Polkouloos Discussion—1 hour a week; seminar—2 hours a month. Prerequisite: students must be first or second year medical students, graduate students, postgraduate fellows, or resident trainees. Continuing education in basic science areas (biochemistry, molecular biology, physiology, pharmacology) and their applications to clinical gastroenterology and hepatology. Current literature review describing major advances in basic science areas stressing their importance and applications to medical diagnosis and treatment. Held at VA Martinez Medical Center. (SU grading only)

Professional Courses 460. Clinical Clerkship (3-16) I, II, III, IV. Pimstone and staff.


462. Gastroenterology Clinical Clerkship (1-16) I, II, III, IV. Clinical activity (inpatient/outpatient service). Prerequisite: successful completion of third year and consent of instructor. Participation with members of subspecialty service, basic care, and g.i. C.G. grand rounds. (SU grading only)

499. Research (1-12) I, II, III, IV. Pimstone, Trudea, Zeldis, Prindiville Clinical activity: varied. Prerequisite: medical student status; consent of instructor. Parttime participation in active clinical and basic research projects. Some will involve both patient care and relevant laboratory procedures. Basic research includes liver metabolism, cancer markers, porphyria diet and cancer, folate metabolism. (SU grading only)

Internal Medicine—General Medicine

Upper Division Course 192. Internship in General Medicine (1-12) I, II, III, IV. J. Robbins and staff.

Internship—3-38 hours; final report. Prerequisite: upper division standing; approval of project by preceptor prior to Internship. Supervised work experience in general medicine. May be repeated for credit up to 12 units. (P/NP grading only)

Professional Courses 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 permission of instructor. This course familiarizes students with the diagnosis and treatment of individuals infected with the human immunodeficiency virus. Students will interview patients, observe patient care and participate in ongoing clinical research as well as examine alternative lifestyle styles. May be repeated for credit. (SU grading only)

450. Physicians in the Nuclear Age (1) I. Flynn: Lecture—1 hour; discussion—1 hour. Prerequisite: medical student in good standing, or consent of instructor. Examine actual and potential physical, medical, psychosocial, epidemiological, and economic consequences of nuclear weapons and nuclear war. (SU grading only) Offered in alternate years.

460. General Medicine Consults (1-18) I, II, III, IV. The Staff (Division Chief in charge) Clinical activity (inpatient service)—40 hours. Prerequisite: fourth-year medical student with consent of instructor; a general medicine clerkship. Supervised opportunity to see entire spectrum of medical problems encountered by a general internist. Student spends time in General Medicine Clinic and on the General Medicine Consult Service. Consultation Service is particularly concerned with medical evaluation of surgical patients. Limited enrollment.

471. Clinic of AIDS and Related Disorders (2) I, II, III, IV. Flynn Clinical activity—30 hours; discussion—10 hours. Prerequisite: first and fourth year medical students in good academic standing and permission of instructor. Students will participate in patient care, including patient examination and the diagnosis and treatment of patients with acquired immune deficiency syndrome and AIDS related complex. Students will participate in intensive ambulatory care medicine as well as clinic research. May be repeated for credit. (SU grading only)

499. General Medicine Research (1-16) I, II, III, IV. The Staff Discussion—3 hours; clinical research—6-40 hours. Prerequisite: consent of instructor. The student will be involved in a clinical research project 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

Upper Division Course 199. Research in Hematology-Oncology (1-5) I, II, III, IV. MacKenzie and staff Laboratory—hours variable. Prerequisite: upper division standing and consent of instructor. Experience in laboratory research. (P/NP grading only)

Graduate Courses 298. Topics in Hematology (1-4) I, II, III, IV. The Staff (Lewis in charge) Prerequisite: one year of graduate work and/or consent of instructor. Basic and clinical studies in the hematopoietic organ, the pathophysiology of hematopoietic disease, and concepts of therapeutic will be offered for study. The specific topics to be dictated by the interest and background of the students.

299. Research (1-12) I, II, III, IV. The Staff (Lewis in charge) Prerequisite: consent of instructor. Laboratory investigation contributing to the dissertation for a graduate degree. (SU grading only)

*Course not offered this academic year.

Professional Courses 460. Hematology-Oncology Clinical Clerkship (6-18) I, II, III, IV. J.P. Lewis and staff Clinical activity (inpatient-outpatient service)—40 hours. Prerequisite: Medical Sciences 431 and/or consent of instructor. Participation with members of the subspecialty service in the initial clinical evaluation, work-up, management and follow-up of patients with hematologic or oncologic disorders. May be repeated for credit. Limited enrollment.

461. Ambulatory and Consult Clerkship (6-12) I, II, III, IV. Lewis and staff Clinical activity—full time (4 to 8 weeks). Prerequisite: fourth-year medical student in good academic standing. Outpatient rotations include general hematopathology clinics, hemophilia clinic, stoke cell clinic, and two medical wards, outpatient clinic, students will work on inpatient hematolgy and oncology consult service, the bone marrow service, and will attend all conferences sponsored by the Division.

462. Hematology-Oncology Clinical Clerkship (6-18) I, II, III, IV. Gandara, Lawrence and staff Clinical activity (inpatient-outpatient service)—40 hours. Prerequisite: Medical Sciences 431 and/or consent of instructor. Participation in the Hematology-Oncology rotation at Martinez VA Hospital, with emphasis on evaluating new patients, reading bone marrow, and administering chemotherapy. Weekly tutorial sessions will be held that will present a comprehensive review of one topic. May be repeated for credit. Limited enrollment.

490. Practicum in Care for the Terminally Ill (6) I, II, III, IV. Meyers Discussion—3 hours; seminar—2 hours; hospice clinical activity—6 hours (4 weeks duration) written report. Prerequisite: fourth-year medical student and an interview with program Medical Director. UCD Medical Center Sacramento Continuing Care Program provides supportive services to patients with terminal illness. Emphasis on outpatient care and home care. This elective provides experience in symptom-relief, psychosocial care and bereavement counseling. Written report will be major component used in grading. (SU grading only)

499. Research (1-12) I, II, III, IV. The Staff (Lewis in charge) Prerequisite: consent of instructor. (SU grading only)

Internal Medicine—Infectious Diseases

Upper Division Courses 192. Research Internship in Internal Medicine (1-12) I, II, III, IV. Goldstein and staff Internship—3-38 hours; full time or half time. Supervised work experience in the division of infectious diseases. Undergraduates will have an opportunity to acquire research experience in clinical settings. May be repeated for credit up to 12 units. (P/NP grading only)

199. Infectious Diseases Research (1-5) I, II, III, IV. The Staff (Goldstein in charge) Prerequisite: chemistry through organic chemistry (in addition, physical and biochemistry preferred), biology through basic biochemistry, microbiology and Immunology preferred; and consent of instructor. Discrete problem requiring reading and actual manual effort in solution will be assigned to each student. Progress and results will be reviewed at intervals with instructor and via seminar presentation. (P/NP grading only)

Graduate Courses 250. Small Computers in Medical Research (3). Donovan Lecture—2 hours; laboratory—3 hours. Prerequisite: consent of instructor. This course will introduce the student to the theoretical principles and practical aspects of smaller and microcomputer applications in medical research.

299. Research in Infectious Diseases (1-12) I, II, III, IV. The Staff (Goldstein in charge) Prerequisite: consent of instructor. Laboratory investi-
gation contributing to the dissertation for a graduate degree. (SU grading only)

Professional Courses
400. Infectious Diseases Clinic (4.5-6) I, II, III, IV
Goldstein and staff
Clinical activity—full time (3 to 4 weeks). Ambulatory patient care training. Prerequisite: Medical Sciences 431. Selected outpatients at UC Davis Medical Center with chronic respiratory or urinary tract infections will be worked up and followed.

460. Infectious Diseases Clinical Clerkship (6-18) I, II, III, IV
Goldstein
Clinical activity—full time (4-12 weeks). Prerequisite: successful completion of two years of study in an accredited medical school. In addition to seeing patients with infectious diseases regarding whose consultation has been requested, students will have laboratory experience in clinical microbiology. Students will also attend and participate in infectious diseases conferences and rounds. Limited enrollment with priority to third-year medical students.

465. Clinical Clerkship (3-18) I, II, III, IV, McCabe
Lecture—1 hour, discussion—10 hours, laboratory—variable; clinical activity—full time (2 to 12 weeks). Prerequisite: completion of clerkship. Students will do clinical consultations in Infectious Diseases under supervision of a fellow in infectious diseases and attending physician. Students will participate actively in conferences and attending rounds with optional participation in the diagnostic laboratory.

480. Insights in Infectious Diseases (1-3) I, II, III, IV
Goldstein
Clinical activity—3-9 hours. Prerequisite: student in good academic standing and consent of instructor. Student will attend infectious diseases consult rounds and also have opportunity to observe outpatient infectious disease practice and clinically related research. Introduction to diagnosis and treatment of patients in Infectious Diseases. (SU grading only)

490. Seminar in Infectious and Immunologic Diseases (2) I, II, III, IV
Goldstein and staff
Seminar—2 hours; library research. Prerequisite: Medical Sciences 431. Epidemiology, diagnosis and management of the more important infectious and immunologic diseases will be considered. Wherever possible, actual patients (UCDC Medical Center) will be used to demonstrate evaluation of individual cases. (SU grading only). Limited enrollment. (May enroll for two consecutive quarters.)

499. Research Topics in Infectious Disease (2-12) I, II, III, IV
Goldstein
Prerequisite: successful completion of the first year of study in School of Medicine, graduate students (approved for graduate credit), and/or consent of instructor. Discrete problem requiring reading and actual manual effort in solution will be assigned to each student. Progress and results to be reviewed at intervals with instructor and via seminar presentation. (SU grading only)

Internal Medicine—Nephrology

Upper Division Course
192. Internship in Nephrology (1-12) I, II, III, IV
Gulyas and staff
Internship—3-36 hours; final report. Prerequisite: upper division standing; approval of project by preceptor prior to internship. Supervised work experience in nephrology and consultation staff. Also includes pulmonary function, test interpretation, outpatient assignments in outpatient clinic and preparation and presentation of material at weekly conferences.

452. Pulmonary Clinical Clerkship (3-12) I, II, III, IV
Krupke and staff
Clinical activity—full time. Prerequisite: completion of second year of medical school and consent of instructor. Participation at the Martinez VA Hospital with members of the subspecialty service in initial clinical evaluation work-up and follow-up of patients with pulmonary diseases. Includes experience in Pulmonary Function Laboratory, Respiratory Care Unit, and pulmonary diagnostic processes. Limited enrollment.

480. Pulmonary-Critical Care Medicine Insights (1-3) I, II, III, IV
Albertson
Clinical activity—3-9 hours. Prerequisite: student in good academic standing and consent of instructor. Students will attend respiratory outpatient clinics and in-patient pulmonary consultation rounds and medical intensive care rounds. Introduction to diagnosis and treatment of common pulmonary problems. (SU grading only)

489. Research (1-12) I, II, III, IV
The Staff (Cross in charge)
Prerequisite: consent of instructor. (SU grading only)

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 and clinical activities in occupational and environmental medicine which include conferences, occupational and environmental medicine clinics, clinical activities and field visits. Students develop and present small individual research projects. (SU grading only)

499. Research (1-12) I, II, III, IV, Schenker and staff
Laboratory—40 hours; clinical activity—4 of 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.

Internal Medicine—Pulmonary Medicine

Upper Division Course
192. Internship in Pulmonary Medicine (1-12) I, II, III, IV
Goldstein and staff
Internship—3-36 hours; final report. Prerequisite: upper division standing; approval of project by preceptor prior to internship. Supervised work experience in pulmonary medicine. May be repeated for credit up to 12 units. (PnP grading only)

Graduate Course
210. Grant and Scientific Paper Writing (1) I, II, III, IV
Last
Discussion—2 hours. Basics of scientific writing for grants and papers. Each student will present a grant or paper for critique and tutorial feedback.

Professional Courses
460. Pulmonary Clinical Clerkship (3-12) I, II, III, IV
Albertson and staff
Clinical activity—full time (2 to 12 weeks). Prerequisite: Medical Sciences 431. At UCD Medical Center participating and rounding with Pulmonary fellows and consultation staff. Also includes pulmonary function test interpretation, outpatient assignments in outpatient clinic and preparation and presentation of material at weekly conferences.

462. Pulmonary Clinical Clerkship (3-12) I, II, III, IV
Krupke and staff
Clinical activity—full time. Prerequisite: completion of second year of medical school and consent of instructor. Participation at the Martinez VA Hospital with members of the subspecialty service in initial clinical evaluation work-up and follow-up of patients with pulmonary diseases. Includes experience in Pulmonary Function Laboratory, Respiratory Care Unit, and pulmonary diagnostic processes. Limited enrollment.

480. Pulmonary-Critical Care Medicine Insights (1-3) I, II, III, IV
Albertson
Clinical activity—3-9 hours. Prerequisite: student in good academic standing and consent of instructor. Students will attend respiratory outpatient clinics and in-patient pulmonary consultation rounds and medical intensive care rounds. Introduction to diagnosis and treatment of common pulmonary problems. (SU grading only)

489. Research (1-12) I, II, III, IV
The Staff (Cross in charge)
Prerequisite: consent of instructor. (SU grading only)

Internal Medicine—Rheumatology-Allergy

Lower Division Course
99. Directed Research in Immunology (1-5) I, II, III, IV
Gershwin
Laboratory—1-4 hours. Prerequisite: consent of instructor. Independent research will be encouraged in basic immunology, including the role of the cellular immune system in oncogenesis. (PnP grading only)

*Course not offered this academic year.
Upper Division Courses

192. Internship in Rheumatology-Allergy (1-12) I, II, III. Directed internship—3-36 hours; final report. Prerequisite: upper division standing; approval of project by preceptor prior to internship. Supervised work experience in the field of rheumatology and allergy. May be repeated for credit up to 12 units. (P/NP grading only.)

199. Directed Research in Immunology (1-5) I, II, III, IV. Gershwin Laboratory—1-5 hours. 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) I. 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 infections, genetics, transplantation, allergy and autoimmunity. Offered in alternate years. (SU grading only.)

298. Topics in Rheumatology and Clinical Immunology (1-5) I, II, III, IV. Gershwin Laboratory—1-12 hours. Prerequisite: consent of instructor. Independent research will be encouraged in both animal models of human disease (including congenital 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. Rheumatology Clinical Clerkship (1-18) I, II, III, IV. Leek and staff Clinical activity (inpatient-outpatient service)—full time. Prerequisite: Medical Sciences 431 and consent of instructor. Participation with members of the subspecialty service in the diagnosis and therapeutic management of patients with rheumatologic diseases. (SU grading only.)

461. Allergy Clinical Clerkship (3-18) I, II, III, IV. Gershwin and staff Clinical activity (inpatient-outpatient service)—full time (2 to 12 weeks). Prerequisite: completion of second year of medical education. Student will work with practicing allergist in daily work with patients and participate in weekly allergy clinic and teaching conferences. Study of the literature will identify patients with problems in clinical immunology, immunodeficiency, asthma, allergic rhinitis.

480. Insights in Rheumatology (1-3) I, II, III, IV. Leek Clinical activity—3-9 hours. Prerequisite: student in good academic standing and consent of instructor. Participation in rheumatology consultation rounds, rheumatoid disease clinics and conferences with supervised readings in rheumatology. (SU grading only.)

495. Research (1-12) I, II, III, IV. The Staff (Gershwin in charge) Prerequisite: medical student with consent of instructor. Part-time participation in active clinical and basic research projects which can involve both patient care and relevant laboratory procedures. Students can gain experience in clinical medicine and clinical investigation. (SU grading only.)

Medical Microbiology

Upper Division Courses

107. Chemical and Cellular Immunology (4) II. Schiessler Lecture—4 hours. Prerequisite: Biochemistry 101A, 101B or consent of instructor. Chemical and cellular basis of immunity; structure-function relationship of antigens, antibodies and their interactions; molecular basis of antibody diversity; cellular basis of immunity; immunohemical and cellular aspects of hyperactivity; immunogenetics and regulation of the immune response. (Same course as 407.)

115. Ecological Parasitology (2) II. Thesi Lecture—12 hours. Course will be devoted to the study of parasites' influence on environmental factors that affect the development and spread of parasitic agents.

118. Parasitology for Wildlife Biologists (2) III. Thesi Lecture—8 hours. Prerequisite: upper division standing in wildlife biology or biological sciences or ecology. Emphasis on the role diseases and parasites play in wildlife dynamics. Lectures on techniques of collection, preservation and methods of surveying wildlife for parasites and the pathogenesis, ecology and zoonotic potential of parasites encountered by wildlife biologists.

130. Medical Mycology (2) II. Pappagianis Lecture—6 hours. Prerequisite: a course in pathogenic microbiology; consent of instructor. Various aspects of pathogenic fungi, particularly affecting humans, will be discussed including epidemiology, pathogenesis and pathology, diagnosis and therapy. Offered in even numbered years. (SU grading only.)

192. Internship in Medical Microbiology (1-12) I, II, III, IV. The Staff (Beaman in charge) Internship—3-36 hours; final report. Prerequisite: upper division standing; approval of project prior to internship. Directed reading and discussion and/or laboratory investigation on selected topics. (P/NP grading only.)

198. Group Study in Medical Microbiology (1-5) I, II, III, IV. The Staff (Beaman in charge) Hours to be arranged. Prerequisite: upper division standing and consent of instructor. Individual research. (P/NP grading only.)

Graduate Courses

209. Frontiers in Immunology (2) I, II, III. Schiessler Discussion—3 hours; final report. Prerequisite: consent of instructor. Current developments in various aspects of immunology and their interrelationships. (SU grading only.)

215. Medical Parasitology (5) I. Thesi Lecture—8 hours. Prerequisite: upper division standing. Consent of instructor. Directed reading and discussion and/or laboratory investigation on selected topics. (SU grading only.)

298. Research in Medical Microbiology (1-15) I, II, III, IV. The Staff (Beaman in charge) Prerequisite: upper division standing and consent of instructor. Individual research. (SU grading only.)

299. Research (1-12) I, II, III, IV. The Staff (Beaman in charge) Prerequisite: medical student with consent of instructor. Directed reading and discussion and/or laboratory investigation on selected topics. (SU grading only.)

409. Frontiers in Immunology (2) I, II, III, IV. Discussion—2 hours. Prerequisite: consent of instructor. Current developments in various aspects of immunology and their interrelationships. (Same course as 209.)

411. Tissue Typing (1-4) I, II, III, IV. Chang Individualized instruction, discussion—1-3 hours and laboratory—3-4 hours. Prerequisite: course in immunology; consent of instructor. Principles and techniques of tissue typing and hemocompatibility. Offered in alternate years. (SU grading only.)

415. Medical Parasitology (5) I. Thesi Lecture—5 hours; laboratory—6 hours. Prerequisite: medical student with consent of instructor. Approved for graduate degree credit. Epidemiological, pathogenesis, diagnostic methods and laboratory studies of protozoa, helminths and arthropods of medical importance. Offered in alternate years. (SU grading only.)

430. Medical Mycology (2) II. Pappagianis Lecture—6 hours. Prerequisite: a course in pathogenic microbiology; consent of instructor. Various aspects of pathogenic fungi, particularly affecting humans, will be discussed including epidemiology, pathogenesis and pathology, diagnosis and therapy. Offered in alternate years. (Same course as 215.)

490A. Medical Immunology (2.5) II. Benjamini Lecture—7 hours (four weeks only). Prerequisite: approval by Committee on Student Evaluation and Promotion. Prerequisite: consent of instructor. Directed reading and discussion and/or laboratory investigation on selected topics. (SU grading only.)

490B. Pathogenic Microbiology (2.5) I. Beaman Lecture—7 hours for 9 weeks; laboratory—20 hours per quarter. Prerequisite: approval by Committee on Student Evaluation and Promotion. The biology of pathogenic microorganisms with emphasis on their role in human disease.

497T. Tutoring in Medical Microbiology (1-5) I, II, III, IV. Beaman and staff Tutoring—3-15 hours. Prerequisite: appropriate preparation in subject matter and consent of instructor. Assist instructor by tutoring medical students in one of the departmental courses that is a component of the required curriculum of the School of Medicine. (SU grading only.)

498. Group Study in Medical Microbiology and Immunology (1-5) I, II, III, IV. The Staff (Beaman in charge) Prerequisite: medical students with consent of instructor. Directed reading and discussion and/or laboratory investigation on selected topics. (SU grading only.)

499. Research (1-12) I, II, III, IV. The Staff (Beaman in charge) Prerequisite: medical students with consent of instructor. Directed reading and discussion and/or laboratory investigation on selected topics. (SU grading only.)

Medical Pharmacology and Toxicology

Lower Division Courses

52. Internship in Pharmacology (1-12) I, II, III, IV. The Staff (Chairperson in charge) Internship—3-36 hours; final report. Prerequisite: lower division student with good academic standing; approval of project prior to period of internship.

*Course not offered this academic year.
Supervised work experience in pharmacology and related fields. (P/NP grading only)

199. 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

200. Pharmacology for Educators (2) I. E. K. Killam Lecture—2 hours. Prerequisite: consent of instructor. Survey of 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.

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)

Graduate Courses

200A. Advanced General Pharmacology (3) I. Hance and staff Lecture—3 hours. Prerequisite: upper division courses in biochemistry (101A-101B) and mammalian physiology (111A-111B and 112-113) or the equivalent. May be taken concurrently. Core course in human pharmacology designed for graduate and medical students. Principles in pharmacology, including pharmacokinetics and drug metabolism and actions, use and toxicity of the major classes of drugs.

200AL-200BL. Advanced General Pharmacology (1-1) I, II. Stark and staff Discussion—1 hour; laboratory—3 hours. Prerequisites: upper division courses in biochemistry (101A-101B) and mammalian physiology (111A-111B and 112-113) or the equivalent (may be taken concurrently). Laboratory in advanced pharmacology designed to follow subject-matter sequence of 200A-200B.

200B. Advanced General Pharmacology (4) II. Winters and staff Lecture—4 hours. Prerequisite: upper division courses in biochemistry (101A-101B) and mammalian physiology (111A-111B and 112-113) or the equivalent (may be taken concurrently). Core course in human pharmacology designed for graduate and medical students. Principles in pharmacology, including pharmacokinetics and drug metabolism and actions, use and toxicity of the major classes of drugs.

201. Pharmacology of the Nervous System I: Transmitter Substances (2) I. Hance 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 II: Hypnotics, Sedatives and Anesthetics (2) III. E. K. Killam 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 III: Stimulants and Antiepileptic Drugs (2) III. Stark Lecture—2 hours. Prerequisite: courses 200A-200B or 400A-400B, or the equivalent. Pharmacology of stimulant and convulsant agents, anticonvulsant agents, and their evaluation in animal models. Offered in alternate years.

204. Pharmacology of the Nervous System IV: Drug Alteration of Behavior (1-3) II. K. Killam Prerequisite: courses 200A-200B or 400A-400B, or the equivalent. Activity of drugs affecting mood and behavior; psychopharmacological agents, hallucinogens, and antidepressants. Offered in alternate years.

206. Pharmacokinetics (2) I. Henderson Lecture—2 hours. Prerequisite: courses 200A, 200B. Physicochemical and physiological factors affecting absorption, distribution, metabolism and excretion of drugs. Mathematical and graphical methods for determining pharmacokinetic values in experimental animals. Exercises designed to follow subject-matter sequence of courses 206. Offered in alternate years.

206L. Pharmacokinetics Laboratory (2) I. Henderson Laboratory—8 hours. Prerequisite: course 206 (may be taken concurrently). Laboratory procedures for determining pharmacokinetic values in experimental animals. Exercises designed to follow subject-matter sequence of courses 206. Offered in alternate years.

208. Application of Computers to Pharmacology (2) I, II, III, The Staff Lecture—1 hour. Prerequisite: consent of instructor. Presentation of basic concepts and problems.

210. Fundamentals of Pulmonary Toxicology and Pharmacology (2) II. Hollinger Lecture—2 hours. Prerequisite: consent of instructor. Major toxic effects of inhalation and systemic toxic effects of heavy metals and organic compounds in the lungs. Areas considered include: (1) basic lung structure and function, (2) respiratory and non-respiratory lung functions, (3) lung toxins and injury and (4) principal drugs used in respiratory disorders.

220. Statistical Approach to Pharmacological Research (2) III. Hance Lecture—2 hours. Prerequisite: course 200A or consent of instructor. Introduction to application of statistics in pharmacological research and therapeutics. Basic concepts of distributions, measures of location, dispersion and correlation, significance, probability, uncertainty, design of experiments.

297T. Tutoring in Pharmacology (1-3) I, II, III. The Staff (Chairperson in charge) Tutoring—3-9 hours. Prerequisite: courses 200A-200B and 200AL-200BL, or consent of instructor. Under supervision of the instructor, students assist in preparation and teaching of courses in Pharmacology (SU grading only).

296. Group Study (1-5) I, II, III, IV. The Staff (Chairperson in charge) Prerequisite: consent of instructor.

298. 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. Winters and staff Lecture—4 hours; discussion—2 hours. Prerequisite: consent of 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.

490. 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 (1-12) I, II, III, IV. Stark 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. Stark and staff 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

Lower Division Course

192. Individual Special Study and Research (1-4) I, II, III, IV. The Staff (Chairperson in charge) Prerequisite: consent of instructor. Individual special study in neurophysiology and biomedical engineering is offered to qualified students. Studies on psychophysics, single-unit electrophysiology and instrumentation are offered in Davis. (P/NP grading only)

Graduate Courses

201. Human Behavioral Neurobiology (2) I. Jagust, Robertson Lecture—discussion—2 hours. Prerequisite: Cell Biology and Human Anatomy 203; Psychology 130 or 136. Neurobiology of normal and abnormal behavior of humans, based on specific neurological, neurophysiological, and cognitive parameters. Evaluation of these parameters will be, for example, by application of clinical neurologic, neuropsychologic, and neuroimaging tests.

202. Visuomotor Neurobiology (2) II. Rael Seminar—2 hours. Prerequisite: Human Anatomy 201. An overview of neural mechanisms of visually guided behavior in humans will examine the integration of visual attention and eye movements. Performance of normal humans and neurologic patients in reflexive orienting, visual search, reading and reaching will be considered. Offered in alternate years.

260. Seminar in Selected Topics (1) I, II, III, IV. Scobey, Gorni Seminar—1 hour. Prerequisite: consent of instructor. Selected topics in Neuroscience will be offered (SU grading only).

295. Group Study (1-5) I, II, III, IV. The Staff (Chairperson in charge) Prerequisite: consent of instructor. For graduate students desiring to explore particular topics in depth. Lectures and conferences may be involved. (SU grading only)

298. Individual Special Study and Research (1-12) I, II, III, IV. Scobey Laboratory—3-36 hours. Prerequisite: consent of instructor. Individual special study and research in Neurophysiology and Biomedical engineering is offered at both Davis and Sacramento Medical Center. (SU grading only)

Professional Courses

420. Neuromuscular Pathophysiology (4) III. Remley and staff Lecture—6 hours; laboratory/discussion—5 hours (for four weeks total). Diagnosis and treatment of muscular disorders with consent by Committee on Student Evaluation and Promotion. Lectures and case discussions of pathophysiology underlying neurological disorders including disorders of motor unit, muscle, nerve, cerebral circulation, metabolism, myelin, cortical function, movement, cerebrospinal fluid, autonomic function and special senses. Animal basis of clinical testing, nervous system infection, neoplasia and trauma will be discussed.

Requisites and clinical activity—full time (4 weeks at Martinez VA Hospital). Prerequisite: fourth-year medical student. Emphasis on common neurological disorders encountered in practice.

452. Advanced Clinical Neurology (6) I, II, III, IV
Gabor and staff
Clinical activity—full time (4 weeks).
Prerequisite: completion of four-week Neurology selective and consent of instructor. Extension of basic Neurology clerkship. Designed for students with special interest in neurological disorders of nervous system. By arrangement with department, student may serve as an acting intern. Principles of neurological differential diagnosis and therapeutics emphasized.

Ramler and staff
Clinical activity—full time (4 weeks at Martinez VA Hospital). Prerequisite: completion of four-week Neurology selective and consent of instructor. Extension of basic Neurology clerkship. Designed for students with special interest in medical disorders of nervous system. By arrangement with department, student may serve as an acting intern. Principles of neurological differential diagnosis and therapeutics emphasized.

454. Electroencephalography and Evoked Potentials (18) I, II, III, IV, Gabor, Seval
Clinical activity—full time (12 weeks) technique and interpretation. Prerequisite: four-week Neurology clerkship and consent of instructor. Principles of EEG and evoked potentials including technical basis of electroencephalography and evoked potentials. Emphasis placed on how these studies are applied to neurological diagnosis.

455. Child Neurology (6) I, II, III, IV, Gasper
Clinical activity—full time (4 weeks). Prerequisite: satisfactory completion of Medical Sciences 431, 432A, and 432B and consent of instructor. Student exposure to children with disorders of the nervous system, both in inpatient and outpatient services. Cases presented to a member of full-time faculty who will discuss clinical findings, differential diagnosis, management and therapy. This course satisfies the fourth-year neuroscience requirement.

456. Cortical Neurology (3-18) I, II, III, IV, Ramler, Knight
Clinical neurosurgical research—full time (12 weeks at Martinez VA Hospital). Prerequisite: consent of instructor. Student will participate in clinical neurosurgical research on higher cortical functions. Focus on scientific analysis of behavior in disease states. Study may be arranged for from two weeks to twelve weeks, with units corresponding to length of course.

457. Special Topics in Neurology (18) I, II, III, IV, The Staff
Clinical activity—full time (12 weeks). Prerequisite: fourth-year medical student having completed four-week Neurology clerkship, 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 a clinical experience with member of staff.

458. Cognitive and Communication Disorders: Introduction to the Cognitive and Communication Disorders (3) I, Wertz
Lecture—3 hours; observations, individual projects. Prerequisite: consent of instructor. Introduction to cognitive and communication disorders. Basic pathophysiologic and clinical characteristics, and survey of disorders subsequent to brain damage; management by neurology, neuropsychology, and speech pathology; and current research on appraisal, diagnosis, and treatment. Offered in the Martinez VA Medical Center. (SU grading only.)

Conference, observation and data collection—3-9 hours. Prerequisite: consent of instructor. Independent study of neurogenic communication disorders—aphasia, apraxia of speech, dysarthria. Designed for individual interest and includes discussion, directed reading, research design, data collection, and preparation of a final paper. Offered in the Martinez VA Medical Center. (SU grading only.)

460. Clinical Neurology (3-18) I, II, III, IV, The Staff
Clinical activity—full time (minimum of one-half quarter). Prerequisite: fourth-year medical student. Principles of a third-year medical student with completion of a medical clerkship; consent of Chairperson. Clerkship in neurology to be arranged at another institution with accredited neurology residency program in neurology under proper supervision.

462. Special Clinical Elective in Neurology (9) I, II, III, IV, Gabor, Seval
Clinical activity—full time (4 to 12 weeks). Prerequisites: fourth-year medical students and third-year medical students with clerkship in medicine and pediatrics (outside medical schools). Student will function as acting intern on neurology service. Emphasis will be on mastering neurologic examination and on introduction to neurologic evaluation, diagnosis, and therapy.

463. Insights in Neurology (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 neurological-care in emergency room, operating room and hospital wards, including manner of treatment of a variety of chronic and acute neurological diseases. (SU grading only.)

Prerequisite: medical student with consent of instructor. Student may participate in ongoing neurosurgical projects or may pursue and design independent projects. (SU grading only.)

Neurosurgery

Upper Division Course

199. Special Study in Neurosurgery for Advanced Undergraduates (1-5) I, II, III, IV, The Staff (Chairperson in charge)
Prerequisite: advanced undergraduate standing with consent of instructor. Students may participate in ongoing neurosurgical projects or may pursue and design independent projects. (P/NP grading only)

Graduate Courses

299. Neurosurgery Research (3-12) I, II, III, IV, The Staff (Chairperson in charge)
Prerequisite: graduate student with consent of instructor. Students may participate in ongoing neurosurgical projects or may pursue and design independent projects. (SU grading only.)

Professional Courses

309. 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.

Clinical activity—full time (3 days per week; 4 weeks minimum). Prerequisite: third- and fourth-year medical students; consent of instructor. Approved for graduate student credit. Admission and follow-up of patients. Neurological history, examination and further diagnostic procedures emphasized. Students participate in meaningful aspects of surgical procedures and attend listed conferences, rounds, and seminars.

464. Externalship (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.

Neurosurgery in neurosurgery to be arranged at another institution with accredited neurosurgery residency program in neurosurgery under proper supervision.

465. Clinical Neurosurgery Martinez VA Medical Center (6 or 10) I, II, III, IV, Andrews and staff
Clinical activity—full time (4 to 12 weeks). Prerequisites: third- or fourth-year medical student; consent of instructor. Patient work-up, peri-operative care, and frequent first or second assist in the operating room. Close integration with active Neurosurgical Service. Meets requirements in exposure to the neurosurgical practice examination and diagnostic procedures for patients with nervous system disorders.

470. Advanced Clinical Neurosurgical (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. Neurosurgical history, examination, diagnostic procedures, and surgical management are emphasized. Students participate in meaningful aspects of surgical procedures and attend required conferences and rounds.

480. Insights in Neurosurgery (1-3) I, II, III, IV, The Staff
Clinical activity—3 to 9 hours. Prerequisite: first- and second-year medical students in good academic standing; consent of instructor. Observation of neurosurgical-care in emergency room, operating room and hospital wards, including manner of treatment of a variety of chronic and acute neurological diseases. (SU grading only.)

499. Neurosurgery Research (6-18) I, II, III, IV, The Staff (Chairperson in charge)
Prerequisite: medical student with consent of instructor. Student may participate in ongoing neurosurgical projects or may pursue and design independent projects. (SU grading only.)

Obstetrics and Gynecology

Lower Division Courses

190. Seminar in Early Mammalian Development (1) I, II, III, Wiley
Seminar—1 hour; short paper. Prerequisite: Zoology 100 or the equivalent. Each student will present a research paper from the recent scientific literature on various research topics in early mammalian development. Short paper 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)

Upper Division Courses

299. 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)

299. Seminar in Early Mammalian Development (1) I, II, III, IV, Wiley
Seminar—1 hour. Each student will be asked to present a recent scientific literature on various research topics in early mammalian development. Short paper will be required at the end of course.

303. Group Study (1-5) I, II, III, IV, Overstreet
Prerequisite: graduate standing; consent of instructor.

309. Research (1-12) I, II, III, IV, Overstreet
Prerequisite: graduate standing; consent of instructor. (SU grading only)

Professional Courses

420. Reproductive System/Perinatology (2) IV, CI Lecture—3.5 hours. Introduction to clinical obstetrics and gynecology and perinatology as an extension of material introduced in the sciences basic to medicine in anatomy, reproductive physiology, and
molecular biology/genetics. (Same course as Pedi- atrics—genetics. Does not meet medical specialization requirement. Limited enrollment.

445. Elective Clerkship (4-14) I, II, III, IV: The Staff Clinical activity—full time (3 days per week). Prerequisite: third- and fourth-year medical students; Medical Sciences 432A (or the equivalent); consent of instructor. Participation is available in inpatient and outpatient care. Attendance at specified conferences; student-faculty member informal conferences. May be repeated for credit.

470. Acting Internship in Obstetrics and Gynecology (6-8) I, II, III, IV: Clinical activity—full time (6-8 weeks). Prerequisite: third- and fourth-year medical students who have completed Medical Sciences 432A; consent of instructor. Students will perform as intern and expect the following experience: Obstetrics and Gynecology, 2 weeks each; perform inpatient care; be on call every third night; attend scheduled conferences one half-day per week. Round daily with attending.

471. Ambulatory Gynecology and Obstetrics (6-8) I, II, III, IV: MacInroy Clinical activity—full time (6-8 weeks). Prerequisite: third- and fourth-year medical students who have completed Medical Sciences 432A; consent of instructor. Student to participate in following clinics each week: General Gynecology, New and Return Obstetrics, Post-Partum, High-Risk Obstetrics, Pre-Oncology, Gynecologic clinics: as assigned. Student will conduct examinations, present patients to staff and will be able to discuss treatment regimens. Night call in Labor and Delivery Suite every third night.

498. Research in Obstetrics and Gynecology (4-16) I, II, III, IV: Cheung and staff Prerequisite: medical student with consent of instructor. Student will pursue a research project of his/her own choosing, selected with help of the faculty. Integration with ongoing faculty research projects recommended. (SU grading only.)

Ophthalmology

Upper Division Course

192. Research Internship (1-12) I, II, III, IV: The Staff Internship—3-36 hours. Prerequisite: upper division standing; approval of project prior to period of internship by preceptor. Supervised work experience in ophthalmology research. Research staff in Ophthalmology have programs in cell biology, electron microscopy, biochemistry, immunology and visual perception. (RP grading only.)

199. Special Study for Advanced Undergraduates (1-5) I, II, III, IV: The Staff Prerequisite: consent of instructor. (PINF grading only.)

Graduate Course

299. 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 ophthalmic diagnosis and principles; basic ophthalmic instruments; understanding of treatment for eye problems manageable by a primary care physician; knowledge of what patients should be referred for ophthalmic care.

461. Basic Clinical Ophthalmology (4.5) I, II, III, IV: J. Brandt Clinical activity—to be arranged (3 weeks). Prerequisite: medical students who have completed either Medical Sciences 430 or course 440 (in third or fourth year); consent of instructor. Provides an acquaintance with the fundamentals of routine clinical ophthalmology.

465. Advanced Subspecialty Ophthalmology (6 or 9) I, II, III, IV: Mannis, Keltner, J. Brandt Clinical activity—to be arranged (4 weeks off campus or 6 weeks at UCD Medical Center). Prerequisite: medical students who have completed either Medical Sciences 430 or course 440 (in third or fourth year); consent of instructor. Participation in disciplines of neuro-ophthalmology/ pediatric ophthalmology, diseases of the cornea and external eye, glaucoma and retina. Rotations at UCD Medical Center may be arranged in 4-week units of one service alone, or in combination, as arranged with instructors.

480. Insights in Ophthalmology (1-3) I, II, III, IV: J. Brandt and staff Clinical activity—3 to 9 hours. Prerequisite: first- and second-year medical students in good academic standing; consent of instructor. Clinical exposure in ophthalmology clinics: cornea, glaucoma, vitreous, retina, strabismus, external eye, orbit, facial nerve and neuro-ophtalmology. (SU grading only.)

498. Group Study (1-9) I, II, III, IV: The Staff (J. Brandt in charge) Prerequisite: medical students 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—3-38 hours. Prerequisite: medical students with consent of instructor. Individual research on selected topics in optics and visual physiology, cornea and external disease. (SU grading only.)

Orthopaedic Surgery

Lower Division Course

*98. Special Studies for Undergraduates (1-4) I, II, III, IV: The Staff (Chairperson in charge) Prerequisite: lower division standing. (PINF grading only.)

Upper Division Course

*198. Special Studies for Advanced Undergraduates (1-5) I, II, III, IV: The Staff (Chairperson in charge) Prerequisite: upper division standing; consent of instructor. (PINF grading only.)

Professional Courses

401A. Sports Medicine: Medical Aspects of Sports Injuries (1) I, MacRae Lecture—2 hours; laboratory—1 hour. Prerequisite: completion of first year of medical school. Multidisciplinary course introducing student to the pathophysiology of sports injuries, physical examination of the injured athlete, and management of sports injuries. Specific injuries, taping, and use of physical modalities will be discussed. (SU grading only.) (Same course as Physical Medicine and Rehabilitation: 401A.)

*421. The Musculoskeletal System (2.5) I, MacRae 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 orthopedic surgery and traumatology.

426. Initial Management of Musculoskeletal Trauma (3-6) I, II, III, IV: Rodrigo Clinical activity—full time (2 to 4 weeks). Prerequisite: third- or fourth-year student in good academic standing; completion of human anatomy and consent of instructor. Exposure to providing primary care in emergency and operating rooms in management of orthopedic problems of trauma under supervision of resident on call. Does not meet surgical specialty requirement. Limited enrollment.

428. Ambulatory Orthopaedics (3-6) I, II, III, IV: Rodrigo Clinical activity—full time (2 to 4 weeks). Prerequisite: third- or fourth-year student in good academic standing; consent of instructor. Introduction to general orthopedic problems and their management in an outpatient setting. Students will conduct orthopedic examinations, present patients to staff, and lead discussion of treatment regimens.

*Course not offered this academic year.

Emphasis placed on orthopaedic physical exam and interpretation of x-rays does not meet surgical specialty requirement. Limited enrollment.

440. Clinical and Surgical Orthopaedics (6) I, II, III, IV: Rodrigo Clinical activity—full time (4 weeks). Prerequisite: third- or fourth-year student in good academic standing, and consent of instructor. Rotation on an assigned orthopaedic service, emphasizing didactic teaching, related to the musculoskeletal system. Outpatient and inpatient emergency room and operating room exposure. Meets surgical specialty requirement.

462. Community Preceptorship (6) I, II, III, IV: Rodrigo Clinical activity—full time (4 weeks). Prerequisite: third- or fourth-year student in good academic standing and consent of instructor. Designed to acquaint student with private practice of orthopaedics in the community. Opportunity to observe and assist private practitioners in office, emergency room and inpatient environment. Preceptorships available in Sacramento and surrounding areas. Student must provide own transportation to the preceptorship site.

464. Acting Internship (6) I, II, III, IV: Rodrigo Clinical activity—full time (4 weeks). Prerequisite: third- or 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 selected case material. For those students who demonstrate proficiency, responsibility will be similar to that of intern. Does not meet surgical specialty requirement.

480. Insights in Orthopaedic Surgery (1-3) I, II, III, IV: Szabo Clinical activity—3 to 9 hours. Prerequisite: first- and second-year medical students in good academic standing; consent of instructor. Exposure to office, ambulatory and hospital care in orthopaedic surgery via attendance at grand rounds, patient care conferences, and journal discussions. (SU grading only.)

499. Orthopaedics Research (1-12) I, II, III, IV: The Staff (Rodriguez in charge) Clinical activity—3 to 9 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. (Does not meet surgical specialty requirement.) (SU grading only.)

Otolaryngology

Lower Division Courses

*192. Internship in Otolaryngology (1-12) I, II, III, IV: Chairperson in charge Internship—3 to 38 hours. Prerequisite: upper division standing; approval of project prior to period of internship by preceptor. Supervised work experience in otolaryngology and related fields. Final project report. (RP grading only.)

198. Directed Group Study (1-5) I, II, III, IV: The Staff Prerequisite: consent of instructor. (PINF grading only.)

199. Special Study in Otolaryngology for Advanced Undergraduates (1-5) I, II, III, IV: The Staff (Chairperson in charge) Prerequisite: advanced undergraduate with consent of instructor. (PINF grading only.)

Graduate Courses

290C. Research Conference in Otolaryngology (1) I, II, III, IV: The Staff Lecture/discussion—1 hour. Prerequisite: graduate students; medical students; advanced undergraduates with consent of instructor. Presentation and discussion of faculty and student research in otolaryngology. (SU grading only.)

291. Principles of Speech, Hearing and Equilibrium (3) I, II, III, IV: The Staff Lecture/discussion—3 hours. Prerequisite: graduate students; medical students; advanced undergraduates with consent of instructor. Presentations by faculty and guest lecturer on anatomy, physiology, and
behaviors involved in speech production, hearing, and balance. Each student will be expected to make one class presentation.

298. Group Study (1-5) I, II, III, IV. The Staff
(SU grading.)

299. Individual Study in Otolaryngology for Advanced Graduate Students (1-12) I, II, III, IV. Chole and staff
Prerequisite: advanced graduate student with consent of instructor. (SU grading only)

Professional Courses

401. Clinical Examinations in Otolaryngology (11) I, II, III, IV. Chole
Lecture—1 hour; laboratory—1 hour; practical—1 hour total. Prerequisite: second-year medical students with consent of Instructor; open to graduate students. Approved for graduate degree credit. Obtaining the history, applied anatomy of the regions, and the art of the examination. Head mirror required.

402. Otolaryngology in Family Practice (1) I, II, III, IV. Lecture—10 hours total. Prerequisite: fourth-year medical students and family practitioners with consent of instructor; open to graduate students. Approved for graduate degree credit. Planned as a refresher course for those already possessing a background in the specialty.

403. Basic Principles of Reconstructive Surgery (1) II, Donald
Lecture—four 2-hour sessions; laboratory—one 2-hour session (5 weeks). Prerequisite: third- or fourth-year medical student with consent of instructor. Formal presentations covering basic principles of reconstructive surgery, including wound healing, treatment of lacerations, skin and bone grafts, flaps, 2-plastics and revision of scars. Laboratory devoted to utilizing animal tissues.

404. Otolaryngology Required Clerkship (3) I, II, III, IV.
Clinical activity—full time (2 weeks). Prerequisite: completion of Clinical Clerkship Evaluation of Promotion. Provides fundamental knowledge of oto- laryngologic diagnosis and principles, develops facility with basic Ear, Nose and Throat instruments, provides an understanding of treatment for ear, nose and throat problems manageable by a primary care physician, provides knowledge of what patients should be referred for otolaryngologic care.

406. Otolaryngology Elective (3-16) I, II, III, IV.
Clinical activity—full time. Prerequisite: third- and fourth-year medical students with consent of instructor: open to graduate students. Approved for graduate degree credit. Total involvement in clinical activities of the department.

480. Insights in Otolaryngology (1-3) I, II, III, IV.
Senders
Clinical activity—3 to 9 hours. Prerequisite: first- and second-year medical students in good academic standing; consent of instructor. Individualized activities (depending upon time available and previous exposure to Ear, Nose and Throat) including observing patient exams, ward rounds and attendance at lectures and grand rounds. (SU grading only)

490. Journal Seminar (1) I, II, III, IV. Donati, Chole
Lecture/discussion—10 hours total (course given three times per quarter). Prerequisite: fourth-year medical students with consent of instructor; open to graduate students. Approved for graduate degree credit. Monthly review of current otolaryngologic and related literature and recent advances.

495. Individual or Group Study (1-5) I, II, III, IV. The Staff
Lecture/discussion—1-2 hours; laboratory—1-4 hours. Prerequisite: consent of instructor. Introduction to basic research in Otolaryngology. Lectures, discussions and laboratory study of sensory and motor systems. (SU grading only)

499. Research (1-12) I, II, III, IV. The Staff
Prerequisite: medical students with consent of instructor; open to graduate students. Approved for graduate degree credit. Participation in ongoing projects.

Pathology

Upper Division Courses

192. Internship in Human Pathology (1-12) I, II, III, IV. The Staff
Internship—3-6 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, and consent of instructor. (P/NP grading only)

Graduate Courses

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.

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, neoplasia, and inflammation in both the human and experimental model. Emphasis on correlation of clinical, gross and microscopic findings. Discussions provide instruction in microscopic techniques.

210. Introduction to Human Pathology (5) III, C. Miller
Lecture—3 hours; discussion—1 hour; laboratory—3 hours. Prerequisite: graduate or upper division students with background in gross and microscopic anatomy, physiology and biochemistry. Study of the processes, causes and effects of disease, including inflammation, neoplasia, immunology, parasitism, degeneration, abnormalities of growth, and injuries due to environmental and toxic agents. Course not intended for veterinary medical or medical students.

268. 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

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, neoplasia and maldevelopment; application of experimental models to human disease; and clinical correlations. Seminars emphasize microscopic findings in current cases and include individualized experience in neuropathologic techniques. Given jointly with the Departments of Neurology and Neurosurgery.

408. Anatomic Pathology Case Studies (1-12) I, II, III, IV. Rubben
Lecture—1 hour; laboratory—3-4 hours. Prerequisite: medical student or consent of instructor. Participation and/or performance, under supervision, of complete autopsies and surgical pathology, with correlated discussion of clinical material, gross, microscopic and laboratory findings.

411. Pathology I (5) III. Rubben
Lecture—4 hours; laboratory—7 hours. Prerequisite: approval by Committee on Student Evaluation and Promotion. Lectures and computer-assisted learning; introduces basic human disease processes. Mastery of pathophysiology and vocabulary is stressed. Methods of examining gross and microscopic tissue sections are taught.

412. Systemic Pathology (7.5) IV. Cardiff
Lecture—6 hours (for 6 weeks); laboratory—12 hours; laboratory-discussion—6 hours. Prerequisite: approval by Committee on Student Evaluation and Promotion. Provides in-depth study of disease and mechanisms of disease as they relate to specific human organ systems. Basic concepts of pathobiology are introduced which have application in clinical settings.

464. Anatomical Pathology (6-12) I, II, III, IV. Teslik
Clinical activity—40 hours (for 4-8 weeks). Prerequisite: third- or fourth-year medical student or consent of instructor. Designated for students with an intensive experience in surgical pathology. Participation in grossing of specimens, preparation of frozen sections and slide reading sessions. Students attend surgical pathology conferences and seminar sessions in which clinical correlation and diagnostic information is discussed.

486. Applied Clinical Laboratory Medicine (9) IV.
Milar
Clinical activity—full time (6 weeks). Prerequisite: use of the clinical laboratory for the diagnosis and management of patients includes bench techniques, new instrumentation, quantitative analysis, test interpretation, and research approaches applicable to patient care. (SU grading only)

497. 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 pathobiology. (SU grading only can be in effect)

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 can be in effect)

Pediatrics

Upper Division Course

191. Special Study in Pediatric Research (1-1), II, III, IV. The Staff (Chairperson in charge)
Prerequisite: undergraduate student with consent of instructor based upon adequate preparation as determined by instructor. (P/NP grading only)

Graduate Course

295. 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 first-year medical student with consent of instructor. Opportunity to observe and participate in primary medical care in a practicing pediatrician's office. Participation in history-taking and physical examination will be at discretion of preceptor and dependent on student's experience.

402. Clinical Experience in Private Practice (1-10) I, II, III, IV. Chairperson in charge
Clinical activity—full time (4 to 12 weeks). Prerequisite: third- or fourth-year medical student; Medical Sciences 4328; consent of preceptor and Chairperson. Opportunity to participate in practice of precept-
468. Elective in Pediatric Nephrology (3-18) I, II, III, IV. Makers Clinical activity—full time (2 to 12 weeks). Prerequisite: satisfactory completion of Medical Sciences 432B; consent of instructor. Inpatient and outpatient experience in diagnosis and management of renal disorders in children. Laboratory experience and participation in clinical investigations may be arranged. Limited enrollment.

469. Elective in Pediatric Infectious Disease (3-18) I, II, III, IV. Halsted Clinical activity—full time (2 to 12 weeks). Prerequisite: satisfactory completion of Medical Sciences 432B; consent of instructor. Inpatient and outpatient experience in diagnosis and treatment of infectious diseases in infants and children. Laboratory and clinical investigation may be arranged. Limited enrollment.

470. Elective in Pediatric Neurology (3-18) I, II, III, IV. Goespe Clinical activity—full time (2 weeks). Prerequisite: satisfactory completion of Medical Sciences 431, 432A, and 432B and consent of instructor. Inpatient and outpatient experience in diagnosis and management of neurological disorders in children. Students will also participate in other pediatric subspecialty clinics which serve children with neurologic disorders. This course does not satisfy the fourth year neurology requirement.

471. Elective in Pediatric Gastroenterology (3-18) I, II, III, IV. Cannon, Wenner Clinical activity—full time (2 to 12 weeks). Prerequisite: satisfactory completion of Medical Sciences 432B; consent of instructor. Inpatient and outpatient experience in diagnosis and management of gastroenterology disorders in children. Laboratory experience and participation in clinical investigations may be arranged. Limited enrollment.

472. 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 investigations may be arranged. Limited enrollment.

473. Elective in Pediatric Ophthalmology (3-18) I, II, III, IV. Merritt Clinical activity—full time (4 to 12 weeks). Prerequisite: satisfactory completion of Medical Sciences 432B with grade of B or better; letter of recommendation from Pediatrics faculty member. Consensus of the specialty of the medical and surgical high-risk neonate. Student expected to take night call. Limited enrollment.

474. Elective in Pediatric Cardiology (3-18) I, II, III, IV. Parrish Clinical activity—full time (2 to 12 weeks). Prerequisite: satisfactory completion of Medical Sciences 432B; consent of instructor. Supervised experience in a variety of pediatric subspecialty clinics. Limited enrollment.

475. Elective in Pediatric Neurosurgery (3-18) I, II, III, IV. McDonald, Joad Clinical activity—full time (2 to 12 weeks); daily rounds, two weekly half-day clinics. Prerequisite: pediatric clerkship. Inpatient and outpatient management of pediatric patients with pulmonary diseases. Tobacco is allowed but will not be limited to cystic fibrosis, asthma, and other forms of chronic pulmonary diseases as well as congenital abnormalities.

476. Elective in Pediatric Hematology/Oncology (3-18) I, II, III, IV. Abdalaaga Clinical activity—full time (2 to 12 weeks). Prerequisite: satisfactory completion of Medical Sciences 432B; consent of instructor. Inpatient and outpatient experience in diagnosis and management of hematologic disorders in children. Laboratory experience and participation in clinical investigations may be arranged. Limited enrollment.

477. Elective in Pediatric Intensive Care (6-18) I, II, III, IV. Shekhar Clinical activity—full time (4 to 12 weeks). Prerequisite: completion of Medical Sciences 432B with grade of B or better; letter of recommendation from Pediatrics faculty member. Evaluation and support of critically ill infants and children. In general, student expected to take night call every third night during rotation. Limited enrollment. *499. Research Topics in Pediatrics (1-18) I, II, III, IV. The Staff (Styne in charge) Prerequisite: student in Medical School with consent of instructor. Individual research project in pediatric subspecialty. Laboratory, endocrinology, hematology, metabolism, newborn physiology and other. Independent investigation by student will be emphasized and long-term projects are possible. (SU grading only.)

Physical Medicine and Rehabilitation

Upper Division Courses

192. Internship in Physical Medicine and Rehabilitation (1-12) I, II, III, IV. The Staff (Enrich coordinator) Internship—3-36 hours. Prerequisite: upper division standing; approval of project prior to period of internship by preceptor. Supervised work experience; clinical and "basic" research projects in Physical Medicine and Rehabilitation; emphasis on neuromuscular disorders; final written report. (PAP grading only)

196. Directed Group Study (1-5) I, II, III, IV. The Staff (Chairperson in charge) Prerequisite: advanced standing and consent of instructor. (PAP grading only)

196. Special Study for Advanced Undergraduates (1-5) I, II, III, IV. The Staff (Chairperson in charge) Prerequisite: advanced standing and consent of instructor. (PAP grading only)

Graduate Courses

201A. Sports Medicine: Medical Aspects of Sports Injuries (3) I, Bernauer Lecture—2 hours; laboratory—1 hour. Prerequisite: graduate students with upper division course in systemic physiology or anatomy. Multidisciplinary course introducing student to the pathophysiology of sports injuries, physical examination of the injured athlete, and management of sports injuries. Specific injuries, taping, and use of physical modalities will be discussed. (Same course as Physical Education 201A.)

209. Selected Topics in Rehabilitation and Physical Medicine (1-5) I, II, III, IV. The Staff Prerequisite: consent of instructor.

210. Research (1-12) I, II, III, IV. The Staff Prerequisite: consent of instructor. (SU grading only.)

Professional Courses

401A. Sports Medicine: Medical Aspects of Sports Injuries (3) I, Bernauer Lecture—2 hours; laboratory—1 hour. Prerequisite: medical students or graduate students with upper division course in systemic physiology or anatomy. Multidisciplinary course introducing student to the pathophysiology of sports injuries, physical examination of the injured athlete, and management of sports injuries. Specific injuries, taping, and use of physical modalities will be discussed. (Same course as Orthopaedic Surgery 401A.)

410. Rehabilitation Medicine Clerkship (3) I, II, III, IV. Berneman Clinical activity—full time (2 weeks). Prerequisite: third- or fourth-year medical student; consent by Committee on Student Evaluation and Promotion. Rehabilitation medicine and geriatrics relating to comprehensive care of the physically disabled and the physical medicine management of neurologic and musculoskeletal disorders. Physiologic effects, indications and contraindications of the therapeutic modalities and their application to common musculoskeletal disorders.

411. Rehabilitation Medicine Clinical Elective (5-18) I, II, III, IV. The Staff Clinical activity—full time. Prerequisite: completion of third year in Medical School; Medical Sciences 431, 431. Intended for non-UC medical students. Emphasizes on evaluation of patients with neuromuscular, 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.

452. Rehabilitation Medicine Clinical Elective (5-18) I, II, III, IV. The Staff Clinical activity—full time. Prerequisite: Medical Sciences 430, 431; completion of third year in Medical School. Emphasis on evaluation of patients with neuromuscular or orthopaedic problems requiring rehabilitative techniques for their management. Introduction to management of such patients. Physical Medicine and Rehabilitation at off-campus facility must be approved by Chairperson.

480. Insights In Physical Medicine and Rehabilitation (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. Exposure to time and methods in rehabilitation medicine including ancillary therapies and related services. Development of knowledge and experience of musculoskeletal examination of patients with physical/round and outpatient clinics. (SU grading only)

498. Advanced Group Study (1-5) I, II, III, IV. The Staff Prerequisite: consent of instructor. Study and experience for medical students in any of a number of areas in physical medicine and rehabilitation. (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

Professional Courses
Clinical activity—full time (approximately 40 hours per week). Prerequisite: third- or fourth-year medical students; Medical Sciences 430; consent of instructor. Total involvement in patient care involving surgical preparation, treatment, operative care, and follow-up. Designing and understanding reconstruction and aesthetic plastic surgery. Microvascular surgery included. Student rotation.

461. Dentistry for Future Physicians and Surgeons (6-8) I, II, III, IV. Thalier, Department of Dentistry—full time (8 hours); laboratory—2 hours; clinic activity—full time (4-6 weeks). Prerequisite: third- or fourth-year medical students. General practitioners must recognize dental-related problems, have the ability to alleviate potential pain, and be able to refer these problems for further definitive evaluation and treatment. Students will have basic knowledge of dentistry; recognize potential dental problems, and be able to refer these problems for further definitive evaluation and treatment. (SU grading only.)

Psychiatry

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/N grading only.)

199. Special Study for Advanced Undergraduates (1-5) I, II, III, IV. The Staff (Chairperson in charge)
Prerequisite: advanced standing and consent of instructor. (P/N grading only.)

Graduate Courses
225. Psychiatric Implications of Legal Intervention (2) I, II. Bauer
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, mental health court demonstrations. (Same course as Community Health 226.)

289. Directed Group Study For Graduate Students (1-5) I, II, III, IV. The Staff (Blackor in charge)
Prerequisite: graduate standing and consent of instructor. (SU grading only.)

Professional Courses
401. Medicine and the Mind: An Introduction to Psychiatry (2) I. Seward
Laboratory/discussion—3 hours. Prerequisite: approval from Committee on Student Evaluation and Promotion. Introduction to concepts and clinical applications of psychiatry throughout the human life cycle. Includes tutorials tailored to individual student interests which will explore the biological, psychological, social, and cultural factors influencing health and illness, includes lecture and video presentations as well as group discussion.

402. Human Sexuality (1) V. Blacker
Lecture—2 hours; discussion—3 hours. Prerequisite: consent by Committee on Student Evaluation and Promotion. Normal and variant human sexuality. The focus will be on understanding human sexual function in health and illness.

403. Psychopathology (3.5) V. Madock
Lecture—6 hours; discussion—2 hours (5 weeks). Prerequisite: consent by Committee on Student Evaluation and Promotion. Introduction to basic aspects in mental/emotional dysfunction. Focus on understanding the development and symptomatology of major forms of psychiatric dysfunction.

412. Psychiatry Grand Rounds (1) I, II, III, IV. Grindlinger and staff
Lecture—1 hour. Prerequisite: medical students or staff or other qualified mental health professionals with consent of instructor. Weekly case presentation at UCSF Medical Center for presentation of selected clinical cases, presentation of lecture and research reports.

413. Outpatient Psychiatry Clerkship (6-12) I, II, III, IV. Grindlinger and staff
Clinical activity—full time (4 to 8 weeks). Prerequisite: Medical Sciences 433 (Psychiatry Core Clerkship) and/or consent of instructor. Clinical management of adult outpatients, including initial evaluation, differential diagnosis, and treatment planning, in addition to brief psychotherapy and interviewing skills. Conferences, medication clinics, and videotaping under supervision.

414. Consultation-Liaison Clerkship (6-12) I, II, III, IV. Grindlinger and staff
Clinical activity—full time (4 to 8 weeks). Prerequisite: Medical Sciences 433 (Psychiatry Core Clerkship) and/or consent of instructor. Student functions as member of the team in evaluation, management, and psychiatric liaison with other medical specialties. Intensive supervision from senior staff and psychiatric residents.

Clinical activity—32 hours; lecture-conference—8 hours. Prerequisite: Medical Sciences 433 (Psychiatry Core Clerkship) and/or consent of instructor. Outpatient consultation, conferences, evaluation and treatment (under supervision) of patients at UCSF Medical Center Psychiatry Emergency Services and affiliated hospitals. Participation in usual clinical activities of Emergency Psychiatry Emergency Services.

416. Child Psychiatry Clerkship (5-12) I, II, III, IV. Grindlinger and staff
Clinical activity—full time (4 to 8 weeks). Prerequisite: Medical Sciences 433 (Psychiatry Core Clerkship) and/or consent of instructor. Didactic and clinical inpatient, outpatient, and consultation-liaison experiences with children, adolescents and families. Clinical observations, diagnostic assessment, and treatment will be undertaken with close supervision. Literature review and case conferences presented on a regular basis.

417. Jail Psychiatry Clerkship (6 or 12) I, II, III, IV. Grindlinger and staff
Clinical activity—full time (4 to 8 weeks). Prerequisite: Medical Sciences 433 (Psychiatry Core Clerkship) and/or consent of instructor. Didactic and clinical inpatient, outpatient, and consultation-liaison experiences with children, adolescents and families. Clinical observations, diagnostic assessment, and treatment will be undertaken with close supervision. Literature review and case conferences presented on a regular basis.

418. Off-Campus Clinical Experience (6-12) I, II, III, IV. Grindlinger and staff
Clinical activity—full time (4 to 8 weeks). Prerequisite: Medical Sciences 433 (Psychiatry Core Clerkship) and/or consent of instructor. Didactic and clinical inpatient, outpatient, and consultation-liaison experiences with children, adolescents and families. Clinical observations, diagnostic assessment, and treatment will be undertaken with close supervision. Literature review and case conferences presented on a regular basis.

420. Acting Internship in Psychiatry (6 or 12) I, II, III, IV. Grindlinger and staff
Clinical activity—full time (4 to 8 weeks). Prerequisite: Medical Sciences 433 (Psychiatry Core Clerkship) and/or consent of coordinator. Acting intern position on the UCSF Medical Center Inpatient Unit. Close faculty supervision with emphasis on the biological, psychological, psychosocial, and behavioral aspects appropriate to diagnostic and long-term patient management.

421. Advanced Psychiatry Clerkship: Martinez VA Hospital (8-12) I, II, III, IV. Grindlinger and staff
Clinical activity—full time (4 to 8 weeks). Prerequisite: Medical Sciences 433 (Psychiatry Core Clerkship) and/or consent of instructor. Weekly case presentation at UCSF Medical Center for presentation of selected clinical cases, presentation of lecture and research reports.
magnetic resonance and ultrasound. Principles of radiation protection in imaging will be covered. Offered at VA Hospital, Martinez. Offered in alternate years. (SU/grad grading only).

414. Medical Radiation Biology (3) III, Bushberg, Leiboldt
Lecture—27 hours total. Prerequisite: consent of instructor. Medical radiation biology; molecular cellular and organ system response to acute and chronic irradiation; radiation carcinogenesis and genetic effects; radiation risk assessment; diagnostic ultrasound and magnetic resonance imaging; health effects. Medical/legal considerations of radiation exposure. Offered at VA Hospital, Martinez. Offered in even numbered years only. (SU/grad grading only).

415. Radiopharmacy (3) III, Veltman
Laboratory—6 hours. Prerequisite: consent of instructor. Fundamentals of radiopharmaceutical sciences including radiochemistry; radiopharmaceutical production; theory; applications; mechanisms of localization, radionuclide and radiopharmaceutical drug applications and related regulatory aspects. Offered in alternate years. (SU/grad grading only).

461. Clinical Clerkship in Diagnostic Radiology (1-16) I, II, III, IV, Rosenow
Clinical—3 hours per day, 3 days per week. Prerequisite: completion of third year of Medical School; consent of instructor. Student works with radiologists at UCSF Medical Center in film reading sessions and radiographic examinations. Covers fluoroscopy, vascular radiology and special investigations. Includes daily individual teaching sessions with faculty radiologists, radiology learning laboratory, and radiology conferences and seminars. Limited enrollment.

498. 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

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 understanding of the lecture/lab experience in biomedical nuclear chemistry. Subjects include choice and purification of appropriate gamma and beta radionuclides, compounding biochemical radiochemistry and radiomunnochemistry. (Same course as 401).

195. Directed Group Study (1-5) I, II, III, IV, The Staff
Prerequisite: upper division standing and consent of instructor. (P/NP grading only)

197. 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)

Graduate Course

298. Research (1-12) I, II, III, IV, Wolfe in charge
Prerequisite: graduate standing and consent of instructor. (SU/grad grading only)

Professional Courses

401. Biomedical Radiochemistry (3) III, The Staff
Lecture—2 hours, laboratory—3 hours. Prerequisite: upper division 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 radionuclides, compounding biochemical pharmacodynamics and radiomunnochemistry. (Same course as 101).

411. Radiological Physics I (Physics of Nuclear Medicine) (5) S. Bushberg, Leiboldt, Veltman
Lecture—43 hours total, laboratory—12 hours total. Prerequisite: consent of instructor. Physics of diagnostic and therapeutic nuclear medicine, nuclear physics, radioactive decay; interaction of ionizing radiation; dosimetry; radiopharmaceuticals; internal and external dosimetry; health physics; radiation detection and imaging, scintillation cameras, computerized planar and tomographic imaging. Offered at VA Hospital, Martinez. Offered in alternate years. (SU/grad grading only).

463. Clinical Clerkship In Nuclear Medicine (9 or 18) I, II, III, IV, Statdinlık
Clinical activity—full time (3 days per week). Prerequisite: satisfactory completion of second year of Medical School or equivalent; consent of instructor. Clerkship correlates radiopharmaceuticals with clinical, pathophysiological, and other diagnostic aspects of the patient's care. Each patient reviewed with student by faculty members. Reading assignments, instructor projects, and research techniques available. Limited enrollment with preference to students enrolling for 18 units.

480. Group Study In Nuclear Medicine (1-12) I, II, III, IV, The Staff
Prerequisite: consent of instructor. (SU grading only)

490. Research In Nuclear Medicine (1-12) I, II, III, IV, The Staff
Prerequisite: consent of instructor. Approved for graduate degree credit. (SU/grad grading only for medical students).

Surgery

Upper Division Courses

192. Internship In General Surgery (1-12) I, II, III, IV, The Staff
Internship—36 hours. Prerequisite: upper division standing; approval of program prior to internship by preceptor. Supervised work experience in general surgery and related fields. (P/NP grading only)

199. Special Study In General Surgery for Advanced Undergraduates (1-5) I, II, III, IV, The Staff
Prerequisite: advanced undergraduate student with consent of instructor. (P/NP grading only)

Graduate Course

299. Research (1-12) I, II, III, IV, Wolfe in charge
Prerequisite: graduate standing and consent of instructor. (SU/grad grading only)

Professional Courses

419. Introduction to Clinical Surgery (1-6) I, II, III, IV, Ward
Clinical activity—full time. Prerequisite: second-year medical student with consent of instructor. Designed to introduce medical students to basic principles of surgical practice and the most common surgical diseases. Course is designed to acquaint surgical patients and discuss them with members of staff.

460. Clinical Surgical Elective (3-9) I, II, III, IV, The Staff
Clinical activity—full time (2 to 6 weeks). Prerequisite: fourth-year medical student or third-year medical student with completion of Medical Sciences 430. Preparation of patients, treatment, operative care, and postoperative follow-up. Includes Surgery Clerkship, Cardiothoracic Surgery, Cardiac Surgery, Gastrointestinal Surgery, and Burn Clinic.

461. Surgery Burn Unit Clerkship (6 or 9) I, II, III, IV, The Staff
Clinical activity—full time (1 to 6 weeks). Prerequisite: fourth-year medical student or third-year medical student with completion of Medical Sciences 430. Preparation of patients, treatment, operative care, and postoperative follow-up. Includes Surgery Clerkship, Cardiothoracic Surgery, Gastrointestinal Surgery, and Burn Clinic.

462. Surgery Trauma Service 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 Medical Sciences 430. Students work as an extended member of the 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, Holsclaw and staff
Clinical activity—full time (4 or 6 weeks). Prerequisite: fourth-year medical student, or third-year medical student with completion of Medical Sciences 430. Students work in direct supervision of critically ill surgical patients in a twelve-bed surgical ICU. Each student is closely supervised. Provides in-depth experience with management of critically ill patients.

464. General Surgery Clerkship: Kaiser Hospital (6 or 9) I, II, III, IV, The Staff
Clinical activity—full time (4 or 6 weeks). Prerequisite: fourth-year medical student, or third-year medical student with completion of Medical Sciences 430. Students participate with University residents on the teaching services at Kaiser Hospital, Sacramento. Opportunity to see larger number of practical, general surgical problems and participate in their care.

465. General Surgery Clerkship: Martinez VA Hospital (6 or 12) I, II, III, IV, The Staff
Clinical activity—full time (4, 6, or 8 weeks). Prerequisite: fourth-year medical student, or third-year medical student with completion of Medical Sciences 430. Part of the General Surgery Residency Training program with the University of California, Davis. The Martinez rotation has a large number of gastrointestinal and vascular surgical problems as well as broad surgical experience.

466. General Surgery Clerkship: Travis AF Base Hospital (6 or 9) I, II, III, IV, Gilmore, Ward
Clinical activity—full time (4 or 6 weeks). Prerequisite: fourth-year medical student, or third-year medical student with completion of Medical Sciences 430. Opportunity to participate on the surgical service of our affiliated Air Force Hospital. The program has a large number of general surgical problems and provides a broad operative experience in surgery.

467. Surgical Oncology (3-9) I, II, III, IV, Goodnight and staff
Clinical activity—full time (2 to 6 weeks). Prerequisite: fourth-year medical student or third-year medical student with completion of Medical Sciences 430. Student learns medical and surgical principles applicable to cancer. Participation in the care and major surgical oncologic problems; and opportunity to study the medical, biological, and surgical approaches to cancer therapy.

468. Cardiothoracic Surgery Clerkship (6-12) I, II, III, IV, Benfield
Variable clinical activity—full time (4 to 6 weeks). Prerequisite: fourth-year medical student or third-year medical student with completion of Medical Sciences 430. Student works as an extern on the Cardiothoracic Surgical Service, participating in peroperative management and operations on the heart, lungs, mediastinum, and other thoracic structures. Regularly scheduled teaching conferences are conducted.

478. Surgical Preceptorship: Off Campus (6-18) I, II, III, IV, Ward
Clinical activity—full time. Prerequisite: fourth-year medical student and consent of instructor. Student participates in the preoperative, operative and postoperative care of surgical patients under the supervision of attending staff.

480. Insights In Surgery (1-3) I, II, III, IV, The Staff
Clinical activity—3 to 9 hours. Prerequisite: good academic standing and consent of instructor. Individualized clinical activities. Includes participation in speciality clinics and conferences, grand rounds, and observation of a variety of surgical procedures. (SU/grad grading only)

484. Fourth-Year Surgical Honors Program (18) I, II, III, IV, Wollman
Prerequisite: completion of third year of Medical School with superior performance on Medical Sciences 430; consent of instructor. To provide intensive and comprehensive training in surgery to students

*Course not offered this academic year.
interested in postgraduate surgical care; that work will parallel during the internship and residency training. (SU grading only.)

498. Group Study (1-5) I, II, III, IV.
Prerequisite: medical student; consent of instructor. Directed reading and discussion and/or laboratory investigation on selected topics.

499. Laboratory Research (1-12) I, II, III, IV. Werd and staff
Laboratory—3-36 hours. Prerequisite: completion of second year of medical school; consent of instructor. Laboratory research on urology-related problems. Participation in projects to include the following: burn, nutrition, oncology, transplant and others. (SU grading only.)

Urology

Upper Division Course

198. Special Study for Advanced Undergraduates (1-3) I, II, III, IV. DeVere White
Prerequisite: consent of instructor. (PINP grading only.)

Professional Courses

400. Office Urology (1) I, II, III, IV. DeVere White
Clinical activity—4 hours in afternoons (6 weeks).
Prerequisite: fourth-year medical students with consent of instructor. Introduction to ambulatory care of urologic patients including basic therapeutic and diagnostic procedures from case material referred to private clinic. Management of urinary tract infection will be emphasized.

460. Urology Clinical Clerkship (5-18) IV I, II, III, IV. DeVere White
Clinical activity—full time. Prerequisite: second-year medical student; physical diagnosis or the equivalent; consent of instructor. Clinical experience in diagnosis and treatment of urologic disease. Student will work closely with house staff, participate in conferences, and perform initial patient evaluation on new patients. May be repeated for credit. Limited enrollment.

461. Externship in Urology (5-18) I, II, III, IV. DeVere White
Clinical activity—full time. Prerequisite: fourth-year medical students with consent of instructor. Under supervision, student acting as intern will assume full inpatient responsibility including admission history, physical examination, management of hospitalization, and participate in surgical procedures, outpatient clinic and learning diagnostic and therapeutic procedures. May be repeated for credit.

465. Surgical Team Participation: Martinez VA Medical Center (6 or 12) I, II, III, IV. Merrill Medical Center Clinical activity—full time (4 or 8 weeks); lecture—Varied. Prerequisite: third- or fourth-year medical student. Medical Sciences 430. Students will participate in care of assigned patients on a busy urology inpatient service and outpatient clinic. Clerkship provides exposure to urologic procedures performed in operating room and cystoscopic suite under supervision of Urology staff physicians.

495. Research in Urology (1-12) I, II, III, IV. DeVere White
Research—3-36 hours. Prerequisite: medical or veterinary medical students with consent of instructor. Research in oncology, male infertility, urodynamics, urologic biochemistry. Unique opportunity to apply recent technologies (nuclear medicine resonance, flow cytometry, recombinant DNA) in investigation, diagnosis and treatment of GU cancer, infectious disease, male infertility and development of gynecological biopolisopohics.

Medicine

(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. Ardana, D.V.M., M.S., Professor
Jeffrey E. Barough, D.V.M., Ph.D., Assistant Research Virologist
Dale L. Brooks, D.V.M., Ph.D., Lecturer
Gary R. Carlson, D.V.M., Ph.D., Professor
Larry D. Cowgill, D.V.M., Ph.D., Associate Professor
Nancy E. East, M.S., D.V.M., M.P.V.M., Assistant Professor
Pamela H. Eisele, D.V.M., Assistant Clinical Professor
Laurence R. Fensham, D.V.M., Lecturer
Murray E. Fowler, D.V.M., Professor Emeritus
Jeanne W. George, D.V.M., Ph.D., Assistant Research Clinical Pathologist
Lisa W. Girard, D.V.M., Associate Professor
Ronald P. Hedrick, D.V.M., Associate Professor
Roy V. Herrin-Frank, D.V.M., Adjunct Lecturer
David E. Hinton, Ph.D., Professor
Charles A. Hjerpe, D.V.M., Professor
Peter J. Ishke, V.M.D., Professor
Mark D. Kittleton, D.V.M., M.S., Ph.D., Associate Professor
Professors
Gerald V. Lang, D.V.M., Professor
Donald G. Low, D.V.M., Ph.D., Professor Emeritus
John F. Maass, D.V.M., M.S., Assistant Professor of Clinical Diagnostic Medicine (California Veterinary Diagnostic Laboratory)
John MacKinnon, M.V.M., Assistant Professor
Richard W. Nelson, D.V.M., Assistant Professor
Niel C. Pederick, D.V.M., Ph.D., Professor
William R. Pritchard, D.V.M., Ph.D., J.D., Professor
Livio G. Ragusa, D.V.M., Professor Emeritus
Edward C. Ramsay, D.V.M., Lecturer
Edward A. Rhodes, D.V.M., Professor
Jeffrey A. Roberts, M.V.M., Clinical Professor
Bradford R. Smith, D.V.M., Professor
Michael S. Stanlevsky, D.V.M., Research Associate
Sharone J. Siler, D.V.M., Ph.D., Assistant Professor
Anthony A. Stannard, D.V.M., Ph.D., Professor (Medicine, Pathology)
Donald R. Stromback, D.V.M., Ph.D., Professor
William P. Thomas, D.V.M., Associate Professor
Michael Torstain, D.V.M., Ph.D., Assistant Research Virologist
Leon D. Weaver, V.M.D., Senior Lecturer
James F. Wilson, D.V.M., J.D., Lecturer
W. David Wilson, B.V.M.S., M.R.C.V.S., Associate Professor
William W. Wingfield, M.S., Ph.D., Associate Adjunct Professor
Janet Yamamoto, Ph.D., Assistant Research Immunologist

Courses in Medicine

Upper Division Course

198. Special Study for Advanced Undergraduates (1-5) I, II, III. The Staff (Chairperson in charge) (PINP grading only.)

Graduate Courses

290. Seminar in Veterinary Medicine (1) I, II, III. The Staff (Chairperson in charge)

288. Group Study (1-5) I, II, III. The Staff
Prerequisite: student in School of Veterinary Medicine or consent of instructor. Group study in selected areas of the clinical sciences. (SU grading only.)

295. Research (1-12) I, II, III. The Staff (Chairperson in charge)
(SU grading only.)

Professional Courses

401. Small Animal Clinics (1 1/2 per week) I, II, III. The Staff (Chairperson 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 wards and outpatient clinic, including history taking, physical examinations, professional laboratories, special diagnostic and therapeutic procedures, and consultations, under the direction of the senior staff. May be repeated for credit. (SU grading only.)

402. Large Animal Medicine (1 1/2 per week) I, II, III. The Staff (Chairperson in charge)
Laboratory—50 hours total. Prerequisite: professional standing, resident in Veterinary Medical Teaching Hospital, or consent of instructor. Residents responsible for the medical care of patients in the VM Teaching Hospital and outpatient clinics under the direction of the senior staff of the hospital. May be repeated for credit. (SU grading only.)

403. Small Animal Medicine (1 1/2 per week) I, II, III. The Staff (Chairperson in charge)
Laboratory—50 hours total. Prerequisite: professional standing, resident in Veterinary Medical Teaching Hospital, or consent of instructor. Residents responsible for the medical care of patients in the 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.)

404. Hered Health Management (1 1/2 per week) I, II, III. Hjerpe in charge
Laboratory—50 hours total. Prerequisite: professional standing, resident in Veterinary Medical Teaching Hospital, or consent of instructor. Residents apply their knowledge of veterinary medicine, animal nutrition, genetics, husbandry, management, and economics on a herd basis toward the improvement of food animal production efficiency through control and prevention of disease. (SU grading only.)

421. Veterinary Dermatology (3/4 week) I, II, III. Stannard Laboratory—25 hours. Prerequisite: professional standing, resident in Veterinary Medical Teaching Hospital, or consent of instructor. Residents are responsible for patient care in the hospital and outpatient clinic including history taking, physical examination, and diagnostic procedures under the direction of the staff dermatologist. (SU grading only.)

423. Pulmonary Diseases (3/4 week) I, II, III. Amlis Laboratory—25 hours. Prerequisite: professional standing intern in Veterinary Medical Teaching Hospital. Prerequisite: consent of instructor. New and advanced techniques for the detection and characterization of respiratory and cardiac diseases in animals demonstrated and discussed. Interns assist in assessment of respiratory dysfunction of patients and correlation of the dysfunction and clinical signs. (SU grading only.)

425. Zoo and Wildlife Medicine (3/4 week) I, II, III. Fowler Laboratory—25 hours. Prerequisite: professional standing, resident in Veterinary Medical Teaching Hospital, or consent of instructor. Residents responsible for assisting in handling and treatment of clinic cases and for learning the techniques of manual and chemical restraint of a wide variety of exotic animals, birds, reptiles, and fish. Medication problems, anesthetic techniques, and surgical procedures will be discussed and practiced. (SU grading only.)

491. Small Animal Grand Rounds (1/2) I, II, III. The Staff (Chairperson in charge)
Discussion—1 hour. Prerequisite: professional standing, intern, or resident in Veterinary Medical Teaching Hospital or consent of instructor. Residents take an active part in the presentation and discussion of selected cases from small animal medicine. May be repeated for credit. (SU grading only.)

492. Large Animal Grand Rounds (1/2) I, II, III. The Staff (Chairperson in charge)
Discussion—1 hour. Prerequisite: professional standing as resident in Veterinary Medical Teaching Hospital or consent of instructor. Residents take an active part in the presentation and discussion of selected cases from large animal medicine. May be repeated for credit. (SU grading only.)

493. Seminar in Veterinary Medicine (1) I, II, III. The Staff (Chairperson in charge)
Seminar—2 hours. Prerequisite: professional standing, resident in Veterinary Medical Teaching Hospital. Seminars given by the faculty of the School of Veterinary Medicine in topics relating directly to the practice of clinical medicine and surgery. Residents will
Medieval Studies
(College of Letters and Science)

---, Ph.D., Program Director
Program Office, 322 Sprague Hall (919-752-1219)

Committee in Charge
Samuel G. Armitaard, Ph.D. (Spanish)
Dennis J. Dutschke, Ph.D. (Italian)
Ingeborg Henderson, Ph.D. (German)
Winder McConnell, Ph.D. (German)
James J. Murphy, Ph.D. (Rhetoric)
David A. Nutter, Ph.D. (Music)
Marijane Osborn, 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 study 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 course work 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, art, music, 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 the student with a well-rounded education rather than specialized training, and is therefore excellent preparation for the rigors of the professional schools as well as careers in 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.

Depth Subject Matter

History, at least 12 units from History 102B, 121A, 121C, 121B, 130

50. Directed Group Study (1-5) I, II. The Staff

50. Special Study for Undergraduates (1-5) I, II. The Staff

50. Upper Division Courses

120A-5. The Medieval World (4) I, II, III. The Staff

Arts and language, at least 8 units from Art 176A, 176B, 176C, 177A, 178A, 178B; Dramatic Art 155, German 106; Music 121 (note prerequisite); 199; Rhetoric and Communication 110, 111

Political thought, at least one course from Political Science 115, 116, 11A

Senior thesis, Medieval Studies 190

Total Units for the Major

Major Advisers. W. McConnell (German), Phyllis Jestice (History)

Minor Program Requirements:

UNITs

Medieval Studies 24

The minor in Medieval Studies is designed to be a coherent program of interdisciplinary study. Medieval Studies units may be taken in one or more of the traditional fields of concentration, including art, drama, history, literature, music, national languages, philosophy, political theory, religious studies and rhetoric. Courses must be upper division and chosen from at least two of these subject areas, and they must be within the three periods of Early Medieval Culture, culture of the High Middle Ages, and Medieval transformations. Students may also select a minor with a thematic emphasis.

There is no foreign language requirement for the minor, although knowledge of Latin or a romance language is recommended.

The minor must be designed in consultation with a Department Adviser.

Minor Advisers. J. Dutschke (Italian), W. McConnell (German), J. J. Murphy (Rhetoric), M. Osborn (English)

Courses in Medieval Studies

Lower Division Courses

20A. Early Medieval Culture (4) I. The Staff

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: Civilized and Culture/Non-Introductory. Recommended GE preparation: Art 18, History 4A, or Comparative Literature 1 or 2.

20B. The Culture of the High Middle Ages (4) II. The Staff

Lecture—3 hours; discussion—1 hour. Readings (in translation) in the culture of the high Middle Ages, such as the Summa Theologiae of Thomas Aquinas, the Chronicles of Froissart, the Canterbury Tales of Chaucer, and the Divine Comedy of Dante. General Education credit: Civilization and Culture/Non-Introductory. Recommended GE preparation: Art 18, History 4A, or Comparative Literature 1 or 2.

20C. Medieval Transformations (4) III. The Staff

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/Non-Introductory. Recommended GE preparation: Art 18, History 4A, or Comparative Literature 1 or 2.

50. Directed Group Study (1-5) I, II. The Staff

50. Special Study for Undergraduates (1-5) I, II. The Staff

50. Upper Division Courses

120A-5. The Medieval World (4) I, II, III. The Staff

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.


180. Senior Thesis (4) I, II, III. The Staff

Seminar—4 hours. Prerequisite: senior standing and major in Medieval Studies. Preparation of a research paper dealing with a selected aspect of medieval culture, under supervision of three members of the Committee in Charge.

197T. Tutoring in Medieval Studies (1-4) I, II. The Staff (Chairperson in charge)

Seminar—2 hours. Prerequisite: courses 20A and 20B; upper division standing; consent of instructor and chairperson of curriculum committee. Tutoring in Medieval Studies 20A and 20B, including leadership in small discussion groups affiliated with the course. May be repeated for credit for a total of 6 units. (P/NP grading only)

198. Directed Group Study (1-5) I, II, III. The Staff

199. Special Study for Advanced Undergraduates (1-5) I, II, III. The Staff

(Mexican-American (Chicano) Studies)

See Chicano Studies

Microbiology

See Microbiology, below: Microbiology (A Graduate Group); Medical Microbiology; and Veterinary Microbiology and Immunology

Microbiology

(College of Letters and Science)

Mark L. WHEELS, Ph.D., Acting Chairperson of the Department
Department Office, 156 Hutchison Hall (919-752-2535)

Faculty

Stanley W. Arzt, Ph.D., Associate Professor
Paul Baumgarten, Ph.D., Professor
Robert E. Hunka, Ph.D., Professor Emeritus
Michelle M. Igo, Ph.D., Assistant Professor
John L. Ingraham, Ph.D., Professor Emeritus
Daniel J. Klioczyk, Ph.D., Assistant Professor
Stephen C. Kowalczykowski, Ph.D., Professor
Jaune S. Manning, Ph.D., Professor

*Course not offered this academic year.
The Major Programs

Microbiology is the branch of biology which deals with the smallest organisms, a group that includes bacteria, yeasts and other small fungi, algae, protozoa, and viruses. Despite their small size, these ubiquitous organisms are enormously important because of their effect on our environment, our food supply, and our health.

The Program. Both undergraduate major programs provide a balance of studies in microbiology, with appropriate courses in mathematics and physical sciences. The A.B. program emphasizes the biology of bacteria, while the B.S. program includes more biochemistry and related course work. Either program, with judicious course selection, is appropriate for students contemplating a career in medicine, 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 careers should be discussed with a major adviser.

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 in the approved college sections in the front of this catalog for more information.

Students majoring in Microbiology in the College of Letters and Science may petition the Dean of the College to receive credit toward the 64 upper division units required for the degree for certain courses in organic chemistry that have been taken at other institutions prior to first enrollment at UC Davis and that are judged by the Chemistry department to cover the same material as upper division courses in the subject at UC Davis. Students in the College of Agricultural and Environmental Sciences must accumulate 54 units of upper division courses to graduate. Further information can be obtained from the Division of Biological Sciences Office, 376 Mrak Hall.

Career Alternatives. A bachelor's degree in microbiology is excellent preparation for a career in biotechnology, pharmacology, agriculture, and the food industry. It also provides a strong background for students wishing to continue on to professional studies in medicine and 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 1A, 1B, 1C</td>
<td>15</td>
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<tr>
<td>Chemistry 1A, 1B</td>
<td>10</td>
</tr>
<tr>
<td>Chemistry 8A, 8B or 118A, 118B, 118C</td>
<td>6-12</td>
</tr>
<tr>
<td>Statistics 13</td>
<td>4</td>
</tr>
<tr>
<td>Mathematics 21B, 21C</td>
<td>6-8</td>
</tr>
<tr>
<td>Physics 1A, 1B, or 5A, 5B, 5C</td>
<td>6-12</td>
</tr>
</tbody>
</table>

Additional units from: Microbiology 110, 110L, 120, 120L, 130B, 130L, 177, 177L; Botany 101L; Botany 114, 116, 118; Veterinary Microbiology 126, 127 | 5 |

Total Units for the Major: 85-101

B.S. Major Requirements:

<table>
<thead>
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<th>Preparatory Subject Matter</th>
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</tr>
</thead>
<tbody>
<tr>
<td>Biological Sciences 1A, 1B, 1C</td>
<td>15</td>
</tr>
<tr>
<td>Chemistry 1A, 1B, 1C or 4A, 4B, 4C</td>
<td>15-19</td>
</tr>
<tr>
<td>Chemistry 8A, 8B or 118A, 118B, 118C</td>
<td>6-12</td>
</tr>
<tr>
<td>Statistics 13</td>
<td>4</td>
</tr>
<tr>
<td>Mathematics 16A, 16B, 16C or 21A, 21B, 21C</td>
<td>9-12</td>
</tr>
<tr>
<td>Physics 5A, 5B, 5C</td>
<td>12</td>
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<tr>
<th>Depth Subject Matter</th>
<th>46-48</th>
</tr>
</thead>
<tbody>
<tr>
<td>Microbiology 102, 102L, 105, 130A</td>
<td>14</td>
</tr>
<tr>
<td>One of the following: Microbiology 110-110L, 120-120L, 130B-130L, 177-177L</td>
<td>14</td>
</tr>
<tr>
<td>Additional units from: Microbiology 110, 120, 120L, 130B, 130L, 177, 177L; Veterinary Microbiology 127</td>
<td>5</td>
</tr>
<tr>
<td>Recommended: Chemistry 107A, 107B, 108</td>
<td>108</td>
</tr>
<tr>
<td>in a course in computer programming.</td>
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</tbody>
</table>

Total Units for the Major: 107-122

Breadth Subject Matter

<table>
<thead>
<tr>
<th>College of Agricultural and Environmental Sciences</th>
<th>24</th>
</tr>
</thead>
<tbody>
<tr>
<td>English and/or rhetoric</td>
<td>8</td>
</tr>
<tr>
<td>Social sciences and/or humanities</td>
<td>16</td>
</tr>
</tbody>
</table>

See also the College section for additional requirements.

<table>
<thead>
<tr>
<th>College of Letters and Science students:</th>
<th>Refer to the College section for a description of requirements to be completed in addition to the major.</th>
</tr>
</thead>
</table>

Major Advisers. W.J.C. Pfeiffer, M.L. Wheels.

Honors and Honors Program. Contact a major adviser from those listed above.

Teaching Credential Subject Representative. W.J.C. Pfeiffer. See also the Teacher Education Program.

Graduate Study. The Graduate Group in Microbiology offers programs of study and research leading to the M.S. and Ph.D. degrees in Microbiology. The offerings of the Department of Microbiology are augmented by courses and faculty of the Departments of Biochemistry and Biophysics; Botany; Food Science and Technology; Genetics; Land, Air, and Water Resources; Plant Pathology; Virology and Entomology; and the Schools of Medicine and Veterinary Medicine. For detailed information regarding graduate study in microbiology, address the Chairperson, Graduate Group in Microbiology, Department of Microbiology.

Related Courses. For other courses related to Microbiology, see course offerings in the Division of Biological Sciences and Departments of Botany, Zoology and Preventive Medicine; Food Science and Technology; Land, Air, and Water Resources; Medical Microbiology; Plant Pathology; and Veterinary Microbiology.

Faculty of the Department of Microbiology also teach or participate in the following courses: Biological Sciences 1A, 10 and 19.

Courses in Microbiology

Lower Division Courses

2. General Bacteriology (3) I, II. The Staff
Lecture—3 hours. Prerequisite: Biological Sciences 1 or 1A. The biology of bacteria with some of its applications. Not open for credit to students who have completed course 102.

3. Bacteriological Laboratory Techniques (1) I, II. The Staff
Laboratory—3 hours. Prerequisite: Chemistry 1A. Designed to acquaint student with basic techniques of bacteriology, with major responsibility for organizing and accomplishing work resting with student. (P/NP grading only.)


98. Directed Group Study (1-5) I, II, III. The Staff
Chairperson in charge

Prerequisite: consent of instructor. Primarily for lower division students. (P/NP grading only.)

Upper Division Courses

102. General Bacteriology (4) I. Baumann; III. Marr
Lecture—4 hours. Prerequisite: Biological Sciences 1 or 1A and Chemistry 8B (may be taken concurrently). Survey of the biology of bacteria and viruses, including bacterial structure, metabolism, physiology, genetics, and evolution; viral structure and replication; the role of bacteria in global element cycles; and the role of microorganisms in infectious disease. Only two units of credit allowed to students who have previously passed course 2.

102L. General Bacteriology Laboratory (2) I, Pfeiffer; II, III. The Staff
Laboratory—8 hours. Prerequisite: course 102 (may be taken concurrently). Introduction to principles and laboratory methods employed in working with microorganisms. For students planning to continue study of microbiology, or use microorganisms as tools for study of genetics and biochemistry. Only one unit of credit allowed if course 3 has been taken.

105. Bacterial Diversity (5) II, Pfeiffer, Wheels. Lecture—3 hours; laboratory—3 hours. Prerequisite: Microbiology 102, 102L, and Biochemistry 101A; Biochemistry 101B recommended. Survey of the major groups of bacteria emphasizing diversity of energy metabolism, morphology, and natural history. Includes methods for determination of evolutionary relationships among groups. Isolation and characterization of bacterial strains from various habitats.

110. Bacteriology of Insects (3) I. Baumann
Lecture—3 hours. Prerequisite: course 2 or 102; Biochemistry 101A or Physiological Sciences 101A. Physiological basis of pathogenic and symbiotic associations between prokaryotes and insects. Taxonomy, physiology, pathogenesis and molecular biology of insect pathogens. Insect immunity. Nutritional associations between microorganisms and insects. Pertinent entomological background information will be included in the lectures.

110L. Bacteriology of Insects Laboratory (2) I, Ii, Iii. Baumann
Laboratory—6 hours. Prerequisite: course 3 or 102L, and 110 (may be taken concurrently). Practical experience in isolation, identification, genetics and taxonomy of selected insect pathogens. Biosafety of toxins and observations on the mechanisms of pathogenesis. Offered in alternate years.

120. Microbial Ecology (3) I, II. Meeks
Lecture—3 hours; laboratory—3 hours. Prerequisite: course 105; Biochemistry 101A. Interactions between non-pathogenic microorganisms and their environment, emphasizing physiological and metabolic character
istics of various groups and their adaptation to and modification of specific habitats.

120L. Microbial Ecology Laboratory (2) III, Meeks Laboratory—4 hours on one or two days, one optional overnight weekend field trip. Prerequisite: course 120 (may be taken concurrently); consent of instructor. Study of prokaryotic microorganisms from certain habitats. One-half of laboratory effort will consist of organized experiments on ecologically important microbial activities. For remaining one-half, research projects will be done on student-selected specific habitats of microbial interest. Limit: 18.

130A. Bacterial Physiology and Genetics (3) II. Iggo Lecture—3 hours. Prerequisite: course 2 or 102; Biochemistry 101B (may be taken concurrently); Mathematics 16A. Physiology and regulation of bacterial growth including the effect of the environment. Mapping techniques and use of mutants in problem solving.

130B. Bacterial Physiology and Genetics (3) III. Arzt Lecture—3 hours. Prerequisite: course 130A. Genes regulating anaerobic growth, cell envelope, and metabolism. Structure and function of the bacterial cell envelope: synthesis of peptidoglycan and lipopolysaccharide; active transport of nutrients; chemotaxis.

150L. Bacterial Physiology Laboratory (3) III. Arzt Laboratory—3 hours. Prerequisite: course 130A and either course 3 or 102L. Physiology and genetics of bacteria and viral viruses. Isolation and characterization of mutant strains. Mapping of mutations by conjugation and transduction. Studies on control of enterobacterial Shiga-like toxin production and catechol repression.

162. General Virology (4) I. The Staff Lecture—4 hours. Prerequisite: Biological Sciences 1A and 101A. Integrated presentation of the nature of animal, bacterial, and plant viruses, including their structure, replication, and genetics.

177L. Metabolism of Anaerobic Bacteria (3) II, Macy (Animal Science) Lecture—3 hours. Prerequisite: course 2 or 102; Biochemistry 101B (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 the anaerobic pathways.

177L. Laboratory in Metabolism of Anaerobic Bacteria (2) II, Macy (Animal Science) Laboratory—3 hours. Prerequisite: course 3 or 102L; course 177 (may be taken concurrently). Isolation and study of bacteria of different natural environments; experiments dealing with characteristic physiological and metabolic aspects of anaerobic bacteria. Offered in alternate years.

192. Undergraduate Research Conference (1) I, II, III. The Staff (Chairperson in charge) Discussion/conference—1 hour. Prerequisite: upper division standing; consent of instructor. Presentation and critical discussion of staff research activities; designed for advanced undergraduate students. May be repeated for a maximum of 3 units of credit when subject matter differs. (P/NP grading only.)

192L. Internship (1-12) I, II, III. The Staff (Chairperson in charge) Internship—3-36 hours. Technical and/or professional experience on or off campus. Supervised by a member of the Microbiology Department faculty. (P/NP grading only.)

194H. Microbiology Honors Research (2) I, II, III. The Staff Independent study—6 hours. Prerequisite: senior standing; eligibility for college honors; completion of six quarters of 190 in microbiology; consent of department. Continuation of an individual microbiological research project culminating in writing of a senior thesis under a faculty director. (P/NP grading only.)

197T. Tutoring in Bacteriology (1-5) I, II, III. The Staff (Chairperson in charge) Tutoring—1-5 hours. Prerequisite: course 3 and 18 upper division units in Microbiology; consent of chairperson. Assist in undergraduate laboratory courses supervised by teaching assistants or faculty. (Course not offered this academic year.)

in discussion sections supervised by faculty; and staffing "drop-in" offices for individual help. (P/NP grading only.)

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

199. Special Study for Advanced Undergraduates (1-5) I, II, III. The Staff (Chairperson in charge) Lecture—1 hour. Prerequisite: consent of instructor. (P/NP grading only.)

Graduate Courses

200A. 200B-200C. Microbiology for First-Year Graduate Students (3-3-3) I-III. The Staff Lecture—3 hours. Prerequisite: first year graduate standing with interest in microbiology. A survey of general microbiology at the graduate level.

210. Molecular Mechanisms in Microbial Pathogenesis (3) I, Manning, Hirsh (Veterinary Microbiology and Immunology) Lecture—3 hours. Prerequisite: course 105 or Veterinary Microbiology 127 and course 162 or Veterinary Microbiology 128 or the equivalent. Study of the molecular mechanisms involved in cytopathogenesis of higher eukarctic organisms. Emphasis on the alteration or inhibition of cellular metabolism and function by bacteria and animal viruses. Offered in alternate years.

215. Recombinant DNA (2) I, Privalsky Lecture—2 hours. Prerequisite: courses 130A-130B or Biochemistry 101A-101B; Genetics 100. 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, The Staff Laboratory—discourse—10 hours. Prerequisite: course 130L or Biochemistry 101L; Genetics 100; 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 Department Office, two weeks prior to first day of class.)

220. Biology of Autotrophic Prokaryotes (3) I. Meeks, Whisler Lecture/discussion—3 hours. Prerequisite: Biochemistry 101B. Biochemistry and ecology of photo- and chemoheterotrophic bacteria, and of methanotrophic bacteria, with specialization on models of ATP and reductant generation. Offered in alternate years.

225. Biology of Yeasts (5) I. Bisson (Microbiology and Enology), C. Price (Food Science and Technology) Lecture—4 hours, laboratory—1 hour. Prerequisite: consent of instructor. Survey of the genetics, physiology, regulatory mechanisms, structure, ecology and diversity of yeasts and related organisms. Offered in alternate years.

230. Genetic Control of Regulatory Mechanisms (3) II. Arzt Lecture/discussion—3 hours. Prerequisite: general knowledge of nucleic acid biochemistry and bacterial genetics. Analysis at the molecular level of genetic regulation in selected bacterial systems. Specific systems discussed will include the following types of regulation: control of transcription initiation and termination; translational controls; tRNA modification; effects; autoregulation; control circuits in bacterial viruses; supercontrols. Offered in alternate years.

232. Advanced General and Molecular Virology (3) II. Lucock (Medical Pathology), Broun (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.

270. Advanced Animal Virology (3) II, Manning, Privalsky 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 consent of instructor. Presentations and critical discussion of original research activities. Designed for advanced graduate students. May be repeated for credit. (SU grading only.)

291. Selected Topics in Bacteriology (1) I, II, III. The Staff (Chairperson in charge) Seminar—1 hour. Current progress in bacteriology and cellular and molecular biology. (SU grading only.)

292. Seminar in Bacteriological 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 bacteriological genetics, virology, and virology with presentations by individual students. (SU grading only.)

296. Seminar in Animal Virology (1) I. The Staff Seminar—1 hour. Prerequisite: consent of instructor. Discussion of current topics in animal virology. (SU grading only.) (Same course as Veterinary Microbiology 292.)

298. Group Study (1-15) 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.)

Microbiology (A Graduate Group)

John C. Meeks, Ph.D., Chairperson of the Group, Office 156, Hutcheson Hall (Microbiology Department), 916-752-0262.

FACULTY: Participating faculty are in the Colleges of Letters and Science and Agricultural and Environmental Sciences, and the school of Veterinary Medicine and Medical Center.

Graduate Study. The Graduate Group in Microbiology offers study and research leading to the M.S. and Ph.D. degrees. The group offers study in general microbiology, medical microbiology, microbial genetics, molecular mechanisms of microbial regulation, molecular mechanisms of microbial pathogenesis, immunology, virology, and recombinant DNA technology. Information on the graduate study and undergraduate preparation for the program can be obtained from a graduate adviser or the Chairperson of the group.

Graduate Advisers. J.R. Carlson (Medical Pathology); R.B. LeFevre (Veterinary Microbiology and Immunology); C.W. Price (Food Science and Technology); D.M. Ogrydziak (Food Science and Technology).

Courses in Microbiology

Graduate Courses

290C. Advanced Research Conference (1) I, II, III. The Staff (Meeks in charge) Discussion/conference—1 hour. Prerequisite: graduate standing and/or consent of instructor. Presentations and critical discussion of staff research activities. Designed for advanced graduate students. May be repeated for credit. (SU grading only.)

299. Research (1-12) I, II, III. The Staff Research under the guidance of dissertation committee. (SU grading only.)
Military Science
(College of Letters and Science)
Reserve Officers' Training Corps (ROTC), Army
Michael P. Tucker, Lt.Col., Chairperson of the Department
Department Office, 125 Hickory Gymnasium (916-752-0541)
Faculty
Lieutenant Colonel Michael P. Tucker, Professor
Captain Robin B. Friedman, Assistant Professor
Captain Melissa A. Stanley

Program of Study
The Military Science Department extends the educational opportunities and provides extracurricular activities which qualify a student for a commission in the Army Reserve, National Guard, or Regular Army. The program assists qualified students in all academic fields to prepare for positions of leadership in military or civilian careers. A continuing effort is made to assign graduates to military career fields aligned with their major field of study, individual capabilities and preferences in one of seventeen career fields (i.e., Infantry, Engineer, Aviation, Medical Service Corps, Armor, Military Intelligence, etc.). Active duty obligation for ROTC graduates will not exceed four years for those who choose Active Duty or six months for those who choose Reserve Component Duty. The total combined service obligation is eight years.

Department Programs
Students are enrolled in military science under one of two programs.

Four-Year Program
Students are enrolled in the basic course (lower division) for the first two years on a voluntary basis. There is no military obligation associated with attendance in lower division courses. Admission to the advanced course (upper division) is by application from second-year lower division students who meet the academic, physical, and military aptitude requirements. Qualified veterans can enter the advanced course immediately because of their military service experience, upon approval by the Department Chairperson.

Upper division students receive $100 subsistence per week, subject to contract stipulation, to complete the course and accept a commission if offered. During the course all military science text books, uniforms and equipment are provided without cost. Students are given leadership development experience at summer camp (advanced camp) between their third and fourth years of the course. Emphasis is on individual participation, leadership development, and the capability to function effectively in positions of significant responsibility.

Two-Year Program
This program is designed for students who have not attended lower division Military Science classes. In lieu of lower division courses an applicant attends a six-week summer camp (basic camp) which is voluntary and carries no military obligation. Applicants are paid for camp attendance and transportation costs. Applications are accepted during the winter and spring terms of the year preceding enrollment in the two year program. All other provisions explained above for the upper division course apply to the two-year program.

Scholarship Program
The U.S. Army offers four- and 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 pays $7000 or 80% of your college tuition, plus laboratory fees, on-campus education fees, attendance at Advanced Camp, and a flat rate amount from which you may purchase personal supplies and equipment. Scholarship winners also receive a tax-free subsistence allowance of $100 a month for 10 months for each year that the scholarship is in effect.

The Army Reserve Corps four-year, Active Duty merit scholarships are awarded to qualified high school seniors in a national competition each year. There are two cycles available for submission of the four-year scholarship application. High school juniors can compete for an Early Cycles scholarship by submitting their application complete and postmarked by 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 Cycles scholarship by submitting their application complete and postmarked by 1 December. Those applicants not selected in the Early Cycle are considered in the Regular Cycle competition. Applicants will receive notification of their final status by 1 March of their senior year in high school. Interested applicants should see their high school counselor for an application or contact UC Davis, Department of Military Science.

The three-year Active Duty and two-year Reserve Forces Duty scholarships are awarded to college students who are already attending UC Davis or transferring from other accredited colleges and have three or two years remaining before graduating with a baccalaureate. Students interested in competing for these scholarships can submit their application beginning in November of each school year. The deadline for submission of an application is 15 January for the two-year scholarship and 15 February for the three-year scholarship. Additionally, students may win a two-year scholarship at the six-week summer camp (basic camp) in the Two-Year Program mentioned above. Students apply for these Army scholarships through the Military Science Department.

DASE Cooperative Program
The Department of the Army Scientific and Engineering (DASE) Cooperative Program is designed to support the U.S. Army’s efforts to recruit, employ, and retain a science and engineer skilled work force as both military officers and civilian employees.

Qualified students may receive financial assistance of up to $5,000 per year to pay for tuition, fees, books, lodging, and meals. Additionally, a $1,000 per year stipend is paid to ROTC Advanced Course students during their last two years in school.

DASE Cooperative students must work in a Department of the Army project (DAV-041, Civilian Career) for a minimum of 26 weeks, typically divided into two thirteen week periods. At least one work period must be completed during the school year. While working, the DASE student must accept the regular pay and benefits for their grade.

Students must be enrolled full time in an undergraduate program leading to a degree in either science or engineering and enroll, or be enrolled, in the U.S. Army Senior ROTC Program. A first semester freshman applicant needs a high school minimum cumulative grade point average (GPA) of 2.75 on a 4.0 scale and a recommendation from the principal or guidance counselor. University applicants must have a 2.0 GPA and a minimum C average in all major fields of study. The DA civilian employers may set their standards above these averages.

Students choose to serve in either the Active Army or a Reserve Forces Component and apply for available DA Civilian positions for a specified period of employment.

For complete information you may contact the Military Science Department or the Planning and Placement Work Force, University Housing and Career Services, Physical Science Program Manager.

Leadership Laboratory
During the course of the school year, several weekend and two hours per week are spent in the conduct of practical exercises. Classes emphasize adventurous activities including off-road, defense and patrolling techniques, weapons familiarization, rappelling, rope bridging, obstacle courses, leadership reaction course, and land navigation. All cadets are required to attend leadership laboratories for practical leadership experience and to prepare for attendance at the Army ROTC Advanced Camp.

Military Qualifications Standards (MQS) System
During the program of study, students will become familiar with the MQS System. It is designed to articulate skills and knowledge that are required of ROTC commissioned to begin military service. The components of the MQS System include: military skills, professional knowledge, and a professional military education.

The military skills component consists of 73 military skills which are categorized into 12 subject areas. They are basic soldiering tasks fundamental to the military professional and serve as the basis for future branch-directed specialty training.

The 24 professional knowledge subjects familiarize cadets with the history, customs and traditions, leadership, and ethics administration, organization, and training of the U.S. Army.

The professional military education component consists of two essential parts—a baccalaureate degree and at least one undergraduate course from each of the following fields of study. Cadets must take a course in written communication, military history, human behavior, math reasoning, and computer literacy.

Academic Credit
College of Letters and Science. The Bachelor of Arts degree requires the completion of 180 units. Military Science courses are counted in the allowance for electives.

College of Agricultural and Environmental Sciences. The Bachelor of Science degree in agriculture requires the completion of 180 units. Military Science courses are counted in the unit allowance for electives.

College of Engineering. Military Science units are acceptable toward the requirements for the Bachelor of Science degree to the extent of the unallocated 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. Students who complete the DVM degree may apply for direct commission in the United States Army Veterinary Corps.

Courses in Military Science
Lower Division Courses
11. Roles and Organization of the U.S. Army (1.0)
Lecture—1 hour. Prerequisite: lower division status. Constitutional and legal basis of the Army, organization and strategic roles in times of war and peace, and "total Army" concept. Impact of civil-military relations and Soviet military power on role of Army studied in context of current problems.

12. Introduction to Military Leadership (1.0)
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 roles performed. Introduces military map reading skills.

13. Introduction to Basic Military Operations (1.0)
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.

Lecture—2 hours. Prerequisite: lower division standing.
148. Introduction to Military Leadership Skills (1/2) II.
Laboratory—2 hours. Prerequisite: lower division status and consent of instructor. Development of leadership and military skills introduced in course 14A is continued with emphasis on the individual’s role in the squad, the basic organizational element of the Army. As students develop their competencies, surveillance and advisory controls are reduced. (P/N: grading only)

14C. Introduction to Military Leadership Skills (1/2) III.
Laboratory—2 hours. Prerequisite: lower division status and consent of instructor. Composition of all previous laboratory sections. Students demonstrate skill levels required for promotion to non-commissioned officer level. Use of chain of command from company through battalion is individualized. Interaction of squad and platoon organizations is explored. (P/N: grading only)

21. Military History (2) II.
Lecture—2 hours. Prerequisite: lower division status; consent of instructor. Survey of military history from 1900 to present, focusing on World War I, World War II, the Korean War, and the Vietnam War.

22A. Intermediate Military Leadership and Operations (2) I.
Lecture—2 hours. Prerequisite: lower division status; course 12 or consent of instructor. Development and exercises personal military leadership skills in extensive supervised leadership laboratories. Intermediate-level military skills necessary for leadership roles as junior non-commissioned officers are developed. Students perform in role of junior non-commissioned officers.

22B. Intermediate Military Leadership and Operations (2) II.
Lecture—2 hours. Prerequisite: lower division status; course 22A or consent of instructor. Continuation of course 22A. Individual leadership traits identified in course 22 are studied in more depth enabling each student to improve on targeted weaknesses. Instruction is presented in intermediate defensive tactics at the squad level.

24A. Individual Military Leadership Skills (1/2) I.
Lecture—2 hours. Prerequisite: lower division status; courses 14A, 14B, 14C, 21, or consent of instructor. Development and exercises personal military leadership skills in extensive supervised leadership laboratories. Intermediate-level military skills necessary for leadership roles as junior non-commissioned officers are developed. Students perform in role of junior non-commissioned officers. (P/N: grading only)

24B. Individual Military Leadership Skills (1/2) II.
Laboratory—2 hours. Prerequisite: lower division status; courses 14A, 14B, 14C, 21, or consent of instructor. Personal supervisory and leadership styles are developed in a supervised laboratory environment. Students are rotated through squad and team-level supervisory positions, given responsibility concomitant with position. (P/N: grading only)

24C. Individual Military Leadership Skills (1/2) III.
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 laboratory setting. (P/N: grading only)

Upper Division Courses

131. Advanced Military Leadership and Management (2) III.
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 provided in roles in which a commissioned officer could serve.

132A. Advanced Military Operations (2) I.
Lecture—2 hours. Prerequisite: upper division status; course 22B or consent of instructor. First phase of advanced military tactical operations. Advanced work on topographical maps, navigation, and orienteering techniques. Instruction is also provided on resource planning techniques and military intelligence.

132B. Advanced Military Operations (2) II.
Lecture—2 hours. Prerequisite: upper division status; course 132A or consent of instructor. Continuation of course 132A. Military tactical theories and their application in offense and defense are presented at the platoon and company level. Course covers in-depth analyses of the principles of warfare related to offensive and defensive operations.

134A. Military Organizational Leadership Skills (1/2) I.
Laboratory—2 hours. Prerequisite: upper division status; courses 24A-24B-24C or consent of instructor. Students devevelop interpersonal and management skills by practical application of leadership organizational skills in the laboratory. Advanced-level military skills presented. Students fulfill the roles of non-commissioned officers. (P/N: grading only)

134B. Military Organizational Leadership Skills (1/2) II.
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 environment becomes more challenging. Students serve as senior non-commissioned officers in squad, platoon and company levels, given appropriate authority and responsibility. (P/N: grading only)

134C. Military Organizational Leadership Skills (1/2) III.
Laboratory—2 hours. Prerequisite: upper division status; courses 24A-24B-24C or consent of instructor. Students prepare for advanced summer training experience by extensive requirements to plan, organize, and conduct military operations. Includes management procedures at unit level.

141. U.S. Army Management Systems (2) III.
Lecture—2 hours. Prerequisite: upper division status and course 131. Army decision making, personnel and equipment management, includes command and staff functions, training, intelligence gathering, techniques for the conduct of meetings, and logistics management procedures at unit level.

142. Military Ethics and Professionalism (2) I.
Lecture—2 hours. Prerequisite: upper division status and course 141. Analysis of the American Military Justice System, the Uniform Code of Military Justice, the Hague and Geneva Conventions, and customary law of war. Includes detailed study of selected procedures of military justice system.

143. Military Ethics and Professionalism (2) II.
Lecture—2 hours. Prerequisite: upper division status and course 142. Profession of arms, its characteristics, unique values, and responsibilities. Discussion topics include the professional soldier's responsibilities to the Army and the Nation, and the need for ethical conduct. Case studies are used to develop ethical decision making skills.

144A. Military Training Leadership Skills (1/2) I.
Laboratory—2 hours. Prerequisite: upper division status; courses 134A, 134B, 134C, and 141. Develops and exercises the leadership skills necessary to plan, organize, and conduct a training program through practical application under supervision. Emphasis on analysis of objectives, instructor planning, media utilization, and evaluation of learning. Students perform as course officers.

144B. Military Training Leadership Skills (1/2) II.
Laboratory—2 hours. Prerequisite: upper division status; course 144A.

*Course not offered this academic year.

Music

(College of Letters and Science)

David A. Nutter, Ph.D., Chairman of the Department
Department Office, 112 Music Building
(916) 752-0666

Faculty

Rosa Bauer, Ph.D., Associate Professor
Robert S. Bloch, M.A., Professor
Anna Maria Busta Bergstrom, Ph.D., Assistant Professor
Pamela J. Charles, Ph.D., Professor Emeritus
Andrew D. Frank, M.A., Professor
Paul Hillier, A.G.S.M., Assistant Professor
D. Ken Holman, Ph.D., Professor
Robert R. McNeil, M.S., Professor Emeritus
David A. Nutter, Ph.D., Associate Professor

Aerospace Studies (Air Force)

Air Force ROTC is available to UC Davis students through a program offered at California State University, Sacramento (CSUS). UC Davis' participation is large, with about 30 students in the corps graduating from that campus. The CSUS Department of Aerospace Studies (AFRC) offers a two- or four-year program leading to a commission in the United States Air Force. All course work (12 or more semester units) is completed on the CSUS campus. Drills and courses are normally offered on Thursday mornings. Field training is conducted during part of the summer months.

Application to the AFRC program should be no later than the middle of a student's sophomore year. Contact representatives in the Aerospace Studies Department at CSUS (1214-276-2159) for information on the program or processing of entry. (An AFRC program is also available within the UC system at Berkeley campus Department of Aerospace Studies, 415-642-3972.) AFRC offers 3 1/2-, 4-, and 2-year scholarships to qualified students. Applications are accepted in April of each year. Upon graduation, students are offered positions in the Air Force Reserve or Air Force Civilian program.

Music

(Rose Writer, Ph.D., Associate Professor
Roberta S. Bloch, M.A., Professor
Anna Maria Busta Bergstrom, Ph.D., Assistant Professor
Pamela J. Charles, Ph.D., Professor Emeritus
Andrew D. Frank, M.A., Professor
Paul Hillier, A.G.S.M., Assistant Professor
D. Ken Holman, Ph.D., Professor
Robert R. McNeil, M.S., Professor Emeritus
David A. Nutter, Ph.D., Associate Professor
A.B. Major Requirements:

Preparatory Subject Matter........................................4
Music 30, 31 (or the equivalent as determined in consultation with major advisors)........3
Piano skills, Music P (required of all majors)......................0

Depth Subject Matter.....................................................38
Music 104A, 104B, 104C........................................12
At least 12 units selected from Music 121, 122, 140..............12
At least 6 units selected from Music 107A, 107B, 107C (Note: only 3 units of 107 or electronic music may be counted toward the major). 108A, 108B, 111, 112, 113A, 113B, 198, 199..................6
At least 8 units in performance courses.........................8
Select from Music 130 or 131, 141, 142, 143, 144, 145, 146......................6

Total Units for the Major.....................................92

Beginning and transfer students must take an examination in piano playing. Sufficient pianistic ability to perform four-part chorales and compositions comparable in difficulty with The Little Preludes of Bach is prerequisite to upper division courses in the major. Students with deficiencies will be required to pass Music P. All majors in music will be expected to perform the compositions cited above before a jury of faculty members prior to advancement into the upper division. Students transferring from other colleges should take the Placement Examination and consult with departmental major advisors before enrolling in any music course.

Foreign Language Requirement. Attention is called to the requirements in foreign languages for higher degrees in music.


Minor Program Requirements:

Music..............................................................................18
A minimum of eighteen units of upper division Music courses........................................18
Courses chosen with advisor's consent from: Music 107A, 110 (maximum of two courses), 111, 112, 121 (minimum of two courses)

A maximum of two units in performance courses (Music 130, 141, 142, 143, 144, 145, 146) may count toward the major.

Lower-division preparatory work to be determined in consultation with minor advisors.

Teaching Credential Subject Representative. L. E. Anderson; also the section on the Teacher Education Program.

Graduate Study. The Department of Music offers programs of study and research leading to the M.A., M.A.T., and Ph.D. degrees. Detailed Information regarding graduate study may be obtained from the Graduate Advisor.

Graduate Advisor. A. M. Busser Berger.

Courses in Music

Lower Division Courses

P. Rudimentary Piano (0) (I, II, III). The Staff
Laboratory—1 hour. Prerequisite: Music majors and minors are enrolled. Designed to train students to meet the minimal piano requirements for the major or minor in music. (Piano grading upon completion of term.)

1. Basic Musicianship (3) (I, II). The Staff
Lecture—3 hours. Fundamentals of music, singing, ear-training and conducting for beginners in music. Designed for students with career plans where musical literacy is important, for example, primary level classroom teachers, actors, theatre directors, designers, and stage managers. Not open to students who have successfully completed 3A, 4A, or the equivalent.

3A. Introduction to Music Theory (4) (I). The Staff; II. Valente
Lecture—3 hours; laboratory—1 hour. Fundamentals of music theory, ear-training, harmony, counterpoint, and analysis directed toward the development of listening and writing techniques. Intended for the general student. General Education credit for two-course sequence of non-GE courses (3A-3B) which will satisfy requirement for one course: Civilization and Culture/Introductory.

3B. Introduction to Music Theory (4) (I, II, III). The Staff
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/Introductory.

4A-4B-4C. Elementary Theory (5-5-5). I. Bloch and staff; II. The Staff
Lecture-discussion—4 hours; practicum—2 hours. Development of music writing and listening skills through the study of music fundamentals, tonal structure, counterpoint, harmony, score reading, and analysis of repertoire. Intended primarily for music majors and minors.

5A-5B-5C. Intermediate Theory (4-4-4). I, II, III. Frank
Lecture-discussion—3 hours; practicum—2 hours. Prerequisite: course 4C. Study of imitative tonal counterpoint and of harmony; keyboard harmony; analysis of repertoire.

10. Introduction to Musical Literature (4) (I, II). The Staff
Lecture—3 hours; listening section—1 hour. An Introduction to composers and major styles of Western music. Lectures, listening sections, and selected readings. For non-majors. General Education credit: Civilization and Culture/Introductory.

24A. Introduction to the History of Music, (I, IV). Busser Berger
Lecture—3 hours; listening section—1 hour. Prerequisite: course 4A or 5A (concurrently). Intended primarily for majors and minors in music. History of music from the baroque to the Classical Period.

24B. Introduction to the History of Music, II (IV). Busser Berger
Lecture—3 hours; listening section—1 hour. Prerequisite: course 24A; course 4B or 3B (concurrently). Intended primarily for majors and minors in music. History of music from the classical period to the nineteenth century.

24C. Introduction to the History of Music, III (IV). Busser Berger
Lecture—3 hours; listening section—1 hour. Prerequisite: courses 4C and 24C; course 5A (concurrently). Intended primarily for majors and minors in music. History of music from the nineteenth century to the present.

25A. Introduction to the History of Music, IV (II). Nutter
Lecture—3 hours; listening section—1 hour. Prerequisite: courses 4C and 24C; course 5A (concurrently). Intended primarily for majors and minors in music. Historical survey of composers and musical styles from the eighteenth century to about 1850.

25B. Introduction to the History of Music, V (IV). II. Nutter
Lecture—3 hours; listening section—1 hour. Prerequisite: courses 5B and 25B; course 5C (concurrent-
ly. Intended primarily for majors and minors in music, historical survey of composers and musical styles from around 1500 to around 1650.

28. Introduction to Afro-American Music (4). II. The Staff
Lecture—3 hours; listening and discussion—1 hour. A study of the Afro-American rhythm, field hollers, work songs, Negro spirituals, gospel, and jazz; the contrast between West African, Afro-Caribbean, and Afro-Cuban musical traditions. 

Performance: 1 hour; practice—5 hours. Prerequisite: Open to Music majors with ability to perform scales and short compositions from standard repertoire; audition by admission and consent of instructor. Continuing students enrolled by section: (A) Voice (prerequisite: course 1 or the equivalent); (B) Piano; (C) Harpsichord; (D) Organ; (E) Violin; (F) Viola; (G) Cello; (H) Double Bass; (I) Flute; (J) Oboe; (K) Clarinet; (L) Bassoon; (M) French Horn; (N) Trumpet; (O) Trombone; (P) Tuba; (Q) Percussion; (R) Classical Guitar; (S) Lute; (T) Viola da gamba; (U) Recorder. May be repeated for credit. Offered only as demand dictates.

Performance Instruction—1 hour; intermediate level. Prerequisite: Open to Music majors only; audition by admission and consent of instructor. Individual instruction in (A) Voice (prerequisite of course 1 or the equivalent); (B) Piano; (C) Harpsichord; (D) Organ; (E) Violin; (F) Viola; (G) Cello; (H) Double Bass; (I) Flute; (J) Oboe; (K) Clarinet; (L) Bassoon; (M) French Horn; (N) Trumpet; (O) Trombone; (P) Tuba; (Q) Percussion; (R) Classical Guitar; (S) Lute; (T) Viola da gamba; (U) Recorder. May be repeated for credit.

41. University Symphony (2). I, II, III. Holoman
Rehearsal—4 hours. Prerequisite: admission subject to audition before the first class meeting. Open to any student in the University whose proficiency meets the requirements of concert performance. Sight-reading, rehearsal, and performance of music from the orchestral literature. May be repeated for credit. (P/N grading only.)

42. University Chamber Singers (2). I, II, III. Hillier
Rehearsal—4 hours. Prerequisite: admission subject to audition before first class meeting. Rehearsal and performance of works in small chorus group. May be repeated for credit. (P/N grading only.)

43. University Concert Band (2). I, II, III. Valente
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/N grading only.)

44. 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/N grading only.)

45. University Music Ensemble (2). I, II, III. Nutter
Rehearsal—4 hours. Prerequisite: admission subject to audition before first class meeting. Rehearsal and performance of Medieval, Renaissance and Baroque music for vocal ensemble and historical instruments. May be repeated for credit. (P/N 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 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/N grading only.)

95. Special Study for Undergraduates (1-5). I, II, III. The Staff (Chairperson in charge) (P/N grading only.)

Upper Division Courses
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. 

107A. Computer and Electronic Music (3). I. Slawson
Lecture—3 hours; laboratory—1 hour. Prerequisite: consent of instructor. Use of 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. Slawson
Lecture—3 hours; laboratory—1 hour. Prerequisite: course 107A and consent of instructor. Continuation of course 107A. (Limited enrollment.)

107C. Computer and Electronic Music (3). III. Slawson
Lecture—3 hours; laboratory—1 hour. Prerequisite: course 107B and consent of instructor. Continuation of course 107B. (Limited enrollment.)

108A-108B. Orchestration (6-2). I, II. Bloch
Lecture—3 hours; laboratory—2 hours. Prerequisite: course 5C. Techniques of orchestration, from study of basic instrumental techniques to analysis of orchestral scores and scoring for various instrumental combinations. 

109. Masterworks in Performance (2). I. Holoman
Lecture—3 hours; laboratory—1 hour. Prerequisite: course 10 recommended. Thorough study of a single masterwork to be performed on campus during the quarter. Guided listening, selected readings, analysis, and study of composer's music. Recommended especially for members of the performing ensembles scheduled to present the work. 

110A. The Music of a Major Composer: Beethoven (4). II. Holoman
Lecture—3 hours; discussion—1 hour. Prerequisite: course 10 or 3A-3B. The work of Beethoven will be studied in the context of his time and his contemporaries. Lectures, discussion/guided listening sections, and selected readings. For non-majors. General Education credit: Civilization and Culture/Non-Introductory. 

110B. The Music of a Major Composer: Stravinsky (4). I. Franks
Lecture—3 hours; discussion—1 hour. Prerequisite: course 10 or 3A-3B. The work of Stravinsky will be studied in the context of his time and his contemporaries. Lectures, discussion/guided listening sections, and selected readings. For non-majors. General Education credit: Civilization and Culture/Non-Introductory. 

Lecture—3 hours; discussion—1 hour. Prerequisite: course 10 or 3A-3B. The work of Bach will be studied in the context of his time and his contemporaries. Lectures, discussion/guided listening sections, and selected readings. For non-majors. General Education credit: Civilization and Culture/Non-Introductory. 

110D. The Music of a Major Composer: Mozart (4). III. Reynolds
Lecture—3 hours; discussion—1 hour. Prerequisite: course 10 or 3A-3B. The work of Mozart will be studied in the context of his time and his contemporaries. Lectures, discussion/guided listening sections, and selected readings. For non-majors. General Education credit: Civilization and Culture/Non-Introductory. 

111. Choral Conducting (2). II. Hillier
Lecture—2 hours. Prerequisite: courses 4A-4B-4C and consent of Instructor. Principles and techniques of conducting choral ensembles. 

112. Instrumental Conducting (2). II. Holoman
Lecture—2 hours. Prerequisite: courses 4A-4B-4C and consent of Instructor. Principles and techniques of conducting instrumental ensembles. Offered in alternate years. 

121. Topics in Music History and Criticism (4). III. Hillier
Seminar—4 hours (includes selected listening). Prerequisite: courses 4A-4B-4C, 24A-24B-24C, and consent of instructor. Sources and problems of a historical period or musical style selected by the instructor and announced in advance. May be repeated for credit. 

122. Topics in Analysis and Theory (4). II. Swift
Seminar—4 hours (includes selected listening). Prerequisite: courses 5C and 26C. 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. 

129. World Music (4). I. The Staff
Lecture—3 hours; listening—1 hour; selected readings. Prerequisite: course 3A-3B or 10 recommended. Intended for non-majors. Studies in selected areas of non-western music, including appropriate instrumental and performing techniques, analysis of tonal systems, melody, rhythm and musical structures. Emphasis placed on cultural context of the music. General Education credit: Civilization and Culture/Non-Introductory. Recommended GE preparation: Music 3A-3B or 10.

Performance Instruction—1 hour; independent practice—5 hours. Prerequisite: open to Music majors only; ability to perform scales and short compositions from standard repertoire; audition by admission and consent of instructor. Class instruction, arranged by section: (A) Voice (prerequisite of course 1 or the equivalent); (B) Piano; (C) Harpsichord; (D) Organ; (E) Violin; (F) Viola; (G) Cello; (H) Double Bass; (I) Flute; (J) Oboe; (K) Clarinet; (L) Bassoon; (M) French Horn; (N) Trumpet; (O) Trombone; (P) Tuba; (Q) Percussion; (R) Classical Guitar; (S) Lute; (T) Viola da gamba; (U) Recorder. May be repeated for credit. Offered as demand dictates. 

Performance Instruction—1 hour; independent practice—5 hours. Prerequisite: open to Music majors and minors; admission by audition and consent of instructor. Individual instruction in (A) Voice (prerequisite: of course 1 or the equivalent); (B) Piano; (C) Harpsichord; (D) Organ; (E) Violin; (F) Viola; (G) Cello; (H) Double Bass; (I) Flute; (J) Oboe; (K) Clarinet; (L) Bassoon; (M) French Horn; (N) Trumpet; (O) Trombone; (P) Tuba; (Q) Percussion; (R) Classical Guitar; (S) Lute; (T) Viola da gamba; (U) Recorder. May be repeated for credit. Offered as demand indicates.
145. Early Music Ensemble (2) I, II, III. Nutter Rehearsal—4 hours. Prerequisite: admission subject to audition before first class meeting. Rehearsal and performance of Baroque and Renaissance music for vocal ensemble and historical instruments. May be repeated for credit. (PAN grading only.)

146. 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 concert performance. Study, rehearsal, and performance of ensemble music for strings, winds, voice, piano, harpsichord, and organ. May be repeated for credit. (PAN grading only.)

150. Senior Seminar in Music (4) I. The Staff (Chairperson in charge) Lecture—4 hours. Prerequisite: course 25 and 25C, and consent of instructor; course 104C recommended. Intended primarily for majors in music intending to apply for graduate programs in music history, composition, or theory. Review of major issues in music theory and analysis, and the history and literature of music. (PAN grading only.)

199. Directed Group Study (1-3) I, II, III. The Staff (Chairperson in charge) Prerequisite: consent of instructor. (PAN grading only.)

199. Special Study for Advanced Undergraduates (1-3) I, II, III. The Staff (Chairperson in charge) (PAN grading only.)

Graduate Courses

200. Music Research (4) I. Reynolds 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 theses 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.


204. Advanced Conducting (3) I, II, III. The Staff (trombonist in charge) Tutorial—4 hours; practical—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) II. Slawson Seminar—2 hours; plus individual student laboratory 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. Swift Seminar—3 hours; term paper. Voice-leading analysis of tonal music derived from Schenker and pitch-class set theory. Recent work on compositional design problems of Martinus's concept of interrelated psychologically-oriented music theory, and theories of durational structure and time.

210B. Proseminar in Music (Mycology and Criticism) (4) II. Busse Berger 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. The Staff Seminar—3 hours; term paper. Intensive examination of major trends in ethnomusicology as exemplified by scholars working in technical non-Western cultures. Ethnomusicological theory, ranging from ethnographic description to metamuiscalological study (Segal) to analysis of individual genres to sociological study.

221. Topics in Music History (4) I. Busse Berger, III. Reynolds 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, Korea, Japan, Melanesia, and Inochindia. Issues concerning history, theoretical constructs, performance practice, and social and cultural settings of the music will be studied. May be repeated for credit.

299. Individual Study (1-12) I, II, III. The Staff (Holomok in charge) (SU grading only)

Teaching Methods Courses

300. The Teaching of Music (3) II. The Staff Lecture—3 hours. Prerequisite: course 3 or the equivalent. Methods of teaching music in grades K-12.

301. The Teaching of Music (3) II. The Staff Lecture—3 hours. Prerequisite: course 25 (or the equivalent). Methods of teaching music in grades 7-12.

Instrumental Methods. The courses in this series consider methods of teaching studio and band instruments, and include repertoire and program planning for secondary schools.

321A-321B. Stringed Instruments (1-1) II. The Staff Discussion—2 hours. Prerequisite: course 4C.

322. Brass Instruments (1) III. The Staff Laboratory—2 hours. Prerequisite: course 4C. Offered in alternate years.

323A-323B. Woodwind Instruments (1-1) III. The Staff Discussion—2 hours. Prerequisite: course 4C.

324. Percussion Instruments (1) II. The Staff Laboratory—2 hours. Prerequisite: course 4C. Consider teaching of percussion instruments. Survey course. Offered in alternate years.

Native American Studies

(College of Letters and Science)

Jack D. Forbes, Ph.D., Program Director
Program Office, TB 113 (916-752-3327)

Committee in Charge

Steve Crum, Ph.D. (Native American Studies)
Ines Hernandez, Ph.D. (Native American Studies)
Stefano Varot, Ph.D. (Native American Studies)
Jack D. Forbes, Ph.D. (Anthropology, Native American Studies)
George C. Longfah, M.F.A. (Native American Studies)
David Rilling, M.A. (Emeritus, Native American Studies)
David A. Robertson, Ph.D. (English)
Lenora A. Tirm, Ph.D. (Linguistics)
Delbert L. True, Ph.D. (Anthropology)

*Course not offered this academic year.

Faculty

Steve Crum, Ph.D., Professor
Jack D. Forbes, Ph.D., Professor
Carl N. Gorman, M.F.A., Lecturer Emeritus
Ines Hernandez, Ph.D., Assistant Professor
Sarah Hutchison, M.A., Lecturer Emeritus
George C. Longfah, M.F.A., Professor
David Rilling, M.A., Professor
Stefano Varot, Ph.D., Professor

The Major Program

Native American studies focuses upon the indigenous peoples of both North America. The program is interdisciplinary in its approach to the world of the American Indian and offers a comprehensive and comparative perspective.

The Program. Students electing a major in Native American studies from courses included in Plan I, Plan II, or Plan III. Plan I enables students to concentrate chiefly on the American Indians in the north of Mexico. Plan II encourages students to focus upon Meso-America with, however, some course work integrating Meso-America with North America and South America. Plan II includes upon South America with some course work integrating that region with the north.

Career Alternatives. An interest in the field of Native American studies is excellent preparation for a professional career such as teaching, law, human services, health, tribal administration, social work, and inter-tribal relations. Graduates schools and agencies in these and related areas are looking for students with broad interdisciplinary preparation and who possess knowledge and sensitivity relating to ethnic issues and cultural diversity.

A.B. Major Requirements:

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<tr>
<th>Units</th>
<th>Requirement</th>
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<tbody>
<tr>
<td>20</td>
<td>Preparatory Subject Matter (Plan I, II, and III)</td>
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<tr>
<td>4</td>
<td>Native American Studies 1</td>
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<tr>
<td>4</td>
<td>Native American Studies 2, 3, 5, 7, or one from</td>
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<td>12</td>
<td>Plan I, II, III and Plan II</td>
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<tr>
<td>16</td>
<td>Depth Subject Matter</td>
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<tr>
<td>16</td>
<td>Native American Studies 130A</td>
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<tr>
<td>4</td>
<td>Native American Studies 130B or 130C</td>
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<td>4</td>
<td>Native American Studies 157</td>
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<td>Native American Studies 180</td>
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<td>4</td>
<td>Plan I (North American Emphasis)</td>
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<tr>
<td>64</td>
<td>Total Units for the Major, Plan I</td>
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</tbody>
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Plan II (Mexico-Central America Emphasis)

Preparatory Subject Matter (see above). 20

Depth Subject Matter (see above). 16

Two courses from Native American Studies 116, 117, 118, 124, 141A, 141B, 141C

Two courses from Anthropology 131, 134, 141, 141B, 172, 173, 174, 175, 176, Geography 120, History 173A, 173B

One upper division Native American Studies course, selected in consultation with your major adviser

Total Units for the Major, Plan II. 64
Plan III (South American Emphasis)
Preparatory Subject Matter (see above).....20
Depth Subject Matter (see above).....16
Two courses from Anthropology 134, 141B, 144, 174, 175, Native American Studies 161, 168, 191A.....8
Two courses from Native American Studies 101, 181A, 181B, 181C, Spanish 149, or from Native American Studies 107, 166, 181.....1 specifically focused upon a South American language or topic.....8
Total Units for the Major, Plan III.....64

Major Adviser: D. Rissing.

Minor Program Requirements:
The Native American Studies minor provides an introduction to the Native experience in the Americas by means of exposure to course work dealing with some of the major aspects of Indian life, including history, values, politics, literature, and art.

Native American Studies.....32
Lower division requirement.....4
Native American Studies 1 or 10.....4
Upper division requirement.....20
Five upper division courses, at least one of which is chosen from each of the following groups:
Ethno-History, Native American Studies 130A, 130B, or 130C
Philosophy and values, Native American Studies 156, 157, or 160
Politics and current affairs, Native American Studies 118, 117, 116, 124, or 161
Art and literature, Native American Studies 101, 161A, 168, or 181C

Courses in Native American Studies

Lower Division Courses
1. Introduction to Native American Studies (4) I, II, III, The Staff
Lecture—3 hours; discussion—1 hour. Introduction to U.S. Indian tribal reservation culture; relationships of Native American Studies to other academic disciplines

2. Native American Experience (4) I, II, III, The Staff
Lecture—4 hours. Introduction to American Indian historical and socio-cultural development with emphasis upon the U.S. era and upon those processes such as relations with non-Indians which have contributed to the current condition of Indian people. General Education credit: Contemporary Societies/Introduction

3. Native American Music and Dance (4) I, The Staff
Lecture/discussion—4 hours. Introduction to the music and dance of the native peoples of the Americas. Students will study secular native music and dance from a cross-section of regions and tribes.

33. Native American Art in the U.S. (4) I. Longhaf
Lecture—4 hours. Comprehensive survey of Indian art forms with emphasis upon design, media, and function. Intended to familiarize the student with a wide range of styles and techniques.

34. Native American Art Workshop (4) I, II, III, Longhaf
Lecture—1 hour; laboratory—6 hours; to be arranged—3 hours. Prerequisite: consent of instructor; course 33 recommended. Studio projects in Native-American art, design, and crafts. (P/NP grading only.)

48. Ordination to Research in Native American Studies (4) II, Forbes
Lecture-discussion—3 hours; term paper. Prerequisite: Native American Studies major or minor, or consent of instructor. Introduces students to basic research resources pertinent to Native American subjects available in the region, including libraries, archives, museums, etc. Emphasis is upon learning to use documentary resources or other collections of data. Students will carry out individual projects. Limited enrollment.

55. Americanism: Native American Contributions to World View (4) I, II, III, The Staff
Lecture—4 hours. Prerequisite: course 1. Analysis and study of Americanism: traits, inventions, and developments originated in the Americas by native peoples and adopted by other peoples.

70. Native American Perception (4) I, II, III, The Staff
Lecture—4 hours. Prerequisite: study of the culturally determined attitudes, values, relations, and values developed by Native-American and the differences in perception between Native Americans and the dominant society.

99. Special Study for Undergraduates (1-5) I, II, III, The Staff
Prerequisite: consent of instructor. (P/NP grading only.)

Upper Division Courses
101. Contemporary Indian Art (4) I. Longhaf
Lecture—4 hours. Prerequisite: course 1. Historical review of contemporary Indian art from 1800 to the present by looking at the two art centers of Oklahoma and Santa Fe. Social pressures that have influenced the Indian art that exists today will be examined.

107. Special Topics in Native American Languages (4) I, II, III, The Staff
Lecture-discussion—4 hours. Prerequisite: consent of instructor. Investigation of various subjects in contemporary and historical Native American language studies. May be repeated for credit when a different topic is studied.

112. History and Culture of the Five Civilized Tribes (4) I, II, III, The Staff
Lecture—4 hours. Prerequisite: upper division standing; course 1. History and culture of the Native American people found in southeastern part of the U.S., called the "Five Civilized Tribes." Offered in alternate years.

115. Native American Traditional Governments (4) I, II, III, The Staff
Lecture—4 hours. Prerequisite: course 1; Anthropology 2. Study of selected Native American tribal governments, constitutions, political systems, and alliance systems. Offered in alternate years.

117. Native American Governmental Decision Making (4) I, II, III, 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, III, Rissing
Lecture—4 hours. Prerequisite: course 117. Examination of the various interest groups and movements found among Native people and how they relate to the determination of Indian affairs. Study of political action available to Native groups, and local communities, along with relevant theory relating to development, government, and policy. Offered in alternate years.

130A. Native American Ethno-Historical Development (4) I, Forbes
Lecture—4 hours. Prerequisite: course 1 or 10; History 17A recommended. Study of Native American ethno-History in North America before 1770's. General Education credit: Civilization and Culture/Non-Introductory. Recommended GE preparation: Native American Studies 1 or History 17A.

130B. Native American Ethno-Historical Development (4) I, II, III, Forbes
Lecture—4 hours. Prerequisite: course 1; History 17A-17B recommended. Study of Native American ethno-History in North America, 1770-1860. Offered in alternate years. General Education credit: Civilization and Culture/Non-Introductory. Recommended GE preparation: Native American Studies 1 or History 17A.

*Course not offered this academic year.

preparation: Native American Studies 1, 10, or 130A; or History 17A or 17B; or Anthropology 2.

130C. Native American Ethno-Historical Development (4) I, II, III, Crum

156. Native American Ethic and Value Systems (4) I, Varesse
Lecture—4 hours. Prerequisite: upper division standing; course 1. Analysis of Native American systems of values and how these values translate into actual behavior; attention to the problem of implementing traditional values in the twentieth century and the possible impact of native values in modern societies. Offered in alternate years. General Education credit: Civilization and Culture/Non-Introductory. Recommended GE preparation: Native American Studies 10.

*157. Native American Religion and Philosophy (4) I, II, The Staff
Lecture—4 hours. Prerequisite: upper division standing; course 1 or Anthropology 2. Religious and philosophical thinking of Native American people with emphasis upon North America. Offered in alternate years.

Lecture—4 hours. Prerequisite: upper division standing; course 70 and Women's Studies 50 recommended. Social and cultural history of the Native American women's personality including the development of the Indian girl and the life phases of mature womanhood. Autobiographical and biographical texts will be utilized. General Education credit: Contemporary Societies/Non-Introductory. Recommended GE preparation: Native American Studies 10 and Women's Studies 50.

181A-181B-181C. Native American Literature (4) I-II-III, The Staff
Lecture—4 hours. Prerequisite: English 3, Comparative Literature 1, 2, 3, or any course from the General Education Literature Preparation List. Analysis of works by or about Native Americans including novels and autobiographies, analysis of Native American poetry, oral literature, songs, and tales. (A), the novel and fiction; (B), nonfiction works by native authors; (C), non-American literature. Offered in alternate years. General Education credit: Civilization and Culture/Non-Introductory. Recommended GE preparation: any course from the GE Literature Preparation List.

188. Special Topics in Native American Literary Studies (4) I, II, III, The Staff
Lecture-discussion—3 hours; term paper. Prerequisite: upper division standing and consent of instructor. Special topics drawn from Native American literature. May be repeated for credit when a different topic is studied.

*190. Seminar in Native American Studies (2) II, The Staff (Forces in charge)
Discussion—2 hours. Prerequisite: senior standing. Seminar of critical issues faced by Native American people. (P/NP grading only.)

*191. Topics in Native American Studies (4) I, II, III, The Staff
Lecture-discussion—3 hours; term paper. Prerequisite: upper division standing and consent of instructor. Selected topics in Native American ethno-history, development, culture, and thought. May be repeated for credit when a different topic is studied.

Field work—36 hours. Prerequisite: senior standing and major in Native American Studies; completion of lower division major requirements, and course 151. Field work with governmental and community groups, under supervision of faculty advisor and sponsored by knowledge required in other courses to be applied in field work. (P/NP grading only.)

*Course not offered this academic year.
Nematology
(College of Agricultural and Environmental Sciences)
Howard Ferris, Ph.D., Chairperson of the Department
Department Office, 488 Hutchinson Hall
(815-752-1403)
Faculty
Edward P. Caawell, Ph.D., Assistant Professor
Howard Ferris, Ph.D., Professor
Scott L. Gardner, Ph.D., Assistant Professor
Bruce A. Jaffee, Ph.D., Associate Professor
Harry K. Kay, Ph.D., Professor (Entomology)
Benjamin F. Lowery, Ph.D., Professor Emeritus
Armind R. Maggents, Ph.D., Professor
Dewey J. Reek, Ph.D., Professor Emeritus
Becky B. Westdahl, Ph.D., Lecturer
Vernie M. Williamson, Ph.D., Assistant Professor
Minor Program Requirements:
Nematology (18-20)
Nematology 100, 110, and Veterinary Microbiology 132
Two or three courses from one of the following areas:
(a) Plant Science: Microbiology 102, Botany 120, 121, Entomology 100, 115, 156, 158, Soil Science 111, Zoology 112, 142.
(b) Entomology: Microbiology 102, Botany 120, 121, one upper division Entomology course, Soil Science 100, 111, Zoology 112, 142.
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 Division section in this catalog for details.
Courses in Nematology
Upper Division Courses
100. General Plant Nematology (4) I. Ferris
Lecture—2 hours; laboratory—3 hours. Prerequisite: Biological Sciences 1A or 1B. Introduction to the classification, morphology, biology, and control of the nematodes attacking cultivated crops.

110. Introduction to Nematology (2) I. Maggents
Lecture—2 hours. Prerequisite: Biological Sciences 1A or the equivalent or consent of instructor. The relationship of nematodes to man's environment.

196. Senior Project in Native American Studies (f) I, II, III. Forbes in charge Discussion in hour, independent study—3 hours. Prerequisite: senior standing and major in Native American Studies, course 195 (may be taken concurrently), and consent of instructor. Guided research project that enables student to apply the theory and research principles from major course work. Final product is to be a major senior project or thesis.

197TC. Community Tutoring in Native American Studies (1-5) I, II, III. The Staff (Forbes in charge) Tutorial—3-15 hours. Prerequisite: consent of major committee; upper division standing with major in Native American Studies. Supervise tutoring in community. (PIN grading only)

198. Directed Group Study (1-5) I, II, III. The Staff (Forbes in charge) Prerequisite: upper division standing; consent of instructor. (PIN grading only)

199. Special Study for Advanced Undergraduates (1-5) I, II, III. The Staff (Forbes in charge) Prerequisite consent of instructor. (PIN grading only)

Classification, morphology, ecology, distribution, and importance of nematodes occurring in water and soil as parasites of plants and animals.

196. Special Study for Advanced Undergraduates (1-5) I, II, III, summer. The Staff (Chairperson in charge) Prerequisite: consent of instructor (PIN grading only)

Graduate Courses
220. Principles and Techniques of Nematode Taxonomy and Morphology (4) I. The Staff
Lecture—2 hours; laboratory—6 hours. Prerequisite: course 100. Analysis and evaluation of the techniques used in the collection, extraction, and preparation of specimens, free-hand and histologic sections; presentation of illustrative material. Offered in alternate years.

222. Advanced Plant Nematology (3) I. Caawell, Jaffee, Williamson
Lecture—2 hours; laboratory—3 hours. Prerequisite: course 100 or the equivalent. Review and investigation of relationships between parasitic nematodes and the relationship between nematodes and their environment, and the relationship between nematodes and other pests. Emphasis on systems existing at the population, organism, and cellular levels. Offered in alternate years.

225. Nematode Taxonomy and Comparative Morphology (5) I. Maggents
Lecture—2 hours; laboratory—6 hours; 3 hours of laboratory to be announced. Prerequisite: course 226. The taxonomy, morphology, and comparative morphology of soil, freshwater, and marine nematodes as well as plant and animal parasites. Offered in alternate years.

240. Biological Control In Insect and Plant Nematology (2) I, II, III. Kay, Jaffee
Lecture—1 hour, laboratory—3 hours or field trips. Prerequisite: upper-division course in entomology, nematology, or plant pathology. Biological control potential of nematodes against insect pests and of microorganisms against nematode pests. Offered in alternate years.

243. Topics In Cellular and Behavioral Neurobiology (2) III. Mulloney
Discussion—1 hour, seminar—1 hour. Prerequisite: consent of instructor. An advanced examination of several current problems in neurobiology. Topics will vary in different years; may be repeated for credit. (SU grading only) (Same course as Zoology 243.)

245. Field Nematology (1) I. The Staff
Fieldwork—6 days. Prerequisite: courses 100, 222. Six-day demonstration and field study in applied nematology including diagnosis and prediction of nematode field problem strategies for control field plot design, and establishment in association with diverse California crops. (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) (Same course as Zoology 283.)

290. Seminar (1) I, II, III. The Staff (Chairperson in charge)
Seminar—1 hour. (SU grading only)

290C. Advance Research Conference (1) (Research Faculty)
Discussion—1 hour. Prerequisite: graduate standing and consent of instructor. Planning and results of research programs, proposals, and experiments. Discussion and critical evaluation of original research being conducted by the group. Discussion led by individual research instructors for research group.

299. 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)

*Noun not offered this academic year.

Neurobiology (A Graduate Group)
Martin Wilson, Ph.D., Chairperson of the Group
Group Office, 2320 Soder Hall (916-752-7468)
Faculty. The group includes 23 faculty members from nine departments in the College of Agricultural and Environmental Sciences, College of Letters and Science, the School of Medicine and Veterinary Medicine.

Graduate Study. The Graduate Group in Neurobiology offers programs of study leading to the Ph.D. degree. Neurobiology is a broad, interdepartmental program with faculty interests ranging all the way from molecular architecture of membrane channel proteins to the acquisition of song by juvenile birds. A major goal of the program is to acquaint students with the diversity of contemporary neurobiology. Details of the program may be obtained from the Group office.

Graduate Advisers. B. Mulloney (Zoology), P. Papniss (Animal Physiology).

Courses in Neurobiology
Graduate Courses
200LA. Laboratory Methods in Neurobiology (8) I, II, III. The Staff
Laboratory—18 hours. Prerequisite: standing in the Neurobiology Graduate Group. Individual research in the laboratory of a faculty member. Research problems will emphasis the use of contemporary methods and good experimental design. May be repeated for credit.

200LB. Laboratory Methods in Neurobiology (5) I, II, III. The Staff
Laboratory—9 hours. Prerequisite: standing in the Neurobiology Graduate Group. Individual research in the laboratory of a faculty member. Research problems will emphasis the use of contemporary methods and good experimental design. May be repeated for credit.

210. Contemporary Research in Neurobiology (3) I, II, III. The Staff (Chairperson in charge)
Lecture—2 hours; discussion—1 hour. Prerequisite: graduate standing in Neurobiology 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) III. Mulloney
Discussion—1 hour; seminar—1 hour. Prerequisite: consent of instructor. An advanced examination of several current problems in neurobiology. Topics will vary in different years; may be repeated for credit. (SU grading only) (Same course as Zoology 243.)

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) (Same course as Zoology 283.)

290C. Research Conference in Neurobiology (1) I, II, III. The Staff (Chairperson in charge)
Discussion—1 hour. Prerequisite: graduate standing in Neurobiology or consent of instructor. Course 299 (concurrently). Presentation and discussion of faculty and graduate student research in neurobiology. May be repeated for credit. (SU grading only)

299. 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)
Physiology 110 ............................................. 5

Food Service Management .................................. 24-25
Preparation: plan in advance to include the required course prerequisites.
Food Science and Technology 100A-100B, 101A-101B ............................................. 10
Food Service Management 120, 120L, 121, 122 ............................................. 11
Food Service Management 123 or Agricultural Economics 112 ...................................... 3-4
Replacement courses (see note above):

Nutrition and Food ............................................. 24
Preparation: plan in advance to include the required course prerequisites.
Nutrition 101, 111 ............................................. 9
Nutrition 120 ............................................. 4
Food Science and Technology 100A, 100B ............................................. 8
Physiology 110 ............................................. 5
Replacement courses (see note above):

Nutrition Science ............................................. 20-21
Preparation: plan in advance to include the required course prerequisites.
Biochemistry 101A-101B or Physiological Sciences 101A-101B ...................................... 6-7
Physiology 110 ............................................. 5
Nutrition 110, 111 ............................................. 9
Replacement courses (see note above):
Minor Adviser: R. Rucker.
Graduate Study. Programs of study leading to the M.S. and Ph.D. degrees are available in Nutrition. For information on graduate study contact the graduate adviser.

Courses in Nutrition

Lower Division Courses

10. Discoveries and Concepts in Nutrition (3) II, III. The Staff
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/Introductory. To receive GE credit, course must be taken in a concurrent or subsequent quarter.

11. Current Topics and Controversies in Nutrition (2) II, III. The Staff
Discussion—1 1/2 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. General Education credit: Nature and Environment/Introductory. 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 Culinary (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 major themes in food habit research; minority food habits; origins and development of dietary practices. General Education credit: Nature and Environment/Introductory.

93. Public Issues in Nutrition and Food Science (1) II. Schnoor
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. (PnP grading only) (Same course as Food Science and Technology 93.)

99. Individual Study for Undergraduates (1-5) I, II, III. The Staff
Prerequisite: consent of instructor. (PnP grading only)

Upper Division Courses

101. Introduction to Nutrition and Metabolism (4) I. Lonnardal
Lecture—4 hours. Prerequisite: Chemistry 8B; Physiology 2 or 110. Introduction to the metabolism of protein, fat, and carbohydrate; the role of vitamins and minerals; food utilization. Not open for credit to students who have taken courses 110 or 111.

110. Principles of Nutrition (5) II, III. Calvert (Animal Science) and Rucker (Nursing, Internal Medicine), Hung (Animal Science) and Rucker (Nutrition)
Lecture—5 hours. Prerequisite: Physiology 101B or Biochemistry 101B; a course in physiology or zoology. Fundamental principles of the nutrition of man and other animals. Physiological principles of nutrient requirements for growth, maintenance, and production. Physiological basis of nutritional disorders.

111. Human Nutrition (4) III. McDonald
Lecture—4 hours; discussion—1 hour. Prerequisite: course 110 or 111. Nutrition of humans; critical levels of nutrient requirements at various phases of life cycle.

112. Nutritional Assessment: Dietary, Anthropometric, and Clinical Measures (2) III. Brown
Lecture—1 hour; laboratory—2 hours. Prerequisite: course 111. Variety of biologic markers of human nutritional status including hematological, urinary, and hair analyses of clinical importance will be demonstrated and evaluated. Emphasizes the precision, accuracy, reliability, and interpretation of the values.

114. Developmental Nutrition (4) II. Keen
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. Brown (Animal Science)
Lecture—3 hours; laboratory—3 hours. Prerequisite: Chemistry 8B, Animal Science 41. Analyses and evaluation of feeds, influences of production, processing, and storage methods on nutritional value of feeds. Animal nutrition. Diet formulation.

116A-116B. Diet Therapy (3-3) III-I. 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, II. The Staff
Lecture—1 hour; laboratory—2 hours; extensive written assignments. Prerequisite: course 116A. Planning and evaluation of therapeutic diets; procedures in patient education. Coordinated with course 116B. (Deferred grading only; pending completion of 116AL-116BL sequence.)

116BL. Practicum in Diet Therapy (1) I, II. The Staff
Lecture—1 hour; laboratory—1 hour; extensive written assignments. Prerequisite: course 116B (may be taken concurrently); course 116AL. Planning and evaluation of therapeutic diets; procedures in patient education. Coordinated with course 116B. Continuation of course 116AL. (Deferred grading only; pending completion of 116AL-116BL sequence.)
117. Experimental Nutrition (5) I. Clifford Lecture—3 hours; laboratory—6 hours. Prerequisite: completion of 111, 113, 116, 102 or Physical Sciences 101B; 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, course 116A. Nutrition problems in contemporary communities and dietary target groups. The United States and in developing countries. Nutrition programs and policy principles of nutrition education.

120. Food Habits and their Nutritional Implications (4) I. Griswold Lecture—2 hours; discussion—1 hour. Prerequisite: upper division or graduate standing; upper division course in nutrition or Biochemistry 101B; 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) II. Salm and Macy (Animal Science) Lecture—3 hours; laboratory—1 hour. Prerequisite: Physiology 101B; Biochemistry 101A-101B or Physical Sciences 101A-101B; Microbiology 2 recommended. Study of nutrient utilization as influenced by the unique aspects of fermentation that occur in ruminant rumen.

122L. Ruminant Nutrition Laboratory (2) II. Macy (Animal Science) Laboratory—6 hours. Prerequisite: course 122 (concurrent). Students will conduct experiments in small groups and attend demonstrations on topics peculiar to ruminant digestive physiology and nutrition. The laboratory will deal with topics developed in lecture.

123. Nutrition of Non-Ruminant Animals (3) III. Klausing (Avian Sciences) Lecture—2 hours; laboratory—3 hours. Prerequisite: course 110 or 111. Physical Sciences 101A-101B or Biochemistry 101A-101B; upper division standing in biological or agricultural sciences recommended. Comparative nutrition of non-ruminant animals including domestic animals, wildlife and man. Relation of nutrition to body composition, feed intake, growth, disease, exercise and stress. Discussion and laboratory exercises on the scientific method for answering questions in nutrition.

124. Nutrition and Feeding of Finfishes and Shellfishes (3) III. Hung and Conklin (Animal Science) Lecture—3 hours. Prerequisite: course 110 or 111. Application of nutrition to feeding of finfishes and shellfishes; feeding habits, gastrointestinal anatomy, digestive physiology, aquatic environment, nutrient requirements, diet formulation and quality control, and feeding practices of commercial cultured fishes.

129. Journalistic Practicum in Nutrition (2) II. Stern Discussion—2 hours. Prerequisite: course 111; a course in written or oral expression or consent of instructor. Critical analysis and discussion of current, controversial issues in nutrition: the use of journalistic techniques to interpret scientific findings for the lay public. Students will be required to write several articles for campus media. Course may be repeated once for credit. Offered in alternate years.

130. Prosseminar in Nutrition (1) I, II, III. The Staff Seminar—2 hours. Prerequisite: senior standing; course 111. Discussion of human nutrition problems. Each term will involve a different emphasis among experimental, clinical, and dietetic problems of community, national and international scope. May be repeated for credit with consent of instructor. (P/NP grading only.)

190C. Nutrition Research Conference (1) I, II, III. The Staff (Schneeman in charge) Discussion and research conference: upper division students in Nutrition or related biological science; consent of instructor. Introduction to research findings and methods in nutrition. Presentation and discussion of research by faculty and students. May be repeated for credit. (P/NP grading only.)

192. Internship (1-12) I, II, III. The Staff Internship—3-36 hours. Prerequisite: one upper division course in nutrition or consent of instructor. Work experience on or off campus in practical application of nutrition, supervised by a faculty member. (P/NP grading only.)

197T. Topics in Nutrition (1-2) I, II, III. The Staff Seminar—laboratory—3 or 6 hours. Prerequisite: Nutrition Science, Dietetics, Community Nutrition or related major. Completion of course 101 or 110 with a grade of B or better. Tutoring of students in nutrition, guest instructors in nutrition, classes, presentations with nutrition 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 Study (1-5) I, II, III. The Staff (Schneeman in charge) (P/NP grading only.)

199. Special Study for Advanced Undergraduates (1-5) I, II, III. The Staff (Schneeman in charge) (P/NP grading only.)

Graduate Courses

201. Vitamin Metabolism (2) II. Rucker Lecture—2 hours. Prerequisite: course 110; Microbiology 2; Biochemistry 101A-101B or Physical Sciences 101A-101B; Physiology 110. Review of studies and relationships involving the metabolic functions of vitamins and the role of vitamins in nutrition. Special reference will be made to vitamin requirements and the metabolism and chemistry of vitamins and vitamin-like compounds emphasized.


203. Advanced Protein and Amino Acid Nutrition (2) II. The Staff (Rogers, Physiological Sciences, in charge) Lecture—2 hours. Prerequisite: course 110; Physiological Sciences 101B; Physiology 110 or the equivalent. Nutritional significance of protein and amino acids, including studies of the influence of dietary protein on digestion, absorption, metabolism, resistance to disease, and food intake. Study of dietary requirements and interactions among amino acids.

204. Mineral Metabolism (2) III. Lonnerdal, Kaen Lecture—2 hours. Prerequisite: course 110; Microbiology 2; Biochemistry 101A-101B or Physical Sciences 110. Studies of metabolic functions and nutritional interrelationships involving minerals.

216. Advanced Diet Therapy (3) III. The Staff Lecture—3 hours. Prerequisite: course 110A-110B. Nutrition and disease interrelationships at cellular, tissue, and whole body levels with emphasis on human disease. Critical evaluation of methodology in the study of Nutrition in disease states.

218. Advanced Field Work in Community Nutrition (2-12) I, II, III, extra session summer. The Staff Discussion—1 hour; field work. Prerequisite: courses 110, 118, 119, 120; consent of instructor. Direct experience in community nutrition. Organization and implementation of nutrition programs.

219A. International Nutrition (3) III. Brown, Dewey, Pollitt (Applied Behavioral Sciences) Lecture/discussion—3 hours. Prerequisite: upper division course in nutrition or consent of instructor. Epidemiology, etiology, and consequences of undernutrition in developing countries.

219B. International Nutrition (3) III. Brown, Dewey, Pollitt (Applied Behavioral Sciences) Lecture/discussion—3 hours. Prerequisite: upper division course in nutrition or consent of instructor. Nutrition policies and programs in developing countries.

252. Nutrition and Development (3) I. Keen Lecture—3 hours. Prerequisite: courses 201, 202, 203. Relationship of nutrition to prenatal and early postnatal development. Offered in alternate years.

253. Control of Food Intake (3) II. Rogers (Physiological Sciences), Menzel (Animal Science), Stern 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 physiological control of feeding: energy and physiological mechanisms controlling food intake. Subject matter will be approached through lectures, laboratory demonstration and discussions where students and staff will critically evaluate the literature. Offered in alternate years.

254. Applications of System Analysis in Nutrition (3) I. Baclik (Animal Science) Lecture—2 hours; discussion—1 hour. Prerequisite: course 201 or 202 or consent of instructor. Comprehensive study of the use of system analysis to study behavioral, physiological, and physiological mechanisms controlling food intake. Subject matter will be approached through lectures, laboratory demonstration and discussions where students and staff will critically evaluate the literature. Offered in alternate years.

256. Nutritional and Hormonal Control of Animal Metabolic Function (3) III. Baldwin (Animal Science) Lecture—2 hours; discussion—1 hour. Prerequisite: course 201 or 202 or consent of instructor. Comprehensive study of the effects of nutritional and hormonal control on metabolism. Subject matter will be approached through lectures, laboratory demonstration and discussions where students and staff will critically evaluate the literature. Offered in alternate years.

257. Selected Topics in Nutritional and Hormonal Control of Nitrogen Metabolism (2) I. Klausing (Avian Sciences), Calvert (Animal Science) Lecture/discussion—3 hours. Prerequisite: courses 201 through 204; Physiological Sciences 205A-205B or the equivalent. Quantitative and qualitative aspects of nitrogen metabolism; critical evaluation of dietary intake, hormones and diet hormone interactions which affect nitrogen metabolism, including protein synthesis degradation, amino acid synthesis catabolism, nitrogen transport excretion, depending on current literature. Offered in alternate years.

258. Field Research Methods in International Nutrition (3) II. Brown, Dewey, Pollitt (Applied Behavioral Sciences) Lecture/discussion—3 hours. Prerequisite: graduate standing or consent of instructor. Issues and problems to be discussed: field research in less-developed countries, including ethics; relationships with local governments, communities, and scientists; data collection techniques and quality assurance; research design, research budgets, and other administrative and personal issues. Offered in alternate years.

290. Beginning Nutrition Seminar (1) I, II. The Staff 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. The Staff (Rogers in charge) Discussion—1 hour. Prerequisite: graduate standing and consent of instructor. Major professors lead research discussions with their graduate students. Research papers and methods and topics of discussion presented and evaluated. Format will combine seminar and discussion style. (SU grading only.)

291. Advanced Nutrition Seminar (1) I, II, III. The Staff (Baldwin 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 (Schneeman 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 evalua-
Nutrition

NUTRITION

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 (Schneeman in charge). (SU grading only)

299. Research 1-12 I, II, III. The Staff (Schneeman in charge). (SU grading only)

Professional Course

390. Supervised Teaching in Dietetics 2-12 I, II, III, extra-semester summer. The Staff. Laboratory—6-28 hours. Prerequisite: graduate standing in the M.S. program in Nutrition with emphasis in dietetics; consent of instructor. Directed teaching in approved dietetic internships or coordinated program in dietetics. May be repeated for a total of 12 units; 3 units may be counted toward degree credit.

Nutrition

(A Graduate Group)

R. L. Baldwin, Ph.D., Chairperson of the Group
Group Office, 1151 Meyer Hall (916-752-2512)
Faculty: Faculty are drawn from the Colleges of Agricultural and Environmental Sciences, and Letters and Sciences, 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 in interdiary metabolism; studies on enzymic adaptation, concentrating, nutrition, amino acid utilization requirements and utilization; nutrient balance and food intake regulation; biological antioxidants; food toxicants; mineral and vitamin nutrition; various anodermal changes and postnatal development; pancreatic nutrition; the application of biochemistry to nutritional analyses; human and animal dietetics; and international nutrition. For detailed information regarding these programs, address the chairperson of the group.

Graduate Advisers. Consult the Nutrition Graduate Group Office.

Nutrition Science

(College of Agricultural and Environmental Sciences)

The Major Program

The study of nutrition encompasses all aspects of the collection, preparation, and consumption of food. Also important in the study of nutrition are the biochemical reactions that take place within the body's cells to utilize these nutrients. This is the level at which the nutrition science major explores the general subject of nutrition.

The Program. While students may elect to take courses concerning the social, psychological, economic, or cultural aspects of nutrition, the bulk of the course work making up the major consists of courses in the sciences. Nutrition 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, 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

<table>
<thead>
<tr>
<th>Course Title</th>
<th>Required Courses</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>59-61</td>
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<tr>
<td>Biological sciences (Biological Sciences 1A, 1B, 1C)</td>
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<tr>
<td>Chemistry (1A-1B-1C-5; and 8A-8B or 128A-128B and 128A)</td>
<td>25-27</td>
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<td>Computer science (Computer Science 10 or Applied Science and Management 21)</td>
<td>5</td>
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<td>Mathematics (Mathematics 1A-1B)</td>
<td>6</td>
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<td>Physics (Physics 1A-1B)</td>
<td>6</td>
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<tr>
<td>Statistics (Statistics 13 or Agricultural Science and Management 150)</td>
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<tr>
<td>Breadth/General Education</td>
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<tr>
<td>Satisfactory of General Education requirement plus additional course work in social science or humanities</td>
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<td>Depth Subject Matter</td>
<td>26-29</td>
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<td>Biochemistry (Biochemistry 101A-101B or Physical Science 101A-101B)</td>
<td>6-7</td>
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<td>Nutrition 110, 111, 117</td>
<td>14</td>
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<td>Nutrition courses selected from 112, 113, 114, 115, 116A, 116B, 122, 122S, 123, 190, 190C, 198, and 189</td>
<td>6-8</td>
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<tr>
<td>Restricted Electives</td>
<td>42</td>
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<tr>
<td>Biochemistry laboratory (Biochemistry 101L)</td>
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<td>Food science</td>
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<td>Physiology with laboratory (Physiology 110, 110L, plus an additional physiology course)</td>
<td>10</td>
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<tr>
<td>Additional nutrition or related biological and physical sciences</td>
<td>20</td>
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<tr>
<td>Unrestricted Electives</td>
<td>16-22</td>
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<td>Total Units for the Degree</td>
<td>180</td>
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</table>

Ophthalmology

See Medicine, School of

Organizational Studies

See Sociology

Orientation

(College of Agricultural and Environmental Sciences)

Course in Orientation

Questions pertaining to the following course should be directed to the instructor or to the Biochemistry and Biophysics Department, 149 Briggs Hall.

Lower Division Course

1. Orientation (no credit) I, II, III. Chaykin (Biochemistry and Biophysics)

Discussion. Exploration of the philosophy, purposes, significance, expectations and mechanisms of university education. (PND grading only.)

Orthopaedic Surgery

See Medicine, School of

Otolaryngology

See Medicine, School of

Pathology

See Pathology (Medicine, School of); and Pathology (Veterinary Medicine), below

Pathology

(School of Veterinary Medicine)

Donald L. Dungworth, B.V.Sc., Ph.D., Chairperson of the Department
Department Office, 1126 Haring Hall (916-752-1365)
Faculty

Mark L. Anderson, D.V.M., Ph.D., Assistant Professor of Clinical Diagnostic Pathology (California Veterinary Diagnostic Laboratory)
Brad C. Barr, D.V.M., Ph.D., Assistant Adjunct Professor (California Veterinary Diagnostic Laboratory)
Arthur A. Bickford, V.M.D., Ph.D., Adjunct Professor (California Veterinary Diagnostic Laboratory)
Patricia C. Blanchard, D.V.M., Ph.D., Assistant Adjunct Professor (California Veterinary Diagnostic Laboratory)

Obstetrics and Gynecology

See Medicine, School of
Courses in Pathology

Upper Division Course

199. Special Study for Advanced Undergraduates (1-5) I, II, III. The Staff (Chairperson in charge) (PRN grading only)

Graduate Courses

281. Foreign Animal Diseases (3) I. Olander Lecture—3 hours. Prerequisite: Veterinary Medicine 452, and 451 or 453. Designed for students interested in research and teaching in tropical veterinary medicine. Diseases studied are the most important ones that currently ravage third-world countries, particularly in Africa and Latin America. (SU grading only.) Offered in alternate years.

282. Tumor Pathology (3) II. The Staff (Dungworth in charge) Lecture—3 hours. Prerequisite: graduate standing or final-year veterinary student and consent of instructor. The histogenesis, incidence, geographical distribution, etiology, transmission, immunity, host responses, gross and microscopic structure, and metastasis of the neoplasms of domestic animals. Offered in alternate years.

286A-286B-286C. Selected Topics in Advanced Special Pathology (2-1-1) I, II, III. The Staff (Dungworth in charge) Lecture—variable. Prerequisite: graduate standing, DVM degree, or final-year veterinary student. Varied topics. See department for details. (Deferred grading only, pending completion of sequence.) Offered in alternate years.

287. Comparative Pathology of Laboratory Animals (3) II. Lowneart 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, arthropods, and certain invertebrates as well as rodents, lagomorphs, and non-human primates. Emphasis will be on recognition of lesions and understanding of pathogenesis. Offered in alternate years.

290. Seminar in Veterinary Pathology (1) I, II, III. The Staff Seminar—1 hour. (SU grading only)

291. Histopathology Conference (1) I, II, III. The Staff (Wilson in charge)
Discussion—one hour. Prerequisite: graduate standing or final-year veterinary student; consent of instructor. Discussion of selected cases based on records and slides. Defense of diagnoses. (SU grading only)

292. Surgical Pathology Conference (1) I, II, III. The Staff (Pool in charge) Discussion—one hour. Prerequisite: graduate standing or final-year veterinary student; consent of instructor. Discussion and diagnosis of current surgical pathology cases based on clinical records and microscopic study. (SU grading only)

293. Necropsy and Surgical Pathology (1-4) I, II, III. The Staff (Olander in charge) Discussion—one hour; laboratory—32 hours. Prerequisite: graduate standing; consent of instructor. Responsible diagnostic casework. Performance of necropsies, slide reading, and case reporting. (SU grading only)

294. Comparative Pathology Conference (1) I, II, III. Lowneart Discussion—one hour. Prerequisite: graduate standing or final-year veterinary student; consent of instructor. Discussion of selected topics in comparative pathology based on currently available catalog material 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)

298. Group Study (1-5) I, II, III. The Staff Group Study of advanced topics in pathology. (SU grading only)

299. Research in Veterinary Pathology (1-12) I, II, III. The Staff (SU grading only)

Pediatrics

See Medicine, School of

Pharmacology

See Medical Pharmacology and Toxicology in Medicine, School of

Pharmacology and Toxicology

See Pharmacology and Toxicology (A Graduate Group), below; and Veterinary Pharmacology and Toxicology

Pharmacology and Toxicology (A Graduate Group)

David E. Hinton, Ph.D., Acting Chairperson of the Group
Group Office, 4111 Meyer Hall (Department of Environmental Toxicology, 816-752-4516)

Faculty. Graduate group faculty members are based in the departments of Environmental Toxicology, Pharmacology, Veterinary Pharmacology and Toxicology, and other related departments and laboratories in The School of Medicine and Veterinary Medicine, and the College of Agricultural and Environmental Sciences.

Graduate Study. The Graduate Group In Pharmacology and Toxicology offers programs of study and research leading to the M.S. and Ph.D. degrees. Areas of research specialization are broad in scope and include analytical pharmacology and toxicology, clinical pharmacology and toxicology, ecological, food-nutritional toxicology, genetic and development pharmacology and toxicology, neuropharmacology and toxicology, reproduction pharmacology and toxicology, and respiratory pharmacology and toxicology. For detailed information on the program of study, contact the appropriate graduate adviser or the group chairperson.

Graduate Advisers. C.G. Flesher (Veterinary Pharmacology and Toxicology), A.J. Hance, (Pharmacology), F. Matsumura (Environmental Toxicology), B.W. Wilson (Environmental Toxicology).

Courses in Pharmacology and Toxicology

Graduate Courses

201. Principles of Pharmacology and Toxicology I (5) Miller (Environmental Toxicology) Lecture—3 hours; discussion—1 hour; laboratory—demonstration—3 hours. Prerequisite: Biochemistry 1013, Physiology 110. Basic concepts underlying metabolic fate of xenobiotics, receptor and cell biology, and chemotherapy for cancer and infectious disease. Specific topics include fate processes, disposition kinetics, dose-response relationships, cellular toxicity and oncogenesis.

202. Principles of Pharmacology and Toxicology II (5) I. Buckpitt (Veterinary Pharmacology and Toxicology) Lecture—3 hours; discussion—1 hour; laboratory—demonstration—3 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) Miller (Pharmacology) Lecture—4 hours; discussion—1 hour; laboratory—demonstration—3 hours. Prerequisite: courses 201 and 202. 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. Ecotoxicology, risk assessment and epidemiology.

230. Advanced Topics In Pharmacology and Toxicology (1-5) I, II, III. The Staff Lecture-discussions—seminars—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)

Philosophy

(College of Letters and Science)

Michael V. Wedg, Ph.D., Chairperson of the Department

David I. Cott, Ph.D., Acting Chairperson of the Department (1981-82)

Department Office, 404 Surge IV (916-752-0607)
Faculty
William H. Bossart, Ph.D., Professor
David I. Copp, Ph.D., Professor
Michael R. Dietrich, Ph.D., Assistant Professor
Joy I. Friedman, Ph.D., Assistant Professor
Neal W. Gilbert, Ph.D., Professor Emeritus
Marjorie Grene, Ph.D., Professor Emeritus
James R. Gneissm, Ph.D., Associate Professor
Michael J. Julaen, Ph.D., Professor
Jeffrey King, Assistant Professor
John F. Malcolm, Ph.D., Professor
George J. Mattay II, Ph.D., Associate Professor
Paul Tellire, Ph.D., Professor
Michael V. Weinert, Ph.D., Professor
Richard A. Wolin, M.A., Visiting Professor

The Major Program
Philosophy is the study of conceptual problems that pertain to the nature of knowledge, reality, and human conduct.

The Program. The Department of Philosophy offers courses in such areas as the theory of knowledge, metaphysics, logic, ethics, and aesthetics. In addition, upper division course work is given in the fields of philosophy of history, philosophy of mathematics, political philosophy, philosophy of religion, and philosophy of the natural and social sciences.

Philosophy is a subject in which the problems discussed recur, or have important roots in past discussion. The history of philosophy is thus important not only as part of the heritage of educated persons, but also because it is relevant to contemporary issues. The department therefore places great emphasis on the history of philosophy, and provides courses in the major figures and traditions of western philosophy, as well as in the influential contemporary schools of the continental and analytic varieties.

Career Alternatives. Many students major in philosophy with a plan to go on to advanced work and teach philosophy, or as background training for other professions. Philosophy majors have done extremely well in law schools and medical schools, for example. Also, many philosophy majors go on to advanced work in other academic areas in the humanities and social sciences; graduates may also go into such fields as government, the ministry, publishing, social work, and even business.

A.B. Major Requirements:

Preparatory Subject Matter

<table>
<thead>
<tr>
<th>UNITS</th>
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<tbody>
<tr>
<td>Philosophy 12, 21, 22, 23</td>
</tr>
<tr>
<td>Depth Subject Matter</td>
</tr>
</tbody>
</table>

Upper division units in Philosophy selected with approval from the major adviser. Total units for the major 52. Major Adiresor: G. J. Mattay, J. F. Malcolm.

Minor Program Requirements:

Students wishing to minor in Philosophy may choose a general minor or a minor specializing in logic. There are no specific courses required for the general minor, so students may create their own program to suit their own interests, subject to the approval of the minor adviser. The range of choice in the logic specialization is limited to the courses listed.

Philosophy—General

<table>
<thead>
<tr>
<th>UNITS</th>
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<tbody>
<tr>
<td>20 upper division units in philosophy, chosen in consultation with the minor adviser</td>
</tr>
</tbody>
</table>

Philosophy—Logic

<table>
<thead>
<tr>
<th>UNITS</th>
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</thead>
<tbody>
<tr>
<td>Philosophy 12 or Mathematics 108</td>
</tr>
</tbody>
</table>

Philosophy 112, 116
Select units from Philosophy 131, 132, 133, 134, 135 | 12 |

Minor Adviser: R. A. Armin.

Courses for Non-Majors. The department offers a range of courses. Philosophy 1 is a General Education course for the non-major. Students pursuing careers in agriculture and engineering might find Philosophy 5 and 104-A especially useful, since these courses provide practice in concise and logical writing. Science and mathematics students may find these courses useful, as well as Philosophy 12, 107, 108, and 112. Pre-law students and students planning careers in medicine or the various health sciences may be interested in Philosophy 14 and 114-A. The offerings at the upper division level include courses of direct relevance to students in psychology, history, art, sociology, anthropology, and political science.

Department Activities. The Philosophy department sponsors a lecture-seminar series of well-known philosophers who present papers in their fields of expertise; and it sponsors the interdisciplinary History and Philosophy of Science lecture series. The department also operates on-going faculty and graduate student colloquia; students are welcome to attend and join these discussions. Information can be obtained in the department office.

Graduate Study. The Department of Philosophy offers programs of study leading to the M.A. and Ph.D. degrees. Detailed information may be obtained by writing to the Graduate Adviser. Graduate Adviser: M. J. Ruben.

Courses in Philosophy

Lower Division Courses

1. Introduction to Philosophy (4), I, II, III. The Staff (Chairperson in charge)
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/Introductory.

2. Critical Reasoning (4), I, II, III. The Staff
Lecture—3 hours; discussion—1 hour. Core of good reasoning in everyday life and in science. Basic principles of deduction and induction; fallacies in reasoning; techniques and aids to reasoning; principles of scientific investigation; aids to clarity. Not open to seniors who have completed course 6.

3. Critical Reasoning and Writing (4), I, II, III. The Staff
Lecture—3 hours; discussion—1 hour. Techniques and aids to reasoning; principles of scientific investigation; aids to clarity. Not open to seniors who have completed course 6.

4. Introduction to Ethics (4), I, II, III. The Staff
Lecture—3 hours; discussion—1 hour. Problems of ethical conduct. Not open to seniors who have completed course 6.

5. Introduction to Modern Philosophy (4), I, II, III. The Staff
Lecture—3 hours; discussion—1 hour. Basic principles of deduction and induction; fallacies in reasoning; techniques and aids to reasoning; principles of scientific investigation; aids to clarity. Not open to seniors who have completed course 6.

6. Analysis of Contemporary Issues (4), I, II, III. The Staff
Lecture—3 hours; discussion—1 hour. Basic principles of deduction and induction; fallacies in reasoning; techniques and aids to reasoning; principles of scientific investigation; aids to clarity. Not open to seniors who have completed course 6.

7. History of Philosophy (4), I, II, III. The Staff
Lecture—3 hours; discussion—1 hour. Survey of the history of philosophy from the Presocratics to Kant. General Education credit: Civilization and Culture/Introductory.

8. Approaching Scientific Reasoning (4), I, II, III. The Staff
Lecture—3 hours; discussion—1 hour. An introduction to the nature and use of scientific reasoning. Not open to seniors who have completed course 6.

Lecture—3 hours; discussion—1 hour. An introduction to political theory. Not open to seniors who have completed course 6.

10. Metaphysics (4), I, II, III. The Staff
Lecture—3 hours; discussion—1 hour. Examination of the concept of the person, that is, of our intuitions about what persons are, e.g., that persons are agents that they have a distinct psychology, that they are rational, that they are language-users, that they are moralities. General Education credit: Civilization and Culture/Introductory.

11. Ethical and Social Problems in Contemporary Society (4). The Staff
Lecture—3 hours; term paper. Philosophical issues and problems involved in contemporary moral and social problems. Among possible topics are: equality and diversity and revolution, racial and sexual discrimination, environment, and population control, genetic engineering, technology, and human values, sexual morality, freedom in society. General Education credit: Civilization and Culture/Introductory.

12. Historical Introduction to Political Philosophy (4). The Staff
Lecture—3 hours; discussion—1 hour. Introduction to political philosophy through the reading of classic texts by such philosophers as Plato, Hobbes, Locke, and Marx. Problems to be discussed may include the nature of justice, the right of rebellion, and the defensibility of capitalism. General Education credit: Civilization and Culture/Introductory.

13. Philosophy of Mind (4). The Staff
Lecture—3 hours; discussion—1 hour. Survey of the philosophy of mind. General Education credit: Civilization and Culture/Introductory.

14. History of Philosophy: Seventeenth Century (4). The Staff
Lecture—3 hours; discussion—1 hour. Selections from Descartes, Spinoza, Leibniz, and Hobbes. General Education credit: Civilization and Culture/Introductory.

15. History of Philosophy: Eighteenth Century (4). The Staff
Lecture—3 hours; discussion—1 hour. Selections from Locke, Berkeley, Hume, and Kant. General Education credit: Civilization and Culture/Introductory.

16. Introduction to Ethics (4). The Staff
Lecture—3 hours; discussion—1 hour. An introduction to ethical theory and the nature of moral truth. Not open to seniors who have completed course 6.

17. Approaching Scientific Reasoning (4). The Staff
Lecture—3 hours; discussion—1 hour. A course in scientific thinking and the kinds of reasoning used in such practice. Topics include: adequate justification, criteria, and strategies for distinguishing scientific from pseudoscientific theories. Not open to seniors who have completed course 6.

18. Historical Introduction to Political Philosophy (4). The Staff
Lecture—3 hours; discussion—1 hour. An introduction to political philosophy through the reading of classic texts by such philosophers as Plato, Hobbes, Locke, and Marx. Problems to be discussed may include the nature of justice, the right of rebellion, and the defensibility of capitalism. General Education credit: Civilization and Culture/Introductory.

19. History of Philosophy: Seventeenth Century (4). The Staff
Lecture—3 hours; discussion—1 hour. Selections from Descartes, Spinoza, Leibniz, and Hobbes. General Education credit: Civilization and Culture/Introductory.

20. History of Philosophy: Eighteenth Century (4). The Staff
Lecture—3 hours; discussion—1 hour. Selections from Locke, Berkeley, Hume, and Kant. General Education credit: Civilization and Culture/Introductory.

21. Introduction to Ethics (4). The Staff
Lecture—3 hours; discussion—1 hour. An introduction to ethical theory and the nature of moral truth. Not open to seniors who have completed course 6.

22. Approaching Scientific Reasoning (4). The Staff
Lecture—3 hours; discussion—1 hour. A course in scientific thinking and the kinds of reasoning used in such practice. Topics include: adequate justification, criteria, and strategies for distinguishing scientific from pseudoscientific theories. Not open to seniors who have completed course 6.

23. Historical Introduction to Political Philosophy (4). The Staff
Lecture—3 hours; discussion—1 hour. An introduction to political philosophy through the reading of classic texts by such philosophers as Plato, Hobbes, Locke, and Marx. Problems to be discussed may include the nature of justice, the right of rebellion, and the defensibility of capitalism. General Education credit: Civilization and Culture/Introductory.
102. Theory of Knowledge (4) II. Matty
Lecture-discussion—4 hours; term paper. Prerequisite: one course in philosophy recommended. Philosophical problems of perception and thought, memory and preconception, imagination, truth and error, belief and knowledge. Types of epistemology. General Education credit: Civilization and Culture/Non-Introductory. Recommended GE preparation: Philosophy 1, 22, or 23.

103. Philosophy of Mind (4) III. King
Lecture-discussion—3 hours; term paper. The relation between mind and body, knowledge of other minds, and the explanation of mental acts. Discussion of such concepts as action, intention, and causation.

104. Introduction to Philosophy of Science (4) I. The Staff
Lecture-discussion—3 hours; term paper. Prerequisite: course 12 or 31. Introduction to philosophy of science: logic of scientific explanation, theory testing and confirmation, reductionism, theory structure, laws, scientific change, concepts and theories central to various natural sciences will be used in illustration of key ideas. Not all topics will be equally emphasized.

110. Philosophy of Art (4) III. The Staff
Lecture-discussion—2 hours; term paper. Prerequisite: one course in philosophy recommended. The nature of beauty, the nature of art, the theory of artistic creation, the nature of taste, and the nature of aesthetic experience. Not all topics will be equally emphasized.

111. Philosophy of Space and Time (4) II. The Staff
Lecture-discussion—3 hours; term paper. Prerequisite: one upper division philosophy course. Philosophical problems of space and time. The philosophical Implications of space-time theories, such as those of Newton and Einstein. Topics may include the nature of identity, convention absolutist versus relativist views of space and time, philosophical impact of relativity theory.

112. Intermediate Logic (4) II. Taller
Lecture—3 hours; discussion—1 hour. Prerequisite: course 12 or 31. Development of the full quantifier logic, with identity and descriptions; decision procedures; advanced translation of English into the formal language; elementary theory of classes and relations; Russell's paradox.

114A. History of Ethics (4) I. The Staff
Lecture—3 hours; term paper. Prerequisite: one philosophy course recommended. Introduction to major writings of philosophers on central problems of right conduct; principles of obligation, responsibility, justice, the meaning of the basic terms of ethical language. Readings from such philosophers as Aristotle, Butler, Hume, Kant, Mill.

114B. Problems of Ethical Theory and Practice (4) III. Copp
Lecture-discussion—3 hours; term paper. Prerequisite: one course in philosophy recommended. Discussion of important problems of ethical theory with application to specific ethical problems. Examples: relativism, utilitarianism, justice, act and rule utilization, concept of a right, justification of punishment, the death penalty, morality of civil disobedience, abortion, war.

115. Philosophy of Law (4) III. The Staff
Lecture-discussion—3 hours; term paper. Prerequisite: one course in philosophy recommended. 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.

117. Political Philosophy (4) III. The Staff
Lecture-discussion—3 hours; term paper. Prerequisite: one course in philosophy recommended. Intensive examination of some central concepts of political thought such as the state, sovereignty, rights, obligation, freedom, law, authority, and responsibility in political interaction. General Education credit: Civilization and Culture/Non-Introductory. Recommended GE preparation: Philosophy 2, 22, or 23.

120. Topics in Metaphysics (4) II. Jublin
Lecture-discussion—4 hours. Prerequisite: course 101. Examination of myths and metaphysics, including: logical forms in metaphysics, e.g., atomism; necessity; identity; ontological categories; minds, bodies, and persons; space and time; freedom and determinism.

122. Topics in Theory of Knowledge (4) III. 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) II. Wolheim
Lecture-discussion—3 hours; term paper. Prerequisite: one course in philosophy recommended. Nature of art, of artistic creation, of the work of art, and of aesthetic experience; nature and validity of criticism; relations of art to nature.

127. Philosophy and Economics (4) II. 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) II. Jublin
Lecture-discussion—3 hours; term paper. Prerequisite: course 12 or one course for credit in mathematics. Nature of formal systems and mathematical theorems. Selected topics include logic and semantical paradoxes; foundations of mathematics; set theory, type theory, and intuitional theory; philosophy of geometry; philosophical implications of Gödel's incompleteness results.

132. History of Logic (4) II. Friedmann
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. Survey of Advanced Logic (4) III. Friedman
Lecture—4 hours; discussion—1 hour. Prerequisite: course 112 or consent of Instructor. Survey of topics in mathematical logic includes: axiomatic logic, theory of descriptions, metalogic, models, Tarski's theorem of the non-definability of classes and relations, Russell's Paradox, type theory and axiomatic set theory, Gödel's incompleteness theorems, computability and decidability, and nonstandard logics. Applications to epistemology, ethics, or temporality.

135. Alternative Logics (4) III. Matty
Lecture-discussion—3 hours; discussion—1 hour. Prerequisite: course 112 or the equivalent. Survey of the main systems of modal logic, including Lewis systems S4 and S5. "Possible worlds" semantics and axiomatic treatments. Applications to epistemology, ethics, or temporality.

137. Philosophy of Language (4) II. King
Lecture-discussion—3 hours; term paper. Prerequisite: one course in philosophy or linguistics. Discussion of problems arising from consideration of the syntax and semantics of natural and formal languages. Nature of linguistic rules and universals; theories of universal grammar; linguistic implications for theories of cognition.

143. Helenistic Philosophy (4) II. The Staff
Lecture-discussion—3 hours; term paper. Prerequisite: course 21.

145. Medieval Philosophy (4) III. Malcolm
Lecture-discussion—3 hours; written reports. Prerequisite: course 21. Study of major philosophers in the medieval period.

146. Renaissance Philosophy (4) II. The Staff
Lecture-discussion—3 hours; term paper. Renaissance conceptions of man, as found in the writings of Valla, Floco, Pico, Pomponazzi, Erasmus, Vives, and Montaigne. Some reference to current religious and social developments.

151. Philosophy of the Nineteenth Century (4) I. The Staff
Lecture-discussion—4 hours. Prerequisite: courses 21, 22, or 23 recommended. Idealism of Hegel, the positivism of Comte, Marx, the irrationality of Kierkegaard, Nietzsche's and Dostoevsky's General Education credit: Civilization and Culture/Non-Introductory. Recommended GE preparation: Philosophy 1, 22, 23, History 147A or 147B.

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, Washburne, and O. H. Cook.

156. Contemporary Analytic Philosophy (4) II. King
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 word semantics; influential works by philosophers such as Russell, Moore, Wittgenstein, Austin, Carnap, Quine, Putnam, Kripke, and Frege.

158. Phenomenology and Existentialism in Germany (4) II. Bossert
Lecture—3 hours; term paper. Prerequisite: course 23 recommended. Twentieth-century German thought such as Husserl, Heidegger, Jaspers.

159. Phenomenology and Existentialism in France (4) III. Bossert
Lecture—3 hours; term paper. Prerequisite: course...
210. Philosophy of Science (4) II. Teller Seminar—3 hours; term paper. Prerequisite: graduating standing in philosophy or consent of instructor. Treatment of one or more general topics of current interest in the philosophy of science, such as scientific explanation, theories of confirmation, scientific realism, reduction in physics and biology. Course may be repeated for credit with consent of instructor.

212. Political Philosophy (4) I. Matty Seminar—3 hours; term paper. Prerequisite: course 112 and Mathematics 106, or the equivalent. Uses of logic in political philosophy, including applications of logical propositions to problems in political philosophy. Philosophical issues in logic, including the nature of logical truth, the correctness of logical systems, and the metaphysical presuppositions of logic.

214. Ethics (4) I. Copp Seminar—3 hours; term paper.

217. Political Philosophy (4) I. The Staff Seminar—3 hours; term paper. Prerequisite: graduating student standing. Advanced study of issues in political philosophy. May be repeated for credit with consent of instructor.

221. Political Philosophy (4) I. The Staff Seminar—3 hours; term paper. Prerequisite: graduating student standing. Advanced study of issues in political philosophy. May be repeated for credit with consent of instructor.

226. Political Philosophy (4) I. The Staff Seminar—3 hours; term paper. Prerequisite: graduating student standing; open to undergraduates with consent of instructor. Seminar to consider the nature of the environment, the free will, the sense of emotion, and the application of the concepts of social sciences.

227. Philosophy of Science (4) I. The Staff Seminar—3 hours; term paper. Prerequisite: graduating student standing in philosophy or consent of instructor. Seminar to consider the nature of the environment, the free will, the sense of emotion, and the application of the concepts of social sciences.

230. History of Philosophy (4) I. Bossart Seminar—3 hours. Special topics in the history of philosophy.

297. Political Philosophy (4) I. Teller Seminar—3 hours; term paper. Prerequisite: graduating student standing; open to undergraduates with consent of instructor. Seminar to consider the nature of the environment, the free will, the sense of emotion, and the application of the concepts of social sciences.

299. Research (1-12) I, II, III. The Staff (Chairperson in charge) Prerequisite: consent of instructor. (P/N grading only.)

Graduate Courses
201. Metaphysics (4) III. Jublin Seminar—4 hours.

202. Theory of Knowledge (4) I. Friedman Seminar—4 hours.

206. Philosophical Argumentation (4) I. The Staff Seminar—3 hours; short papers. Prerequisite: graduating standing; investigation and evaluation of philosophical arguments. Critical discussion of student papers on various aspects of philosophical disputes.

207. Philosophy of Science (4) I. The Staff Seminar—3 hours; term paper. Prerequisite: graduating standing in philosophy or consent of instructor. Seminar to consider the nature of the environment, the free will, the sense of emotion, and the application of the concepts of social sciences, mechanics, foundations of statistical mechanics. May be repeated for credit with consent of instructor.

208. Philosophy of Biology (4) I. Griswold Seminar—3 hours; term paper. Prerequisite: graduating standing in philosophy or consent of instructor. Seminar to consider the nature of the environment, the free will, the sense of emotion, and the application of the concepts of social sciences, mechanics, foundations of statistical mechanics. May be repeated for credit with consent of instructor.

*Course not offered this academic year.

Physical Education

(College of Letters and Science)
Keith R. Williams, Ph.D., Chairperson of the Department
Office of the University, 264 Hickey Gymnasium (916-752-0511)

Faculty
William C. Adams, Ph.D., Professor
Richard L. Bell, Ph.D., Professor (Chemical Engineering)
Erdunard, M. Bernauer, Ph.D., Professor Emeritus
G. Robert Biggs, B.A., Associate Supervisor
Bobbie J. Bolden, M.A., Associate Supervisor
Stephen T. Bronson, M.S., Lecturer
Joseph E. Carlson, M.A., Supervisor
Jere H. Curry, M.A., Supervisor
Simon Davies, Ph.D., Lecturer
Kathleen M. DeYoung, B.A., Associate Supervisor
Robert L. Foster, M.A., Supervisor
Pamela N. Gill-Fisher, M.A., Supervisor
Raymond S. Goldbar, M.A., Supervisor
Jerry W. Fishale, A.B., Supervisor
Johal E. Ehrich, M.S., Lecturer
Robert G. Holly, Ph.D., Associate Supervisor
Barbara A. Jahn, M.S., Supervisor
Sandy E. Jennings, Ph.D., Lecturer
Charles R. Kovalick, Ed.D., Professor Emeritus
Willard S. Lotter, Ed.D., Senior Lecturer
Paul A. Moré, Ph.D., Associate Professor
John E. Nelson, M.A., Lecturer
Marlene F. Piper, Ed.D., Associate Supervisor
Melvin R. Ramsey, Ph.D., Professor (Civil Engineering)
E. Deans Ryan, Ed.D., Professor Emeritus
Joe L. Singleton, M.A., Supervisor
Nancy E. Slocum, M.A., Lecturer
James L. Sochor, Ed.D., Supervisor
Phillip S. Swinney, M.A., Supervisor
Jon E. Vochatzer, M.S., Supervisor
Keith R. Williams, Ph.D., Associate Professor
Robert A. Williams, M.A., Lecturer
Suzanne C. Williams, M.S., Supervisor

The Major Program

The major in physical education provides a broad, scholarly understanding of human movement.

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 broad based lower division curriculum. The program permits specialization in either educational studies, behavioral aspects of physical education, and is most appropriate for those who intend to pursue careers in coaching, teaching, or community/club exercise programs, and for those intending graduate study in the social 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 extensive physical and life science preparation in lower division courses, and requires additional upper division course work 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:

<table>
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<tr>
<th>UNITS</th>
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<tbody>
<tr>
<td>Biological Sciences 1A</td>
</tr>
<tr>
<td>Chemistry 1A</td>
</tr>
<tr>
<td>Physical Education 45</td>
</tr>
<tr>
<td>Physics 1A</td>
</tr>
<tr>
<td>Psychology 1 or 15</td>
</tr>
<tr>
<td>Statistics 13</td>
</tr>
</tbody>
</table>

Depth Subject Matter:

<table>
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<tr>
<th>UNITS</th>
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<tbody>
<tr>
<td>Cell Biology and Human Anatomy 101</td>
</tr>
<tr>
<td>Cell Biology and Human Anatomy 101L</td>
</tr>
<tr>
<td>Physical Education 101, 102, 103, 104, 105, 106</td>
</tr>
<tr>
<td>Physiology 110</td>
</tr>
</tbody>
</table>

Minimum of 12 upper division units in physical education chosen with approval by a major advisor.

12 Biological emphasis:

Students electing this emphasis must select a minimum of 9 units from Physical Education 110, 111, 112, 113, 115, 117, or 118.

12 Psychological emphasis:

Students electing this emphasis must select a minimum of 8 units from Physical Education 120, 121, 122, or 125.

Minimum of 8 upper division non-physical education units in either the biological or the psychological area selected with approval by a major advisor.

Students are expected to elect the above biological or psychological concentration by the end of the sophomore year. Under special circumstances an individualized curriculum may be elected, but only after consultation with and approval by a major advisor.

Total Units for the Major: 70-71
Recommended

Students interested in the biological emphasis of physical education are strongly urged to take Chemistry 1A, 1B.

B.S. Major Requirements:

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Units</th>
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</thead>
<tbody>
<tr>
<td>Preparatory Subject Matter</td>
<td>53-59</td>
<td></td>
</tr>
<tr>
<td>Anthropology 1</td>
<td>4</td>
<td></td>
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<tr>
<td>Biological Sciences 1A</td>
<td>5</td>
<td></td>
</tr>
<tr>
<td>Chemistry 1A-1B or 4A-4B</td>
<td>10</td>
<td></td>
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<tr>
<td>Computer science (Computer Science Engineering 10, 30, or Engineering 5)</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Mathematics 16A-16B or 21A-21B</td>
<td>3-4</td>
<td></td>
</tr>
<tr>
<td>Physical Education 45-50</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Physics 6A-6B or 8A-8B</td>
<td>8</td>
<td></td>
</tr>
<tr>
<td>Psychology 1 or 15</td>
<td>3-4</td>
<td></td>
</tr>
<tr>
<td>Statistics 13 or 102</td>
<td>4</td>
<td></td>
</tr>
</tbody>
</table>

Additional Requirements

Biological emphasis: Zoology 2, and Physics 6C or 8C.

Exercise Physiology emphasis: Chemistry 6A-6B, or 12A-12B and 12A-12B, 9-10

Depth Subject Matter | 53

Cell Biology and Human Anatomy 101, 101L | 10

Preparatory Subject Matter | 53-59

Physics 101, 102, 103, 104, 105 | 16

Total Units for the Major | 106-112

Honors Program

Those students with outstanding records in the major requirements may elect to enter the Honors Program with the consent of an adviser. A senior project must be completed, for which up to 10 units of Physical Education 199 (split over two quarters) may be earned. These units are taken in addition to the major requirements, and should be realized that only a maximum of ten 199 units may be counted toward the B.S. degree total unit requirement.

Major Advisers


Teaching Major

The teacher-training curriculum in physical education requires courses in addition to the departmental major requirements.

Minor Program Requirements:

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>Physical Education</td>
<td>18</td>
<td></td>
</tr>
</tbody>
</table>

At least 18 upper division units in physical education from one of three options: 18

a. Biomechanics

1) Physical Education 103 and one course from 101, 102, 104, 105 |
2) Minimum of two courses from Physical Education 110, 111, 126 |
3) Additional courses to complete a total of 18 upper division units.

b. Exercises Physiology

1) Physical Education 101, and one course from 102, 103, 104, 105 |
2) Minimum of three courses from Physical Education 110, 111, 112, 113 |
3) Additional courses to complete a total of 18 upper division units.

c. Psychological Aspects

1) Physical Education 105, and one course from 102, 103, 104 |
2) Minimum of two courses from Physical Education 120, 121, 122, 125 |
3) Additional courses to complete a total of 18 upper division units.

Minor Advisers

Same as major advisers.

Degree and Recreational Use of Facilities. The incidental fee payable by all students at the time of registration enables students to the use of gymnasium, showers, locker rooms, and other related services. The athletic fields. Certain equipment for games and sports is available for exercise and recreation, either with or without instruction. Lockers are to 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.

Courses in Physical Education

Lower Division Courses

1. Physical Education for Men and Women (12)

II. 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 for a total of 6 units. (P/NP grading only)

2. Principles of Basic Exercise Conditioning (2)

II. The Staff (Chairperson in charge)

Lecture—1 hour; laboratory—2 hours. A survey of the basic concepts, facts, and accepted approaches in current exercise training programs, e.g., theory of aerobic function and capacity, exercise and diet, muscular strength and development, and lactation of environment, age, and gender on fitness levels. (P/NP grading only)

3. Foundations of Emergency First Aid Services (2)

II. The Staff (Chairperson in charge)

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.

4. Professional Physical Education Activities: Men and Women (1)

II. The Staff (Chairperson in charge)

Lecture—1 hour; laboratory—2 hours. Fundamentals for skills in a) coaching competitive athletics; b) classroom teaching and coaching; c) classroom teaching and officiating. May be repeated for a total of six units.

5. Administration of Intramural Sports (2)

II. The Staff (Chairperson in charge)

Lecture—2 hours. Planning and administering intramural sports programs at the high school and college level.

6. Theory of Lifesaving and Water Safety (2)

II. The Staff (Chairperson in charge)

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. The student must acquire 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. Also offers the Advanced Lifesaving Certificate awarded upon successful completion of necessary requirements.

7. Training Course for Water Safety Instructors

II. Hinsdale

Lecture—1 hour; laboratory—2 hours. Prerequisite: advanced swimming (course 1) or consent of instructor; course 5 and current Advanced Life-Saving Certificate. Theoretical knowledge and practical experience necessary for the organization and teaching of swimming and lifesaving classes. American Red Cross Water Safety Instructor's Certificate awarded upon successful completion of necessary requirements.

8. Basic Scuba (2)

II. Morris

Lecture—2 hours; laboratory—2 hours. Prerequisite: good physical condition, ability to pass preliminary swim test. Introduction to basic knowledge required for scuba diving, functioning and maintenance of equipment, physics and physiology of diving, first aid and CPR, oceanography and marine life, and underwater communication. Pool and open water sessions available for students with open water rating (P/NP grading only)

9. Dance Composition (2)

II. Bolden

Laboratory—5 hours. Prerequisite: course 1, modern jazz or jazz dance techniques, or consent of instructor. Composing phases of movement with a knowledge of elements involved in the craft of choreography: design, dynamics, rhythm, motivation and gesture, vocabulary.

10. Dance Composition (2)

II. Bolden

Laboratory—5 hours. Prerequisite: course 35A or consent of instructor. Learn the elements of dance production as it applies to the use of lighting, costume design, selection of music, and building of stage props.

11. Dance Composition (2)

II. Bolden

Laboratory—5 hours. Prerequisite: courses 35A, 35B, or consent of instructor. To encourage the student to create new dance forms and prepare them for a 4-7 minute presentation in a spring concert on stage. Costumes and choreography are created and correlated for each dance by the choreographer.

12. History of Dance (3-3-3)

II. Curry

Lecture—3 hours. Study of dance and its relation to culture from the primitive to the Renaissance period. The development and movement of dance from the Baroque period to the twentieth century.

13. Principles of Healthful Living (2)

II. Loehr, Gill

Lecture—2 hours. Application of scientific and empirical knowledge to personal, family, and community health problems. (P/NP grading only)

14. Foundations of Physical Education (3)

II. Adams

Lecture—3 hours. An introduction to historical, biomechanical, physiological, psychological, and sociological foundations of physical education.

15. Physical Education Internship (2-5)

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, recreation, and research or situations involving working with special education students. May be repeated for credit once but no Internship units will be counted toward Physical Education major. (P/NP grading only)

16. Tutoring in Physical Education (1-6)

II, III. The Staff (Chairperson in charge)

Tutorial—1-5 hours. Prerequisite: lower division standing and consent of Department Chairperson. Tutoring of students in lower division physical activity courses. Weekly meetings with instructor in charge.
of courses. Written reports on methods and materials required. May be repeated once for credit. (P/NP grading only.)

98. Group Study (1-5) I, II, III, The Staff (Chairperson in charge)
Prerequisite: consent of Instructor and Department Chairperson. (P/NP grading only.)

99. Special Study for Undergraduates (1-5) I, II, III, The Staff (Chairperson in charge)
Prerequisite: consent of Instructor. (P/NP grading only.)

Upper Division Courses

100. Field Experience in Teaching Physical Education (2) I, II, III, The Staff (Chairperson in charge)
Discussion—1 hour; field work—4 hours. Prerequisites: Upper division standing and appropriate course 1 or 7. Tutoring or teacher 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.)

101. Physiological Regulation During Exercise (3) I, M, O
Lecture—3 hours. Prerequisite: Biological Sciences 1A or 1B. 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 balance, and temperature regulation are studied in relation to control by the cardiovascular, respiratory, and renal systems.

101L. Exercise Physiology Laboratory (1) Bernauer, Moie
Laboratory—3 hours (for 5 weeks); discussion—2.5 hours (for 5 weeks). Prerequisite: course 101 (may be taken concurrently). Biological Sciences 1A, Physiology 110. Series of laboratory experiments demonstrating the principles of physiological regulation to standardized exercise regimens. The assessment of physiological, environmental and anthropometric factors limiting exercise capacities performed on quantitatively controlled ergometer devices, while monitoring physiological variables by noninvasive methods.

102. Physiological Adaptations to Exercise (2) I, II, Adams
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.

103. Analysis of Human Movement (4) I, III, K. Williams
Lecture—3 hours; laboratory—3 hours to alternate weekly with discussion—1 hour. Prerequisite: Cell Biology and Human Anatomy 101 and Physics 1A; Physics 1A recommended. Anatomical and mechanical fundamentals of human motion. Qualitative and quantitative application of kinesthesiological principles to a variety of movement situations.

104. Introduction to Motor Control and Skill Acquisition (3) J. Jennings
Lecture—2 hours; discussion—1 hour to alternate weekly with laboratory—3 hours. Prerequisite: upper division standing in 1 or 15, and course 45. Analysis of variables affecting the ability to produce, learn, and retain movement skills. Basic neuromotoric and behavioral accounts of motor control, acquisition, and performance. Theories of movement regulation and motor learning are covered.

105. Psychosocial Factors in Motor Performance (3) I, II, Jennings
Lecture—3 hours. Prerequisite: Psychology 1, 15, or 16. Basic theories and experimental findings from social psychology and human motivation and their application to motor performance, including sex differences, success and failure, expectations, anxiety, competitiveness, and aggression.

110. Exercise Metabolism (3) I, M, O
Lecture—2 hours; laboratory—5 hours. Prerequisite: courses 101, 102, Chemistry 1A. 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.

111. Environmental Effects on Physical Performance (3) III, Adams
Lecture—2 hours; laboratory—3 hours, with discussion—1 hour. Prerequisite: courses 101 and 112, or consent of instructor. The effects of thermal, barometric and gravitational conditions on physiological function and physical performance of humans. Acute and chronic effects, emphasizing physiological adaptations and limitations will be studied.

112. Clinical Exercise Physiology (4) III, Holly
Lecture—3 hours; laboratory—3 hours to alternate weekdays with discussion—1 hour. Prerequisites: 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.

113. Growth and Development in Human Performance (3) I, II, M, Adams
Lecture—2 hours. Prerequisite: Biological Sciences 1A, Cell Biology and Human Anatomy 101, and Physiology 110. 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.

115. Biomechanical Bases of Movement (3) I, K. Williams
Lecture—2 hours; laboratory—3 hours to alternate weekly with discussion—1 hour. Prerequisite: course 103 or consent of instructor. Biomechanical bases of human movement investigated; topics include musculo-skeletal function, basic mechanics, electromyography, and measurement and analysis techniques. Application made to sport, clinical, and work environments, including extensive analysis of locomotion.

116. Exercise and Aging in Health and Disease (3) I, II, Holly
Lecture—2 hours; discussion—1 hour. Prerequisite: course 101 or 102 (concurrently) or 113 (concurrent). Elbowogy and prevention of various diseases associated with aging (e.g. cardiovascular, pulmonary and renal diseases, diabetes, obesity, epiaamas). Exercise will then be considered as a protective and therapeutic modality.

118. Physical Fitness in the Workplace (3) III
Lecture—2 hours; discussion—1 hour. Explores principles and practice of physical fitness in the workplace. Established assessment procedures including validation of job standards are presented. Cost and health benefits are examined with respect to onsite and offsite programs of fitness maintenance and remediation.

120. Sports in American Society (4) I, II
Lecture—3 hours; discussion—1 hour. Historical development of sport in American society. Relationship and interaction between sport, politics, economics, religion, art, sexism, racism, and education; current trends and problems.

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 in sport psychology through a critical examination of relevant experimental, clinical, and field data.

122. Psychological Effects of Physical Activity (3) II, Jennings
Lecture—3 hours. Prerequisites: Psychology 1 or 15, and upper division standing. Physical activity is evaluated in terms of stress to enhance the quality of life. Topics studied include: individual factors (self concept, type A); special populations (elderly, cardiovacular); and mental health changes (depression, anxiety).

125. Neuromuscular and Behavioral Aspects of Motor Control (3) II, K. Williams, Jennings
Lecture—2 hours; discussion—1 hour to alternate weekly with laboratory—2 hours. Prerequisite: course 104. Factors which affect control of movement from neuropsychological, physiological, behavioral, and methodological viewpoints. Topics include central versus peripheral control mechanisms, open and closed loop theories, motor programming, cognitive learning strategies, and the effects of biochemical and biomechanical influences.

128A. Research Diving: 65 Feet (1) II, Bell, Morris
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 light salvage, 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 (5) II, Bell, Morris
Lecture—1 hour; laboratory—1/2 hour. Prerequisite: course 128A; consent of instructor. Lectures in diver rescue and resuscitation, navigation, search and light salvage, 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.)

131. Physical Education for the Handicapped (4) II, Vochatzer
Lecture—3 hours; laboratory—3 hours. Prerequisite: course 103 and consent of instructor. The role of exercise, physical retraining and remedial work in the improvement of movement for handicapped individuals.

132. First Aid Leadership and Accident Management (3) I, II, III
Lecture—2 hours; students assist in teaching course 5—1 hour to be arranged. Prerequisite: course 5 or American Red Cross Advanced First Aid Card. Administration, organization and supervision of safety and first aid programs in school and community sports, recreation and all types of group activities. Study of practical aspects of first aid leadership skills. (The American Red Cross First Aid Instructor Card will be awarded upon successful completion of the course.)

133. Prevention and Care of Sports Injuries (3) I, II
Lecture—1 hour; laboratory—6 hours. Prerequisite: upper division standing; Cell Biology and Human Anatomy 101 (may be taken concurrently). Management of the prevention, care, and rehabilitation of injuries incurred by athletes. Laboratory on anatomy, emergency care, physical therapy methods, and taping techniques.

135. Advanced Procedures in Evaluation and Management of Athletic Injuries (4) I, II, The Staff (Chairperson in charge)
Lecture—3 hours; laboratory—3 hours. Prerequisite: course 133, Cell Biology and Human Anatomy 101, and consent of instructor. Advanced study of athletic injuries, their evaluation and management, with laboratory work in biomechanics and pathophysiology. In-depth study of selected current topics in athletic training.

142. Physical Education in the Public Schools (3) I, II, Piper
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) II, Singleton
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.)

*Course not offered this academic year.*
143B. Coaching Effectiveness (2) II. Singleton
Lecture—2 hours. Prerequisite: course 143A. Application of general principles of management and administration to athletic coaching in high school.
(PNP grading only)

144. Principles of Health Education (2), II. Lotter
Lecture—2 hours. Prerequisite: course 44 and upper division standing or consent of instructor. Principles of teaching health education in the public schools.
(PNP grading only)

*145. Administration of Health/Fitness Programs (2) III.
Lecture—2 hours. Principles of organizing and directing programs. Includes personnel, methods of evaluating personnel and programs, and elements of planning.

146. Theory and Practice of Exercise Training (1) I, II, III. Holy, Jennings
Lecture—Discussion—1 hour. Prerequisite: course 2 or 45 or 102. Physiological adaptations, exercise programming, and behavioral techniques focusing on young and middle-aged adults. Topics include exercise prescription, nutrition, psychological effects of exercise, stress management techniques, and exercise adherence techniques. (PNP grading only)

146L. Shape-Up Testing and Training Laboratory (1) I, II, III. Holy, Jennings
Laboratory—5 hours. Prerequisite: course 146 (may be taken concurrently). Primary activities involve leading shape-up class, attending workshops, test sessions, and completing final reports. May be repeated once for credit. (PNP grading only)

147L. Adult Fitness Training Laboratory (1) I, II, III. Holy, Jennings
Laboratory—3 hours. Prerequisite: courses 146, 146L, and 102 (may be taken concurrently); current CPR. Involves attending and assisting with aerobic training sessions for older adults, and assisting with physiological testing sessions. (PNP grading only)

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. (PNP grading only)

148L. Adult Fitness Testing Laboratory (1) I, II, III. Holy
Laboratory—3 hours. Prerequisite: courses 146, 146L (concurrently); current CPR. Testing symptomatic and asymptomatic older adults for functional aerobic capacity, body composition, blood lipids, pulmonary function, and aerobic disease risk. Counseling adults in appropriate exercise programs and lifestyle modifications. Two quarters minimum; third quarter permitted. (PNP grading only)

149L. Cardiopulmonary Rehabilitation Laboratory (1) I, II, III. Holy
Laboratory—3 hours. Prerequisite: courses 146 and 146L; 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 required. (PNP grading only)

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 82), but no internship units will be counted toward Physical Education major. (Letter grade only)

1977. Tutoring in Physical Education (1-5) I, II, III. The Staff (Chairperson in charge)
Tutor—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. (PNP grading only)

198. Directed Group Study (1-5) I, II, III. The Staff (Chairperson in charge)
Prerequisite: consent of the instructor and Department Chairperson. (PNP grading only)

199. Special Study for Advanced Undergraduates (1-5) I, II, III. The Staff (Chairperson in charge)
Prerequisite: consent of Department Chairperson. (PNP grading only)

Graduate Courses
200A. Introduction to Research: History and Philosophy in Physical Education (2) I. Mole,
Discussion—1 hour; seminar—1 hour. Prerequisite: consent of instructor. Fundamental tenets of science and their application to current research in human performance; benchmark studies in the evolution of the field.

200B. Problem Solving and Research Design in Physical Education (2) III. Mole,
Discussion—1 hour; seminar—1 hour. Prerequisite: course 200A. Conventional approaches to problem solving; processes in research design and analysis; written and oral presentation of a thesis proposal.

201A. Sports Medicine: Medical Aspects of Sports Injuries (3)
Lecture—2 hours; laboratory—1 hour. Prerequisite: graduate student with upper division course in systemic physiology or anatomy, and medical students. Multidisciplinary course introducing student to the pathophysiology of sports injuries, physical examination of the injured athlete, and management of sports injuries. Specific injuries, taping, and use of physical modalities will be discussed. (Same course as Physical Medicine and Rehabilitation 201A.)

220. Research Topics in Biomechanics (3) III. K. Williams
Lecture—2 hours; seminar—1 hour. Prerequisite: graduate standing and previous exposure. Survey of current research into diverse areas of biomechanics of human movement. Topics include locomotion, sport biomechanics, electromyography, musculo-skeletal tissues, and mechanical/advanced measurement technology, and clinical biomechanics. Offered in alternate years.

*221. Anthropometry in Physical Activity (3) III. Adams
Lecture—2 hours; laboratory—five 3-hour sessions to alternate weekly with five 1-hour discussion sessions. Prerequisite: courses 101 and 102. Consideration of physical constitution, body proportions, and body composition in man as they affect physical performance, and of body structural and compositional changes accompanying prolonged, systematic physical conditioning. Offered in alternate years.

222. Metabolic Functions in Exercise (4) III. Mole
Lecture—2 hours; laboratory—3 hours. Prerequisite: course 102, Physiology 114. Review of the current research literature on the metabolic responses to exercise in man; a laboratory survey of respiratory response, metabolic, and acid-base balances; blood gas adjustments and acid-base balance with particular reference to the effect of environmental conditions.

223. Physiological Basis of Physical Fitness (2) II.
Seminar—2 hours. Prerequisite: graduate standing. Review and critical discussion of current research topics concerned with the physiological aspects of physical training and performance in both young and older individuals.

224. Exercise Electrocardiography (2) I. Holly
Lecture—2 hours. Prerequisite: course 112 or consent of instructor. Physiological bases and clinical implications of normal and abnormal exercise electrocardiograms (ECG) are treated in detail. Exercise prescription is considered as it is the predictive significance of normal 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.

226. Measurement of the Biological Aspects of Human Performance (3) I. The Staff (Holly in charge)
Lecture—2 hours; laboratory—3 hours. Prerequisite: consent of instructor. Introduction to primary measurement strategies used to investigate the biological bases of human performance. Emphasis placed on the critical selection of the most valid tests and on obtaining the most accurate and reliable results.

227. Research Techniques in Biomechanics (3) II. K. Williams
Lecture—2 hours; laboratory—3 hours. Prerequisite: consent of instructor; 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 cinematography, data reduction and smoothing, body segment parameter determination, electromyography, and biomechanical modeling. (Same course as Biomedical Engineering 227.)

*230. Human Performance: Psychological Aspects (3) III.
Seminar—3 hours. Prerequisite: course 105 or consent of instructor. Critical review of current and individual learning with emphasis on social learning theory and its application to clinical problems related to exercise and sport.

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 effect of exercise on mental health.

239. Seminar in Physical Education (1) I. The Staff (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 physical education.

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)

Professional Courses
300. The Elementary Physical Education Program (2) I. Goldbar
Lecture—1 hour; laboratory—2 hours; field trips to selected programs. Prerequisite: senior standing or credential student. Introduction to principles, theories, and practices of elementary school physical education programs.

300. Methods of Teaching Physical Education (3) III. Goldbar
Lecture—1 hour; laboratory—6 hours. Prerequisite: course 142 and six units of course 7; or consent of instructor. The principles and practices in the instruction of physical education, with special emphasis on the actual implementation of the program, with emphasis on the actual implementation of the course program.

*Course not offered this academic year.
Physical Medicine and Rehabilitation

See Medicine, School of

Physics

(College of Letters and Science)

Chairperson of the Department
Wendell H. Potter, Ph.D., Vice Chairperson of the Department
Department Office, 225 Physics-Geology Building (916-752-1500)

Faculty
Robert H. Backer, Ph.D., Professor
Franklin P. Brady, Ph.D., Professor
Thomas A. Cahill, Ph.D., Professor
Steven Carlip, Ph.D., Assistant Professor
Ling-Liu Chen, Ph.D., Professor
Lawrence B. Coleman, Ph.D., Associate Professor
Linton R. Cornucinni, Ph.D., Professor
James E. Draper, Ph.D., Professor
Gian W. Erickson, Ph.D., Professor
Charles S. Fadley, Ph.D., Professor
Ching-Yao Fong, Ph.D., Professor
Claude Garland, Ph.D., Professor
John F. Gunther, Ph.D., Professor
James P. Hurley, Ph.D., Professor Emeritus
John A. Jungerman, Ph.D., Professor Emeritus
Joseph E. Kiplinger, Ph.D., Professor
William J. Knox, Ph.D., Professor Emeritus
Winston T. Ko, Ph.D., Professor
Richard L. Lander, Ph.D., Professor
 Sudhindra Meni, Ph.D., Assistant Professor
Douglas W. McElroy, Ph.D., Associate Professor
Neil Peek, Ph.D., Senior Lecturer Emeritus
David E. Pellet, Ph.D., Professor
Wendell H. Potter, Ph.D., Associate Professor
Roderick W. Reid, Jr., Ph.D., Associate Professor
Richard T. Scalettar, Ph.D., Assistant Professor
Robert N. Shelby, Ph.D., Professor
Rajiv P. Singh, Ph.D., Assistant Professor
William W. True, Ph.D., Professor Emeritus
Dalal J. Webb, Ph.D., Assistant Professor
Philip M. Yager, Ph.D., Professor
Xiangdong Zhu, Ph.D., Assistant Professor
Gertrude Zimany, Ph.D., Assistant Professor

The Major Program

From the smallest subatomic particles to atoms, molecules, stars, and galaxies, the study of physics is the study of what makes the universe tick. Information that is gained by these particles accelerators and nuclear reactors teaches us not only what holds the nucleus and the atom together but also why stars shine and how radiation therapy fights cancer.

The Program. The Department of Physics offers three degree programs: the Bachelor of Arts in Physics, and the Bachelor of Science in Physics and in Applied Physics. The B.A. degree provides a broad coverage of classical and modern physics while permitting a broader liberal arts education than is possible with the other two programs. The B.S. degree in either Physics or Applied Physics should be followed by the student who plans to enter physics as a profession. The B.S. in Applied Physics provides the student with a solid introduction to a particular applied physics specialty. For the student who plans to enter the job market on completing a B.S., the applied physics orientation would be an asset. Either B.S. program provides a solid foundation in physics for the student interested in graduate work in either pure or applied physics.

Career Alternatives. Careers in physics and applied physics include research and development, either in universities, government laboratories, or industry; teaching in high schools, junior colleges, and universities; management and administration in industrial laboratories and in government agencies; and in production and sales in industry. A major in physics also provides a strong base for graduate-level work in such interdisciplinary areas as chemical physics, biophysics and medical physics, geophysics and environmental physics, astrophysics and astronomy, computer science, and materials science.

Applied Physics

B.S. Major Requirements:

Preparatory Subject Matter .................................................. 45


Engineering 5 (or equivalent programming course) .................... 3

Chemistry 1A-1B-1C or 4A-4B-4C ......................................... 15

Any recommended courses for a particular concentration: ..........

Depth Subject Matter (Common Core) .................................. 54


At least 18 units from approved courses within one of the following concentrations chosen in consultation with a major advisor: ....... 18

Materials science, physical electronics, quantum optics, energy, chemical physics, atmospheric physics, geophysics, physical oceanography. (Lists of approved courses in each concentration with representative programs are available from the Physics Department.)

Total Units for the Major .................................................. 109

Physics

A.B. Major Requirements:

Preparatory Subject Matter .................................................. 40

Physics 9A, 9B, 9C, 10A, 10B .............................................. 16

Mathematics 21A, 21B, 21C, 22A, 22B, 22C .................................................. 21

Engineering 5 (or equivalent programming course) .................... 3

Depth Subject Matter .................................................. 39


At least 4 additional upper division units in physics: .............. 4

Total Units for the Major .................................................. 79

Recommended

Chemistry 1A-1B-1C or 4A-4B-4C. See also recommended elective courses following the B.S. program below.

Physics

B.S. Major Requirements:

Preparatory Subject Matter .................................................. 55


Engineering 5 (or equivalent programming course) .................... 3

Chemistry 1A-1B-1C or 4A-4B-4C ......................................... 15

Depth Subject Matter .................................................. 54


*Course not offered this academic year.


At least 10 additional units from physics. (No more than 6 units in courses numbered 194H, 195, 198, and 199 may be applied in satisfaction of this requirement.) .................................................. 10

Total Units for the Major .................................................. 109

Recommended Electives

Astronomy: Asteroid 2

Computer and numerical analysis: Mathematics 128A or Applied Science Engineering 115.

Statistics: Statistics 131A.


Physics 10 (history and philosophy of physics). No credit after any other physics course except 137, 160.

Program Variance. Courses from other departments may be submitted for courses in the depth subject matter requirements by obtaining written permission from the Undergraduate Curriculum Committee chairperson, as approved by the Department.

Major Advisers. Contact Department Undergraduate Majors Office, 231 Physics-Geology Building, for adviser assignment.

Minor Program Requirements:

Three distinct minors are offered, all requiring prerequisites equivalent to Mathematics 21A-21B-112C and 22A-22B-22C and Physics 9A-9B-9C-9D.

Students considering the possibility of becoming a Physics major should consult with a Physics major adviser before beginning work in one of these minor programs.

UNITs

Physics .............................................................................. 18-24

Classical Physics emphasis .................................................. 23


(If the fall quarter courses, 104A, 105A, 110A, 112A, are taken in different years, 105A and 105B should be taken in the first year; course 105C does not require 105B.)

Quantum Physics emphasis .................................................. 22


(Physics 104A-104B and 105A-105B must precede 115A-115B. Physics 110A recommended.)

UNITs

General Physics emphasis .................................................. 22


(Physics 104A-104B and 105A-105B must precede 115A.)

Graduate Study

The Department of Physics offers programs of study and research leading to the M.S. and Ph.D. degrees and the Ph.D. degree with an Applied Physics Research Specialty. Further information regarding requirements for these three degrees, graduate research, teaching assistantships, and research assistantships may be obtained by writing to the Chairperson, Department of Physics, University of California, Davis 95616.

Astronomy. There is no major program leading to a degree in Astronomy. Introductory courses are offered in general astronomy and astrophysics. Students who wish to use the observatory or the portable telescopes may do so through the Astronomy Club. The graduate program in physics provides research opportunities in radio-astronomy or microwave astrophysics.
Courses in Astronomy

Lower Division Courses

2. Introduction to Modern Astronomy and Astrophysics (4.0)  I. The Staff
Lecture—1 hour; laboratory-discussion—2 hours.
Prerequisite: good facility in high school physics and mathematics (algebra and trigonometry). Description and interpretation of astronomical phenomena using the language of modern physics. Modern astronomical instrumentation. Gravitation, relativity, electromagnetic radiation, atomic and nuclear processes in relation to the structure and evolution of stars, the solar system, and the Universe. Not open to students who have received credit for course 10.
10. General Astronomy (4.0) III. The Staff
Lecture—3 hours; laboratory-discussion—2 hours. Non-mathematical description of modern astronomy with emphasis on the structure and evolution of stars, galaxies, and the Universe. The Sun and the solar system. Optional topics include pulsars, black holes, quasars, and extra-solar communications. Not open to students who have received credit for course 2 or any physics course (except 10, 137, 160). General Education credit: Nature and Environment/Introduction.

Courses in Physics

Physics 10 is primarily a concept-oriented one-quarter lecture/discussion course requiring relatively little mathematical background.
Physics 5 is a one-quarter sequence requiring some mathematics (trigonometry). Either 1A alone or both quarters may be taken. The sequence is not intended to satisfy entrance requirements of any year of physics for professional schools, but will satisfy requirements of 3 or 6 units of physics.
Physics 9 is a four-quarter sequence using calculus throughout and including laboratory work as an integral part. The entire sequence is recommended, rather than just 1 or 2 quarters.

Lower Division Courses

1A. Principles of Physics (3.0) I. McColm
Lecture—3 hours. Prerequisite: trigonometry or consent of Instructor. Mechanics. Introduction to general principles and calculations. Basic methods used in physics with emphasis on applications in applied agricultural and biological sciences and in physical education. Not open for credit to students who have completed course 5A or 9A (or former 6A or 9A).
1B. Principles of Physics (3.0) II. McColm
Lecture—3 hours. Prerequisite: course 1A or 5A (or former 6A); and consent of instructor. Continuation of course 1A. Heat, optics, electricity, modern physics. Not open for credit to students who have completed course 5B, 6C, 9B, 9C, or 9D (or former 6B, 6C or 6B, 8C, 8D).

5A. General Physics (4.0) I. II. The Staff
Lecture—3 hours; laboratory—2 1/2 hours. Prerequisite: arithmetic. Mechanics and fluids. Introduction to general principles and analytical methods used in physics. Primarily for biological science majors. Students who have had calculus (formerly 8A) may receive credit for 5A. Those who have had course 1A may receive only 2 units of credit. (Course 5A is former course 6A.) (CAN Phys Seq A)

5B. General Physics (4.0) II. III. The Staff
Lecture—3 hours; laboratory—2 1/2 hours. Prerequisite: course 5A (formerly 6A) or 1A with consent of instructor and Mathematics 16B; or Physics 9A (formerly 8A). Continuation of course 5A. Kinetic theory and thermodynamics, wave phenomena, optics. Students who have had course 9B (formerly 8C) or 6C may not receive credit for course 5B. Those who have had course 1B may receive only three units of credit. (Course 5B is former course 6C.) (CAN Phys Seq A)

5C. General Physics (4.0) III. IV. The Staff
Lecture—3 hours; laboratory—2 1/2 hours. Prerequisite: course 5B (former 6C). Continuation of course 5B. Electricity and magnetism, wave mechanics, wave phenomena, optics. Students who have had course 6B or 9C (former 8B) may not receive credit for course 5C. Those who have had course 1B may receive only three units of credit. (Course 5C is former course 6B.) (CAN Phys Seq A)

5D. General Physics (4.0) IV. V. The Staff
Lecture—3 hours; laboratory—2 1/2 hours. Prerequisite: course 5C (formerly 6D). Effective spring 1991 replaced by course 5B.

8A. Classical Physics
This course has been replaced by course 5A.

8B. Classical Physics
This course has been replaced by course 9C.

8C. Classical Physics
This course has been replaced by course 9D.

9A. Classical Physics (4.0) I. II. The Staff
Lecture—3 hours; laboratory—2 1/2 hours; discussion—1 hour. Prerequisite: course 9A (former 8A) or 5A (former 8A) with consent of instructor; Mathematics 21C; Mathematics 22C (may be taken concurrently). Continuation of course 9A. Fluid mechanics, thermodynamics, wave phenomena, optics. Not open for credit to students who have completed course 5B (formerly 9C). (Course 9B is former course 5C). (CAN Phys Seq A)

9B. Classical Physics (4.0) III. Staff
Lecture—3 hours; laboratory—2 1/2 hours; discussion—1 hour. Prerequisite: course 9B (former 8C; Mathematics 22A recommended) (may be taken concurrently). Continuation of course 9B. Electricity and magnetism including circuits and Maxwell's equations. Only one unit allowed to those who have completed course 5B (formerly 9C). (Course 9C is former course 5D). (CAN Phys Seq A)

9C. Classical Physics (4.0) IV. II. The Staff
Lecture—3 hours; laboratory—2 1/2 hours; discussion—1 hour. Prerequisite: course 9C and Mathematics 22B; Mathematics 22A recommended (may be taken concurrently). Introduction to physics since 1900. Special relativity, quantum mechanics, atoms, molecules, condensed matter, nuclear, particle physics. Only one unit of credit allowed to students who have completed course 5C (formerly 9B). (Course 9D is former course 5E). (CAN Phys Seq A)

10A. 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 (3-3-0) H. McKee
Lecture—3 hours. Prerequisites: courses 9B, 9C, 9D, Mathematics 22A, 22B, 22C passed with grade of C- or better, or consent of department. Elements of vector and tensor analysis, matrix methods, boundary value problems, integral transformations with applications to physics.

105A-105B. Analytical Mechanics (3-3) II. Ko
Lecture—3 hours. Prerequisites: courses 9B, 9C, 9D, Mathematics 22A, 22B, 22C passed with grade of C- or better, or consent of department. Principles and applications of Newtonian mechanics; introduction to Lagrange's and Hamilton's equations.

105A-L. Computational Laboratory in Mechanics (1.0) Ko
Laboratory—3 hours. Prerequisite: Engineering 5 or the equivalent; course 105A concurrently. Introduction to the application of computers to solving physics problems. Introduction to numerical and graphical methods in mechanics. (P/NP grading only)

105B-L. Computational Laboratory in Mechanics (1.0) Ko
Laboratory—3 hours. Prerequisite: course 105AL; course 105B concurrently. Computer application of numerical and graphical methods in mechanics. (P/NP grading only).

105C. Continuum Mechanics (3.0) III. Yager
Lecture—3 hours. Prerequisites: courses 104B, 105A, Continuum mechanics.

108. Optics (3.0) III. Cahill
Lecture—3 hours. Prerequisites: 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, materials science, and atmospheric science. Study of modern optical instrumentation. Open to non-majors.

108L. Optics 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-L. Electricity and magnetism (3-3) I-II. III. Fohl
Lecture—3 hours. Prerequisites: courses 9B, 9C, 9D, Mathematics 22A, 22B, 22C passed with a grade of C- or better; or consent of department. Theory of electrodynamics, electrostatics, Maxwell's equations, electromagnetic waves.

112A-112B. Thermodynamics and Statistical Physics (3-3) III. Garrod
Lecture—3 hours. Prerequisites: courses 9A, 9B, 9C, 9D; Mathematics 22C, and course 105B or 115A or the equivalent. Introduction to statistical mechanics and thermodynamics.

115A-115B. Introduction to Quantum Mechanics (3-3) III. II. Fong
Lecture—3 hours. Prerequisites: courses 104B and 105B passed with grade of C- or better, or consent of chairperson. The classical background, basic ideas, and methods of quantum mechanics, with applications to atomic physics.

116A. Electronic Instrumentation (4.0) III. Pellett
Lecture—3 hours; laboratory—3 hours. Prerequisites: course 9C, Mathematics 22B. An experimental and theoretical study of important electronic circuits commonly used in physics.

116B. Electronic Instrumentation (4.0) III. Pellett
Lecture—3 hours; laboratory—3 hours. Prerequisites: 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 (4.0) III. McColm
Lecture—3 hours; outside work—9 hours. Prerequisite: course 9D; Mathematics 21C. The phenomena...
of atomic physics; introduction to quantum phenomena and quantum mechanics; selected topics dealing with atoms, molecules, nuclei, and the solid state.

122A. Advanced Physics Laboratory: Atomic/Solid-State (3) I, II. Webb 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, ferroelectricity. The student performs three to six experiments depending on difficulty; individual work is stressed.

122B. Advanced Physics Laboratory: Nuclear/High Energy (3) I, II. Lander Laboratory—8 hours. Prerequisite: course 9D. Similar to course 122A with experiments in gamma-ray coincidence, Mossbauer Effect, Rutherford scattering, monolifetime, others. Students perform 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.

129A. Calculus for Nuclear Physics (3) I. Brady Lecture—3 hours. Prerequisite: course 115A. Survey of basic nuclear properties and concepts requiring introductory knowledge of quantum mechanics.


137. Science and Technology of Nuclear Arms Effects and Control (3). J. Jungman. Craig (Applied Science) Lecture—3 hours. Prerequisite: upper division standing; one course from 18, 50, 80, 10. Scientific and technical aspects of nuclear arms effects and nuclear arms control including nuclear physics of atomic and hydrogen bombs, blast and radiation effects, radioactivity, electromagnetic pulse, ICBM accuracy, laser weapons, verification safeguards, biological and ecological effects. Emphasis on order of magnitude calculations. General Education credit: Nature and Environment/Non-Introductory. Recommended GE preparation: Physics 10. (Same course as Applied Science Engineering 137.)

140A. Introduction to Solid-State Physics (3) II. Zhu Lecture—3 hours. Prerequisite: course 115A or 9D, and consent of instructor. Survey of basic concepts and classification of experimental phenomena in solids. Crystal structure, phonons, simple metals.

140B. Introduction to Solid-State Physics (4) III. Zhu Lecture—4 hours. Prerequisite: course 140A. Detailed discussion of: energy bands and Fermi surfaces, transport phenomena, semiconductors, ferromagnetism, magnetic resonance.

150B. Environmental Physics and Society (3) I. Jungman Lecture—3 hours. Prerequisite: course 9D or 5C; or course 10 or 18 and Mathematics 188 or the equivalent. Survey of the environment and the environment as discussed from the point of view of the physical sciences. Calculations based on physical principles will be made, and the resulting policy implications will be considered. (Same course as Engineering 160.) General Education credit: Nature and Environment/Non-Introductory. Recommended GE preparation: Physics 10.

194H. Special Study for Honors Students (4) I, II, III. The Staff (Chairperson in charge). Prerequisite: open only to seniors who qualify for the honors program. Independent research and/or reading on selected topics.

195. Senior Thesis (5) I, II, III. The Staff (Chairperson in charge). Prerequisite: physics major or senior standing. Preparation of a senior thesis on a topic selected by the student with approval of the department. May be repeated for a total of 16 units and for no more than 8 units in any one quarter without Departmental approval.

197T. Tutoring in Physics and Astronomy (1-5) I, II, III. The Staff (Chairperson in charge). Prerequisite: consent of instructor and department chairperson. Tutoring of students in lower division courses. Weekly meetings with instructor. (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)

108. Special Study for Advanced Undergraduates (1-5) I, II, III. The Staff (Chairperson in charge). (P/N grading only)

Graduate Courses

200A. Theory of Mechanics and Electromagnetics (3) I. Scalettar Lecture—3 hours. Prerequisite: courses 104B, 105B, and 110C or the equivalent; course 200A (concurrently). Special theory of relativity, covariant formulation of mechanics and electromagnetic theory. Lagrange's equations, variational principles for discrete and continuous mechanical and electromagnetic systems.

200B. Theory of Mechanics and Electromagnetics (3) II. Scalettar Lecture—3 hours. Prerequisite: course 200A; course 204B (concurrently). Hamilton's equations. Hamilton-Jacobi theory and contact transformations, action-angle variables and perturbation theory, selected topics in mechanics of continuous media; incompressible and compressible flow, gravity waves and shock decay.

200C. Theory of Mechanics and Electromagnetics (3) III. Yager Lecture—3 hours. Prerequisite: course 200B. Brief review of static electromagnetic fields; Maxwell's equations; plane waves in various media; magneto-hydrodynamics.

200D. Theory of Mechanics and Electromagnetics (3) IV. Yager Lecture—3 hours. Prerequisite: course 200C. Diffraction theory. Radiating systems and electromagnetic theory.

204A-204B. Methods of Mathematical Physics (5-6) III, IV. Chau Lecture—3 hours. Prerequisite: courses 104A and 104B or the equivalent. Linear vector spaces, operators and their spectral analysis, complete sets of functions, complex variables, functional analysis, Green's functions, calculus of variations, introduction to numerical analysis.

215A. Quantum Mechanics (3) I. The Staff Lecture—3 hours. Prerequisite: course 115B. Nonrelativistic quantum mechanics. Formal development and interpretation of quantum mechanics, including the Schrödinger wave equation, matrix mechanics, and use of state vectors and operators. Important topics will be developed as time permits. 215B. Quantum Mechanics (3) II. The Staff Lecture—3 hours. Prerequisite: course 215A. Wave packets, Wentzel-Kramers-Brillouin approximation, and perturbation methods applied to atomic, nuclear, molecular, and solid-state problems.

215C. Quantum Mechanics (3) III. The Staff Lecture—3 hours. Prerequisite: course 215B. Scattering theory, radiation theory, and a brief introduction to relativistic quantum mechanics and the Dirac equation.

219A. Statistical Mechanics (3) I. Singh Lecture—3 hours. Prerequisite: courses 112B and 115B. Foundations of classical and quantum statistical mechanics.

219B. Statistical Mechanics (3) II. Singh Lecture—3 hours. Prerequisite: course 219A. Applications to properties of solids, real gases, nuclear matter, fluctuations about the equilibrium state.

221. Atomic Physics (3) III. McColm Lecture—3 hours. Seminar—1 1/2 hours. Prerequisite: course 215A-215B. Term structure of atoms using the angular momentum formalism; methods of computing wave functions and radial integrals; splitting in external fields; term structure in crystals; scattering and collisions. Not offered every year.

223. Group-Theoretical Methods of Physics (3) III. Klakos Lecture—3 hours. Prerequisite: courses 215A-215B-215C or consent of instructor. Theory of groups and their representations with applications in selected areas of physics.

224A. Nuclear Physics (3) II. Draper Lecture—3 hours. Prerequisite: course 215B. Comprehensive study of the nuclear-nucleon interaction including the deuteron, nucleon-nucleon scattering, polarization, determination of real parameters of S-matrix, and related topics.

224B. Nuclear Physics (3) III. Draper Lecture—3 hours. Prerequisite: course 224A. Study of nuclear models, including the shell model, collective model, unified model. Energy level spectra, static moments, and electromagnetic transition rates.

224C. Nuclear Physics (3) I. Draper, Brady Lecture—3 hours. Prerequisite: course 224B. Study of nuclear scattering and development of the optical model and direct interactions. Beta decay and an introduction to weak interactions.

229A. Advanced Nuclear Theory (3) II. Brady Lecture—3 hours. Prerequisite: course 224C. Advanced topics in nuclear theory. Theory of quantum-mechanical scattering processes. Exact formal theory and models for two-body scattering. Not offered every year.

229B. Advanced Nuclear Theory (3) III. Brady Lecture—3 hours. Prerequisite: course 229A. Advanced topics in nuclear theory. Theory of quantum-mechanical scattering processes. Exact formal theory and models for three-body scattering. Not offered every year.

230A. Quantum Theory of Fields (3) I. Gunton Lecture—3 hours. Prerequisite: course 215C. Relativistic quantum mechanics of particles; techniques and applications of second quantization; Feynman diagrams; renormalization.

230B. Quantum Theory of Fields (3) II. Carlip Lecture—3 hours. Prerequisite: course 230A. Continuation of 230A, with selected advanced topics, such as matrix theory, dispersion relations, axiomatic formulations.


240A-240B. Solid-State Physics (3-3-3) I-II, I. Corrub, Zimon Lecture—3 hours. Prerequisite: courses 215A-215B-215C and 140A. One electron model of solids; transport properties; optical properties; properties of lattice waves; electron-phonon interaction; superconductivity; magnetism; non-crystalline solids.

245A. High Energy Physics (3) III. Klakos Lecture—3 hours. Prerequisite: course 230A. Phenomenology and systematics of strong, electromagnetic, and weak interactions of hadrons and leptons; determination of quantum numbers; quarks and quark model; deep inelastic scattering; the quark parton model; experiments at hadron colliders and electron-positron colliders.

245B. High-Energy Physics (3) III. Mani Lecture—3 hours. Prerequisite: course 245A. Electroweak interactions; production reactions for the Standard Model of SU(2)xU(1); weak interaction experiments; properties of and experiments with W and Z vector bosons; Glashow-Weinberg-Salam model and the Higgs boson; introduction to supersymmetry and other speculations.

*Course not offered this academic year.
245C. High-Energy Physics (3) Ill. Carlip
Lecture—3 hours. Prerequisite: course 245A. Strong interaction: quantum chromodynamics phenomenology; jets and other experimental tests: quark and gluon distribution functions; quark and gluon scattering; applications of the renormalization group. Not offered every year.

250A. Special Topics in Physics (3) I, II, III. The Staff
Lecture—3 hours. Prerequisite: consent of instructor. Topic varies from year to year. May be repeated three times for credit. Not offered every quarter.

252A. Techniques of Experimental Physics (3) III. The Staff
Lecture—3 hours. Introduction to techniques and methods of designing and executing experiments. Problems and examples from condensed matter will be utilized.

252B. Techniques of Experimental Physics (3) III. Mani
Lecture—3 hours. Introduction to techniques and methods of designing and executing experiments. Problems and examples from nuclear and particle research will be utilized.

290. Seminar (1-3) I, II, III. The Staff (Chairperson in charge)
Seminar—1-3 hours. (SU grading only.)

291. Seminar in Nuclear Physics (1-2) I, II, III. The Staff (Chairperson in charge)
Seminar—1-2 hours. Prerequisite: graduate standing in Physics. Presentation and discussion of any topic of current research interest in experimental or theoretical particle physics. Topics vary weekly. (SU grading only.)

293. Seminar in Solid-State Physics (1-2) I, II, III. The Staff
Seminar—1-2 hours. (SU grading only.)

295. Introduction to Departmental Research (1) I. 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. Techniques of Teaching Physics (3) Ill. Potter
Prerequisite: consent of instructor and Department Chairperson. Study of devices and methods used to teach physics at the college level. Participation in presenting lectures and demonstrations in undergraduate classes. Preparation of new material for lectures and laboratories. (SU grading only.)

298. 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. 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.)

Physiological Sciences

(School of Veterinary Medicine)
Richard A. Freedland, Chairperson of the Department
Department Office, 1094 Haung Hall (916-752-1373)

Faculty
Arthur L. Black, Ph.D., Professor Emeritus
Michael L. Bruss, D.V.M., Ph.D., Associate Professor
Viktor W. Burns, Ph.D., Professor Emeritus
Charles E. Cornell, D.V.M., Ph.D., Professor Emeritus
Donald L. Curry, Ph.D., Professor
Richard A. Freedland, Ph.D., Professor
Dorothy W. Griesen, Ph.D., Assistant Professor
Robert J. Hansen, Ph.D., Professor
Benjamin L. Hart, D.V.M., Ph.D., Professor
M. A. Hauser, DVM-Ph.D., Assistant Professor
James H. Jones, Ph.D., D.V.M., Assistant Professor
Gary G. Morris, Ph.D., Professor
Stuart A. Popper, M.D., Professor Emeritus
Quinlin R. Rogers, Ph.D., Professor

Courses in Physiological Sciences

Upper Division Courses

101A-101B. Physiological Chemistry (4-3) II-Feldman
Lecture—4-3 hours. Prerequisite: organic chemistry. Recommended: a course in physiology (may be taken concurrently) and quantitative analysis. Chemical and physical properties of substances comprising the animal body, with major emphasis on the changes during development and factors influencing these reactions. Biochemistry of the endocrine glands and other specialized tissues and body fluids; chemistry of nutrition, energy metabolism and nutrition.

195. Special Study for Advanced Undergraduates (1-6) I, II, III. The Staff (Chairperson in charge)
(PRP grading only)

Graduate Courses

205A. Intermediary Metabolism of Animals (4) I. Feldman, Baldwin (Animal Science); Schneeman (Nutrition)
Lecture—4 hours. Prerequisite: a course in biochemistry or physiological chemistry or consent of instructor; a course in physiology recommended. Biochemical data as related to metabolism of intact animals. Pathways and control in biosynthesis and degradation of carbohydrates and lipids; including hormonal, nutritional, and genetic effects. Dynamics of animal metabolism including pools and turnover rates. Offered in alternate years.

205B. Intermediary Metabolism of Animals (3) II. Rogers, Hansen, Harris (Biological Chemistry), Rucker (Nutrition)
Lecture—3 hours. Prerequisite: course 205A or consent of instructor. Pathways and control in animals of the biosynthesis and degradation of amino acids, proteins, nucleotides and porphyrins; includes hormonal, nutritional, and genetic effects. Offered in alternate years.

220. Physiology of the Liver (3) I. Bruss
Lecture—2.5 hours; laboratory—1.5 hours. Prerequisite: systemic physiology; biochemistry or physiological chemistry; or consent of instructor. Topical functions of the liver; intermediary metabolism, pharmacology, and disorders of the liver. Emphasis on bile formation; bile pigments; bile acids; drug and toxin metabolism; circulation; carbohydrate, lipid and protein metabolism; ion transport; and function tests. Offered in alternate years.

230. The Secretory Process (2) I. Curry
Lecture—2 hours. Prerequisite: graduate standing or consent of instructor. Structural and Intra-cellular events involved in secretion with emphasis on physiological and histological events common with all secretory systems, but emphasis on the beta cells of the endocrine pancreas as role model. Offered in alternate years.

238. Behavior and Adaptations to Parasites and Pathogens (2) II. Hart
Lecture—2 hours. 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 injury, bacterial and parasitic diseases, or to overcome such diseases once they are sick. Main emphasis is on vertebrates, especially wild and domestic mammals.

242A. Isotopes as Tracers in Biological Research (2) I. Bruss
Lecture—2 hours. Prerequisite: biochemistry or physiological chemistry; elementary calculus and physics; or consent of instructor. Study of the preparation, properties, and detection with emphasis on biological applications. Offered in alternate years.

242B. Isotopes as Tracers in Biological Research (2) II. Bruss
Lecture—18 hours total; laboratory—2 hours total. Prerequisite: course 242A or consent of instructor. Study of in vivo and in vitro techniques for using isotopes in biological research. Offered in alternate years.

260. Comparative Bioanegarics (4) II. Heuser
Lecture—3 hours; discussion—1 hour. Prerequisite: Chemistry 107A. Fundamentals of thermodynamics and their application in physiology; entropy, probability, information, and thermodynamic potentials. Theory of biological similarity; dimensional analysis, poliklinothermy, heterothermy, homeothermy, and biological time. Offered in alternate years.

280. Advanced Respiratory Physiology (4) II. Jones
Lecture—3 hours; discussion—1 hour. Prerequisite: graduate student status or consent of instructor. Advanced study of respiratory physiology with emphasis on the control and regulation of ventilation, pulmonary gas exchange, and gas transport and delivery at rest and during exercise, at high altitude. Offered in alternate years.

290. Seminar (1) I, II, III. The Staff (Chairperson in charge)
Seminar—1 hour.

298. Group Study (1-5) I, II, III. The Staff (Chairperson in charge)
(SU grading only.)

Professional Course

397T. Tutoring in Physiological Sciences (1-5) I, II, III. The Staff
Prerequisite: graduate or professional student standing and consent of instructor. Designed for graduate or professional students who desire teaching experience, but not teaching assistants. (SU grading only.)

Physiology

See Animal Physiology; Human Physiology (School of Medicine); Physiology (below); and Plant Physiology

Physiology

(College of Agricultural and Environmental Sciences)

Faculty

See under Departments of Animal Physiology, Animal Science, and Avian Sciences.

The 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.
Courses in Physiology

Lower Division Courses

*2. Introductory Physiology (4) III. The Staff
Lecture—4 hours. Prerequisite: Biological Sciences 1A. Physiology of muscular contraction, nervous integration, sensation, circulation, respiration, excretion, and digestion.

*2L. Introductory Physiology Laboratory (2) III. The Staff
Laboratory—6 hours. Prerequisite: course 2 (completed or in progress).

*10. Elementary Physiology (4) III. The Staff
Lecture—3 hours; discussion—1 hour. Prerequisite: not open for credit to students who have had Biological Sciences 1A. Introductory course in Physiology for non-science majors.

Upper Division Courses

100A. General Physiology (3) III. Howitz
Lecture—3 hours. Prerequisite: Biological Sciences 1A and Chemistry 68. Interaction of intracellular components in the functioning of animal cells. The metabolic basis and regulation of cellular function. Relation of cell and tissue structure to physiological mechanisms.

100B. General Physiology (3) III. Fappone
Lecture—3 hours. Prerequisite: course 100A; Physics SC recommended. Coordination of course 100A, with emphasis on transport processes, generation and communication of information between the environment and cells and between cells. Cellular aspects and immune system function.

100L. General Physiology Laboratory (2) II. Horwitz, Horowitz
Discussion—five 2-hour sessions to alternate weekly with laboratory—five 6-hour sessions. Prerequisite: course 100A; course 100B (concurrently); course 102B (concurrently); consent of instructor. Experiments in the physical and chemical processes of cells and tissues.

106. Experiments in Physiology: Design and Execution (3) III. The Staff (Barnley in charge)
Discussion—total of 6 hours; laboratory—7.6 hours. Prerequisite: course 100A, 100B, 100L; consent of instructor. Allows students to experimentally examine current physiological problems. Following group discussions on approaches to designing experiments, groups of 2-3 students will choose a project and design an experimental protocol that they will then carry out and report upon. (P/NP grading only.

106B. Experiments in Physiology: Design and Execution (3) III. The Staff (Cohen in charge)
Discussion—two 2-hour meetings during quarter; laboratory—9 hours. Prerequisite: course 106A and consent of instructor. Continuation of course 106A. (P/NP grading only.

110L. Systemic Physiology (5) II, III, IIII. Take, Fuller, Ishida, Sillman, Weidner
Lecture—5 hours. Prerequisite: Biological Sciences 1A; Physics 1B or SC recommended. Organ systems. Concepts of Integrative and homeostatic mechanisms.

110L. Systemic Physiology Laboratory (2) II. Adamson, III. Ishida
Discussion—total of 10 hours; laboratory—3 hours. Prerequisite: course 110 prior to taking 111L recommended, but 10 may be taken concurrently. Selected experiment to illustrate functional characteristics of organ systems discussed in course 110.

111A. Advanced Systemic Physiology Laboratory (3) I. Adamson
Lecture—1 hour; discussion—five 2-hour sessions to alternate weekly with laboratory—five 6-hour sessions. Prerequisite: course 110, 110L; course 112 recommended. Course 111A is not a prerequisite for course 111B. 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.

111C. Advanced Systemic Physiology Laboratory (3) III. Adson
Lecture—1 hour; laboratory—6 hours. Prerequisite: courses 110, 110L, Statistics 13; courses 112, 113, or 114 recommended. Interface physiological recording equipment with microcomputers; data acquisition and analysis using the microcomputer; data interpretation within the framework of physiological concepts.

112. Neurosciences (3) II. Canters, Horowitz
Lecture—3 hours. Prerequisite: course 110. Advanced presentation of concepts in neuroscience including sensory systems, motor systems, and higher neural integration.

113. Cardiovascular, Respiratory, and Renal Physiology (4) II. Goldberg, Weidner
Lecture—4 hours. Prerequisite: course 110; Chemistry 68, 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, graduate students, and others in allied interests.

*114. Gastrointestinal Physiology (3) III. Mendel
Lecture—3 hours; term paper. Prerequisite: course 110; Biochemistry 101B or Physiological Sciences 1011B recommended. Advanced gastrointestinal physiology covering absorption, secretion, motility, and special emphasis on endocrinology and innervation. Emphasis will be on physiology of the gastrointestinal tract; some pathology and nutritional items will be covered.

117. Avian Physiology (3) III.
Lecture—3 hours. Prerequisite: course 110 or Biological Sciences 1B. Physiology of the various systems of birds with emphasis on digestion, respiration, excretion, and endocrine system.

120A. Comparative Physiology: Neurointegrative Mechanisms (3) III. Woolley
Lecture—3 hours. Prerequisite: course 110. Comparisons of physiological functions in the animal kingdom: neurointegrative mechanisms of integration including aspects of phylogenetic development at both neuronal and systemic levels.

120B. Comparative Physiology: Circulation (3) III. Goldberg
Lecture—3 hours. Prerequisite: course 110. Comparisons of physiological functions in the animal kingdom: circulation. Comparative approach to cardiovascular function in vertebrates and invertebrates.

120C. Comparative Physiology: Endocrinology (3) III. Berkley
Lecture—3 hours. Prerequisite: course 110. Comparison of physiological functions in the animal kingdom: animal hormones and their functions.

120E. Comparative Physiology: Respiration (3) III. Cech
Lecture—3 hours. Prerequisite: course 110. Comparison of physiological functions in the animal kingdom: respiration. Offered in alternate years.

120F. Comparative Physiology of Sensory Systems (3) III. Sillman
Lecture—3 hours. Prerequisite: course 110. Basic physiological mechanisms involved in sensory systems. Comparative approach to considerations of mechno-sensitive systems (audition, lateral lines, touch, echo location, equilibrium), chemosensory systems (olfaction, taste, pheromones), photosensory systems (vision, infrared detection, UV detection), electrosensory, and pain. Emphasis on receptors.

121. Physiology of Reproduction (II) II. Anderson
Lecture—3 hours. Prerequisite: course 110. Physiological mechanisms related to reproduction, breeding efficiency, and fertility, with special reference to domestic animals.
121L. Physiology of Reproduction Laboratory (1) II. Anderson Laboratory—2 hours. Prerequisite: course 121 may be taken concurrently) recommended. Experiments on the reproductive systems of domestic animals including male and female gametes. (PNP grading only)

130. Physiology of the Endocrine Glands (4) I. Moberg Lecture—4 hours. Prerequisite: course 110. Advanced presentation of concepts in endocrinology with consideration of the role of hormones in reproduction, metabolism, and disease.

147. Aviation Physiology (3) II. Smith Lecture—3 hours. Prerequisite: course 110. The nature and physiological consequences of the aviation environment (altitude, acceleration, motion, etc.) and of protective devices (oxygen equipment, G-suits, etc.). Field trips will be available (as course 198) to visit operational aviation physiology installations. Offered in alternate years.

148. Principles of Environmental Physiology (3) II Fuller Lecture—3 hours. Prerequisite: courses 110 and 100A, or Biophysics 101A or the equivalent. Physiology of the organism in the environment of man, man's adaptation to that environment, the processes of the body in relation to the environment of man, and man's adaptation to that environment, the processes of the body in relation to the environment, and the effects of pollutants (radioactive and chemical).

149. Environmental Physiology of Domestic Animals (3) III. Millam Lecture—3 hours. Prerequisite: courses 110-110L, or Biological Sciences 1B. Influenza of environmental factors on physiological processes related to animals including man. The nature of environmental variations which influence physiological responses are given emphasis.

150. Proseminar in Physiology (3) I, II, III. The Staff (Chairperson in charge) Seminar—3 hours. Prerequisite: courses 110 and 100A, one additional upper division course in physiology or a related course in science, and consent of instructor. Subject presentations, discussion, and critical evaluation of material in important areas of physiology. Topics may vary from year to year. Limited enrollment.

151. Introduction to Physiological Research (1) I, II, III. The Staff (Chairperson in charge) Seminar—1 hour. Prerequisite: upper division standing in physiology or related biological science, consent of instructor. Introduction to research finding in a particular area of physiology. Presentation and discussion of research by faculty and students. May be repeated for credit. (PNP grading only)

192. Internship (1-12) II, III. The Staff (Chairperson in charge) Internship—3-36 hours. Prerequisite: completion of 94 units and consent of instructor. Work experience off and on campus in all subject areas offered in physiology. (PNP grading only)

194A-HA-194B-HA-194C. Physiology—Honors (1-4.2) II, III, Laboratory—3-12 hours. Prerequisite: senior standing; minimum 3.5 G.P.A.; approval by the departmental Honors Program. Honors in Physiology Laboratory in physiology on a specific question. Project developed with a sponsoring faculty member (Physiology Graduate Group member) and a faculty Honors Committee. Honors thesis submitted upon completion of the project. (PNP grading only)

198A. Voluntary Control of Physiological Processes (4) II, III. Lorenz Seminar—1 hour; laboratory—3 hours. Prerequisite: adequate upper division preparation in at least one of the following: physiology, behavioral science, computer science, physics or electrical engineering; consent of instructor. Individual or team projects in voluntary control of physiological processes emphasizing application of microcomputer-assisted biofeedback techniques. (PNP grading only)

198B. Voluntary Control of Physiological Processes (4) II, III. Lorenz Laboratory—2 hours. Prerequisite: course 198A. Individual or team projects in voluntary control of physiological processes emphasizing application of microcomputer-assisted biofeedback techniques. May be repeated for credit maximum of 9 units for 198A-198B course sequence. (PNP grading only)

198. Directed Group Study (1-5) II, III, The Staff (Chairperson in charge) (PNP grading only)

199. Special Study for Advanced Undergraduates (1-5) II, III, The Staff (Chairperson in charge) (PNP grading only)

Graduate Courses

200L. Animal Cell Culture Laboratory (4) II. B. Wilson Discussion—2 hours; laboratory—6 hours. Prerequisite: courses in undergraduate biochemistry, cell biology, or general physiology, or consent of instructor. Techniques of cell culture, with emphasis on cell physiology and the actions of drugs and toxins on cultured somatic cells. Design, performance and interpretation of experiments with animal cells in vitro.

213. Principles of Electronics for Biologists (2) II. Horowitz, Sobey Lecture—1 hour; laboratory—3 hours. Prerequisite: Physics 5A, 5B, 5C, and Mathematics 16A, 16B, 16C or the equivalent. Principles of electronics applied to biological measurements. Focuses on interconnection of laboratory instruments including filters and computer. Topics covered include: RC networks; operational amplifiers; digital gates; computer interfacing; and programming.

214. Neurophysiology (4) II. Carlsens Lecture—4 hours. Prerequisite: courses 111B, 112; consent of instructor. Electrical activity of neurons and neuroeffector junctions; physiology of the nervous system as studied by its electrical activity.

215. Neurophysiology Laboratory (3) II. Horowitz, Sobey Discussion—3 hours; laboratory—9 hours. Prerequisite: course 214 (may be taken concurrently). Selected experiments based on modern concepts to illustrate n-depth, surgical techniques, stimulating and recording techniques used in neurophysiology research.

216. Neuropharmacology Literature (2) II. Pappone Discussion—2 hours. Prerequisite: course 214. Critical reading and analysis of current and classic original papers in neuropharmacology.

217. The Veibeteve Eye (3) III. Silman Lecture—3 hours. Prerequisite: course 112 or the equivalent. The vertebrate eye will be considered from the standpoint of physiology, biochemistry, and biology. Retinal functions and mechanisms will be stressed, with particular emphasis on the photoreceptors. Offered in alternate years.

218. Topics in Circulatory Pathophysiology (3) III. Weidner Lecture—1 hour; discussion—2 hours. Prerequisite: course 113 (or the equivalent) or consent of instructor. Selected topics in cardiovascular pathophysiology 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 with consent of instructor. Offered in alternate years.

219. Muscle Growth and Development (3) II, III. B. Wilson, Band man (Food Science and Technology) Lecture—2 hours; seminar—1 hour. Prerequisite: Biochemistry 101B or the equivalent, or consent of instructor. Integration of growth and development of skeletal muscle; morphology, biochemistry, neural control mechanisms, circulatory and nutritional factors. Prenatal and neonatal differentiation of fiber types. Experimental and hereditary myopathies. Offered in alternate years.

220. General and Comparative Physiology of Reproduction (3) I. Anderson (Animal Science), Stabenfeldt (Reproduction), Lasley (Reproduction) Lecture—3 hours. Prerequisite: courses 110, 110L; Biochemistry 101B; Genetics 100. Basic phenomena of reproduction and evolutionary processes and comparisons of processes in a wide variety of animals; gamete formation, structure, and metabolism; fertilization; neuroendocrine mechanisms in maturation and reproduction; role of social factors. Offered in alternate years.

230. Advanced Endocrinology (2) II. Moberg Lecture—2 hours. Prerequisite: course 130 or the equivalent, and graduate standing. Focus on timely topics of endocrine research. Critical review of current literature and discussion of major research strategies in the area. May be repeated for credit when different topics covered.

231. Neuroendocrinology (2) III. Woolley Lecture—3 hours. Prerequisite: course 110 or the equivalent course in equivalent division. Prerequisite: course 130 or the equivalent course in endocrinology, Neuronal-Endocrine Interactions; neural regulation of the endocrine system, especially in relation to reproduction; the role of hormones and growth factors in sexual differentiation of the brain.

234. Physiological Basis of Neurotoxicology (3) I. Woolley Lecture—3 hours. Prerequisite: course 110 or the equivalent; basic understanding of neurophysiology. Mechanisms of action at the cellular and systemic level of a number of different neurotoxins and toxicants. Examples of ways toxins may act on the nervous system and techniques for dealing with neurotoxicology. (Same course as Environmental Toxicology 234.

242. Physiological Rhythmicity (1) I. Winget Lecture—1 hour. General aspects and basic mechanisms of biological rhythms; the importance of rhythm desynchronization in areas of pharmacology and space medicine; telemetry; mathematical methods; chronometry; tidal, lunar, and annual periods; periodic desynchronization. Offered in alternate years.

275. Neurohumoral Regulatory Mechanisms of Thermogenesis (3) III. Horowitz, Horowitz Lecture—2 hours; discussion—1 hour. Prerequisite: course 101A or the equivalent; Biochemistry/Physiological Sciences 101A or the equivalent; consent of instructor. Designed for graduate and advanced undergraduate students, this course will examine thermogenic systems in homeotherms (primarily mammals) with respect to regulation (hormonal and neural control) and effector mechanisms (basis of heat generation at the target cell).

291A (1), I, II, III. The Staff (Chairperson in charge) Seminar—1 hour. Discussion and critical evaluation of advanced topics and current trends in research. (SU grading only)

291B Research Conference in Physiology (1) I, II, III. The Staff (Chairperson in charge) Seminar—1 hour. Prerequisite: graduate standing and consent of instructor. Presentation and discussion of faculty and graduate student research in physiology. May be repeated for credit. (SU grading only)

291A Selected Topics in Visual Science (2) III. Chatapan (Psychology), Johnson (Ophthalmology), Scolding (Neurology), Stiles (Neurology) Seminar—2 hours. Prerequisite: graduate student standing and consent of instructor; course 217 recommended. Visual and computational aspects of vision, vision as a problem-solving process, and the role of vision in cognitive tasks. Consideration of all levels of the visual system from peripheral to high brain centers. Emphasis on recent research. Topics vary each year. May be repeated for credit. (SU grading only)

291B. Seminar in Cellular Mechanisms of Adaptation (1) II, III. Horowitz Discussion—0.5 hour; seminar—0.5 hour. Prerequisite: course 105B; Biochemistry 101B or Physiological Sciences 101B; consent of instructor. Review and evaluation of current literature and research in cellular adaptations to the environment. May be repeated for credit when a different topic is studied. (SU grading only)
Plant Biology (A Graduate Group)

Fred Bliss, Ph.D., Chairperson of the Group
Group Office, 152 Robbins Hall (916-752-7074/ FAX 916-752-4754)

Faculty. Includes 108 faculty members from 13 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 programs are designed to prepare students for careers in teaching and research at community colleges, universities, government, or industrial laboratories. The graduate curriculum involves both a broad overview of the discipline and in-depth study and research in one of four areas of specialization: cell and molecular biology; ecology, systematics, and evolution; integrative plant and crop physiology; and plant development and structure. These areas of specialization permit individual study and research into diverse aspects of plant biology, including anatomy, biochemistry, cell biology, cytology, developmental biology, ecology, genetics, molecular biology, morphology, mycology, paleobotany, phylogeny, physiology, systematics, and weed science.

Preparation. For both the M.S. and Ph.D. programs, a level of scholastic development equivalent to a Bachelor's degree in biological sciences from a recognized college or university is required. Courses in the following areas are considered to be prerequisites to the advanced degrees in Plant Biology: Inorganic chemistry, organic chemistry, introductory physics, genetics, structural botany, biochemistry, introductory plant physiology, Laboratory, calculus, introductory statistics, and evolutionary biology. Limited deficiencies can be made up after admission. The graduate advisor, the major professor, or the student will design a program of advanced courses to meet individual academic needs within one of the specializations.

Graduate Adviser. Contact the Group office.

Courses in Plant Biology

Graduate Courses


202. Advanced Physiology of Cultivated Plants (2). I. Sachs (Environmental Horticulture), Labavitch (Pomology). Lecture—1 hour; discussion—1 hour. Prerequisites: courses 101 and 102; Botany 111, 112. Selected physiological topics generally focusing on sourcesink behavior affecting crop production and quality. (P/NP grading only.) Offered in alternate years.

206. Plant Hormones and Regulators (3). II. Labavitch (Pomology), Yang (Vegetable Crops). Lecture—3 hours. Prerequisite: Botany 112. Chemical, biochemical, and physiological activity of major classes of plant growth regulators. Primary consideration given to concepts that are of current research interest. Uses of growth regulators in agriculture. Offered in alternate years.

214. Higher Plant Cell Wall (3). I. Labavitch (Pomology), Nevin (Vegetable Crops). Lecture—2 hours; discussion—1 hour. Prerequisite: Botany 112, a course in biochemistry. Lectures focus on the structure, analysis, synthesis, and development-related processes of cell walls. Discussions center on analysis of scientific papers related to lecture topics. Offered in alternate years.

216. Advanced Topics in Mineral Nutrition (4). I. Lüthi (Land, Air and Water Resources). Lecture—3 hours; discussion—1 hour. Prerequisite:

Course not offered this academic year.

Plant Pathology

(College of Agricultural and Environmental Sciences)

John M. Dunlavy, Ph.D., Chairperson of the Department
Department Office, 354 Hutchison Hall (916-752-0300)

Faculty

Richard M. Bostock, Ph.D., Associate Professor
George Bruening, Ph.D., Professor
Edward E. Butler, Ph.D., Professor Emeritus
Robert N. Campbell, Ph.D., Professor
Michael R. Davis, Ph.D., Lecturer
James E. Devay, Ph.D., Professor Emeritus
John M. Dunlavy, Ph.D., Professor
W. Harley English, Ph.D., Professor Emeritus
Bryce W. Faiz, Ph.D., Associate Professor
Robert L. Gilbertson, Ph.D., Assistant Professor
David G. Gilchrist, Ph.D., Professor
Deborah A. Golino, Ph.D., Lecturer
Raymond G. Grogen, Ph.D., Professor Emeritus
W. Douglas Humber, Ph.D., Lecturer
William B. Hewitt, Ph.D., Professor Emeritus
Clarence I. Kado, Ph.D., Professor
Bruce Kirkpatrick, Ph.D., Assistant Professor
Becky L. Leaf, Ph.D., Professor Emeritus
James D. MacDonald, Ph.D., Associate Professor
James J. Maroto, Ph.D., Associate Professor
Sreedu John M. Misri, Ph.D., Lecturer
George Nyland, Ph.D., Professor Emeritus
Joseph M. Ogawa, Ph.D., Professor Emeritus
Bret M. Tyler, Ph.D., Associate Professor
Jerry K. Uyemoto, Ph.D., Lecturer
Arlene H.C. van Bruggen, Ph.D., Assistant Professor
Robert K. Webster, Ph.D., Professor

Related Major Program. See the major in Plant Science.
Courses in Plant Pathology

Upper Division Courses

120. Introduction to Plant Pathology (4) I. Gilbertson; III. Campbell Lecture—2 hours; laboratory—6 hours. Prerequisite: Biological Sciences 1C; Microbiology 2 recommended. The nature, cause, and control of plant diseases. Offered in alternate years.

125. Diagnosis and Control of Plant Diseases (4) III. Rocks, Donald Lecture—2 hours; laboratory—6 hours; field trips. Prerequisite: course 120. Clinical plant pathology with emphasis on diagnosis, epidemiology, and control of diseases of economic plants. Students may specialize in diseases of fruits, vegetables, field crops, or ornamentals in the laboratory exercises. Offered in alternate years.

130. Physiological Fruit Fungi (3) I. Gilchrist, Bostock Lecture—3 hours. Prerequisite: Biological Sciences 1C; Biochemistry 101B and Botany 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.


192. Internship (1-12) I, II, III. The Staff (Chairperson in charge) Internship—3-60 hours. Prerequisite: course 120 and consent of instructor. Work experience off and on campus, supervised by a member of the faculty. (PANP grading only)

198. Directed Group Study (1-5) I, II, III. The Staff (Chairperson in charge) (PANP grading only)

199. Special Study for Advanced Undergraduates (1-5) I, II, III. The Staff (Chairperson in charge) (PANP grading only)

Graduate Courses

205A-205B. Diseases of Vegetable and Field Crops (3-3) I-III. Extra-summer, I. Van Bruggen Lecture—1 hour; laboratory—2 hours; fieldwork—8 hours (Summer Session consists of one 4-5 day field trip only). Prerequisite: course 120; Botany 119. Study of vegetable and field crops diseases with emphasis on recognition and diagnosis, epidemiology, and control. (Deferred grading only; pending completion of sequence.) Course 205A-205B may be taken concurrently.

206A-206B. Diseases of Fruit, Nut, and Vine Crops (3-3) I-III. Extra-summer, I. Van Bruggen Lecture—1 hour; laboratory—2 hours; fieldwork—8 hours (Summer Session consists of one 4-5 day field trip only). Prerequisite: course 120; Botany 119. Clinical study of fruit, nut, and vine crops diseases with emphasis on etiology, epidemiology, diagnosis, and control. (Deferred grading only; pending completion of sequence.) Course 206A may be taken concurrently.

208. Ecology of Plant Pathogens and Epidemiology of Plant Disease (3) I. Dunlay Lecture—3 hours; discussion—1 hour. Prerequisite: course 120 or the equivalent. Interaction between higher plants, plant pathogens, and the environment which has an impact in the occurrence and severity of plant disease. Emphasis is placed on the population dynamics and ecology of plant pathogens in the aerial and soil environment. Offered in alternate years.

*209. Principles of Plant Disease Control (3) II. Bostock Lecture—3 hours. Prerequisite: course 120 or the equivalent. Discussion of the underlying principles and methods used for the control of plant diseases. Emphasis placed on application of epidemiological principles, biological (including host resistance), and chemical strategies to achieve disease control. Offered in alternate years.

210. Physiology and Biochemistry of Host-Pathogen Interaction (4) I. Gilchrist, Bostock Lecture—3 hours; discussion—1 hour. Prerequisite: course 120 or the equivalent; Biochemistry 101B. Discussion of the nature of host-pathogen interactions, metabolic alterations in plant disease, biochemistry of disease resistance, toxins in plant disease. 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 Genetics 100. Genetic analysis of pathogenicity, cultivar-specificity, and host-specificity in plant pathogens, particularly fungi; application of molecular biology to the isolation and characterization of the genes involved; and to aspects of pathogen identification; emphasis on research techniques and problem-solving. Offered in alternate years.

217. Molecular Genetics of Fungi (3) II. Holland, Tyler Lecture—3 hours. Prerequisite: graduate standing in a biological science; Biochemistry 101B; Genetics 100, 102A; Botany 119; courses 130, 215X; Microbiology 215 recommended. Advanced treatment of molecular biology and genetics of filamentous fungi and yeasts, including gene structure, organization and regulation; plant pathogenesis; secretion; control of reproduction; molecular evolution; transformation; and gene manipulation. (Same course as Biological Chemistry 217). Offered in alternate years.

224. Pathogenic Fungi (5) III. The Staff Lecture—3 hours; laboratory—6 hours. Prerequisite: Botany 118. Morphology and taxonomy of plant pathogenic fungi.

226. Plant Virology (5) I. Bruening, Falk Lecture—2 hours; laboratory—9 hours. Prerequisite: consent of instructor. Viruses as causal agents of plant diseases; chemical and physical properties of viruses; methods of transmission; procedures for assay and diagnosis; multiplication of viruses; pathological cytology and anatomy; application of equipment and techniques used in research. Offered in alternate years.

228. Plant Bacteriology (5). I. Kado Lecture—2 hours; laboratory—9 hours. Prerequisite: course 120; Microbiology 2 or the equivalent; Biochemistry 101A, 101B. 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.

290. Seminar (1) I, II, III. The Staff (Chairperson in charge) Seminar—1 hour. Review and evaluation of current research in plant pathology. (SU grading only)

290C. Advanced Research Conference (1) I, II, III. The Staff Seminar—1 hour. Prerequisite: course 120 or consent of instructor. Presentation, evaluation, and critical discussion of research activities in the area of advanced plant pathology; primarily designed for graduate students. (SU grading only)

291. Seminar in Host-Parasite Physiology (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. (SU grading only)

292. Seminar in Plant Virology (1) I, II. The Staff (Chairperson in charge) Seminar—1 hour. Prerequisite: course 226. Review and evaluation of current literature and research in virology. (SU grading only)

295. Seminar in Mycology (1) I, III. The Staff (Chairperson in charge)

295A. Seminar—1 hour. Review and evaluation of current literature and research in mycology. (SU grading only) (Same course as Botany 295).

298. Special Group Study (1-5) I, II, III. The Staff (Chairperson in charge)

299. Research (1-12) I, III. The Staff (Chairperson in charge) (SU grading only)

Plant Physiology

See Botany for undergraduate majors, and Plant Biology (A Graduate Group) for graduate study.

Plant Physiology (A Graduate Group)

Students admitted into the Plant Physiology Graduate Group before June 30, 1983 will be allowed to complete their degree in this subject.

New students, however, should see the Plant Biology Graduate Group section in this catalog.

Information. 152 Robbins Hall (916-752-7034)

Plant Protection and Pest Management (A Graduate Group)

Bruce Jaffee, 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 on-going projects on integrated crop management and sustainable agriculture. Weeds, insects, plant pathogens, nematodes, rodents, and other pests are treated as parts of complex ecosystems and not as isolated problems. Courses include: concepts and systems of plant protection and pest management; diagnosis and control of plant pest problems; taxonomy and legal ramifications; and equipment for chemical applications. Detailed information can be obtained from the Group Chairperson and the Graduate Announcement.

Graduate Adviser. R.F. Norris (Botany), M. Parelle (Entomology).

Courses in Plant Protection and Pest Management

Graduate Courses

201. Concepts and Systems of Plant Protection and Pest Management (4) II. Marois (Plant Pathology)

202. Plant Protection, Insects and Disease Control (4) I. Van Bruggen

205C. Seminar in Pest Management (1) I, II, III. The Staff (Chairperson in charge)
Plant Science

(College of Agricultural and Environmental Sciences)

Faculty
For faculty in departments offering areas of specialization (Depth Subject Matter) in Plant Science, see under Departments of Agronomy and Range Science; Botany; Environmental Horticulture; Land, Air and Water Resources; Plant Pathology; Pomology; Vegetable Crops; and Viticulture and Enology.

The Major Program
The plant science major trains students in the biological and natural sciences as they apply to the production, protection, 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/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 (plant diseases), 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 electing 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.)

UNITS
English Composition Requirement 3-11
See Corequisite ENGL 102 0-8
Additional English (English 102 in plant science or related area, or English 104) 0-4
Preparatory Subject Matter 59-61
Computer science (Agricultural Science and Management 21) 3
Economics (Economics 1A or 1B) 5
Physics (Physics 1A-1B) 6
General chemistry (Chemistry 1A-1B) 10
Organic chemistry (Chemistry 94B-94D) 6
Biological sciences (Biology 1A, 1B, 1C) 15
Plant science (Plant Science 2) 5
Mathematics (Mathematics 16A-16B) 6

Depth Subject Matter 36-37
Statistics (Agricultural Science and Management 150) 4
Soil science (Soil Science 100) 4
Weed science (Weed Science 120) 3
Entomology (Entomology 110 or 111) 4
Plant pathology (Plant Pathology 120) 4
Plant physiology (Botany 111, 112) 6
Genetics (Genetics 100) 4
Water science (Water Science 104 or 110) 3
Plant nutrition (Botany/Plant Science 136 or Soil Science 108) 4
Select one of the following eight options 38-49

Agronomy Option
Specific course requirements 20-21
Agronomy 100, 100L 5
Agronomy 111, 112, 113 (any two courses) 7-8
Plant Science 101 4
Soil Science 125 4

Additional courses to be selected with consent of the adviser from the following 24-25
Agricultural Economics 130, 140, 150
Agricultural Engineering Technology 103, 104AT, 105
Agricultural Practices 49, 149
Animal Science 2, 114, 116
Atmospheric Science 105
Nematology 100, 110
Plant Pathology 125
Plant Science 102, 103, 113
Soil Science 102, 120, 150
Water Science 103, 110, 172.

Courses offered in other production departments (e.g., Vegetable Crops, Pomology, Viticulture and Enology, etc.) or in any other department may be selected with consent of the adviser to satisfy specific individual needs.
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, 130, 131, 132, 133 19
Plant Science 102, 109 8

Additional courses to be selected with consent of the adviser from the following 18
Agricultural Economics 18, 112, 113
Agricultural Engineering Technology 114
Agronomy 100; Botany 105, 111L
Economics 11A, 11B
Environmental Horticulture 73, 130
Ecology 111, 112
Landscape Architecture 40, 131, 155
Microbiology 3; Plant Pathology 125
Plant Science 101, 112, 112L, 113
Pomology 102; Psychology 144; Soil Science 109; Vegetable Cross 101; Viticulture and Enology 110B

Courses offered in the natural sciences may be selected in consultation with the adviser.

Landscape Horticulture Option
Specific course requirements 30
Environmental Horticulture 6, 105, 120, 130, 133 17
Landscape Architecture 40, 131, 155 8
Plant Science 102 4

Additional courses to be selected with consent of the adviser from the following 15
Agricultural Economics 112, 114; Agronomy 100; Botany 105; Economics 11A, 11B; Environmental Horticulture 107, 125; Geology 3; Landscape Architecture 111; Plant Pathology 125; Plant Science 101, 103, 113; Pomology 101; Soil Science 106; Vegetable Crops 101; Wildlife and Fisheries Biology 10.

Courses offered in the natural sciences may be selected in consultation with the adviser.

Plant Pathology Option
Specific course requirements 40
Biochemistry 101A, 101B 6
Botany 105, 119 10
Chemistry 1C, 5 9
Microbiology 2, 3 4
Nematology 100 4
Plant Pathology 125, 130 7

Plant Science Option
Specific course requirements 48-49
Plant science (Plant Science 101, 102, 109, 113, 122) 11
Agricultural economics (Agricultural Economics 18, 113, 130, 140, 150) 5
Agronomy (Agronomy 100, 100L) 5
Environmental horticulture (Environmental Horticulture 6, 105, 125, 130) 3-4
Pomology (Pomology 101, 102) 4
Vegetable crops (Vegetable Crops 101) 4
Viticulture (Viticulture 2) 2
Biochemistry (Biochemistry 101A, 101B) 8
Environmental toxicology (Environmental Toxicology 1C) 4
Soils (Soil Science 109) 4

Pomology Option
Specific course requirements 15
Pomology 101, 102 8
Plant Science 109, 112 7

Additional courses to be selected with consent of the adviser from the following 130
Agricultural Economics 112, 140; Agricultural Engineering Technology 101AT; Agronomy 100, 100L; Atmospheric Science 105; Entomology 111, 112L; International Agricultural Development 101; Nematology 100, 110; Plant Pathology 125, 130; Plant Science 101, 102, 112, 113; Pomology 101; Soil Science 102, 109, 120, 150; Vegetable Crops 101, 118; Viticulture and Enology 110, 116; Water Science 110.

Natural sciences electives, not to exceed 8 units may also be included.

Vegetable Crops Option
Specific course requirements 19
Vegetable Crops 101, 105, 150 12
Plant Science 102, 112 7

Additional units selected with consent of the adviser from the following 19
Agricultural Economics 130; Biochemistry 101A, 101B, 122; International Agricultural Development 102, 103A, 108B, 141; Plant Pathology 125; Plant Science 101, 103, 112L, 113, 122, 128, 135, 196, 270; Soil Science 109; Vegetable Crops 116, 195; one unit of seminar to be selected with consent of the adviser from subject matter area of specialization; 2 units of 190 or 198 or 9 units of 199 may be applied toward requirement.

Senior Thesis option (1-3)

Natural sciences electives, not to exceed 8 units, may also be included.
**Course Requirements**

Specific course requirements: 32-35

Biochemistry 101A, 101B

Plant Science 101, 102, 109, 112

Viticulture and Enology 2, 101A, 101B, 101C, 110 or 111, 115 or 116, 116

Additional courses to be selected with the advice of the counselor from the following:

- Agricultural Economics E, 140, 150
- Agricultural Engineering Technology 101AT, Agricultural Practices 49, 149
- Atmospheric Sciences 105, Biochemistry 122, Hematology 100, 110, Plant Pathology 119, 215, 226

Natural sciences electives, not to exceed 8 units, may also be included.

**Restrictions**

Upper Division Courses

2. Production of Cultivated Plants (5) I. Salvest; III

3. Rappoport (Vegetable Crops) Lecture—3 hours; laboratory—6 hours; 2 three-hour field trips required. Prerequisite: high school courses in biology and chemistry recommended. Introduction to and application of principles of plant science to production of cultivated plants, including how yield and quality are affected by breeding, propagation, culture, harvesting, storage, and marketing. Laboratory includes demonstrations, discussions, planned experiments, and individual field plot experiments.

10. Plants and People (3) The Staff (Vegetable Crops) Lecture—3 hours. Prerequisite: high school biology. Plants as a resource for food, recreation, and environmental enhancement. Emphasis on how our relationship with plants has changed through history, how the growth and development of plants affect their utility. General Education credit: Nature and Environment/Introduciton.

52. Plant Science Internship (1-6) I, II, III, Summer. The Staff (Rains (Agronomy and Range Science) in charge) 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+NP 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+NP grading only)

Upper Division Courses

101. Ecology of Crop Systems (4) III. Bloom (Vegetable Crops) Lecture—3 hours; discussion—1 hour. Prerequisite: courses 10 and 101C, 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.

102. Physiology of Cultivated Plants (4) III. Sachs (Environmental Horticulture) Lecture—3 hours; discussion—1 hour. Prerequisite: course 2 and Botany 112. The plant as a dynamic unit; physiological processes in the vegetative growth, development, flowering and fruiting of cultivated plants.

103. Evolution of Crop Plants (3) II. Jain (Agronomy and Range Science) Lecture—4 hours; discussion—1 hour. Prerequisite: course 10, Introductory genetics (e.g., Genetics 100). Diversity and domestication of economic plants; ecological adaptation; character of genetic diversity and germ plasm collections; implications in new agricultural developments. Offered in alternate years.

104. Conservation of Plant Genetic Resources (4) I. Bliss and McGranahan Lecture—3 hours; discussion—1 hour. Prerequisite: Genetics 10 or Biological Sciences 10. Biological, social, and ethical issues involved in plant genetic resources. Offered beginning with their historical importance to human welfare and conserving germplasm utilization, property rights and strategies for conservation, both on an international and a personal scale.

105L. Plant Cell, Tissue, and Organ Culture (5) III. The Staff Lecture—2 hours and laboratory—6 hours (Intensive 5-day session); seminar—1 hour and research projects. Prerequisite: course 10 (may be taken concurrently); consent of instructor. Basic and applied aspects of plant tissue culture methodology with emphasis on quantification. Intensive one-week methodology section will be conducted before spring quarter, but can extend into the first week of instruction. Application of methodology will extend throughout the quarter with weekly seminars and individual research projects.

109. Plant Propagation (4) II. Sutter (Pomology) Lecture—2 hours; laboratory—3 hours. Prerequisite: course 2 or Biological Sciences 1C. Principles and practices of propagating plants covering anatomical, physiological, and practical aspects.

112. Postharvest Physiology and Handling of Horticultural Commodities (3) I. Kader (Pomology) Reid (Environmental Horticulture), Salvest (Vegetable Crops) Lecture—3 hours. Prerequisite: general plant science background recommended (e.g., course 2, 10 or Food Science and Technology 2); concurrent enrollment in course 12L recommended. Physiological processes related to senescence of fruits, vegetables, and ornamentals; fundamentals involved in handling, transportation, storage, and marketing practices, e.g., temperature and humidity control, protected atmosphere.

112L. Postharvest Physiology and Handling Laboratory (2) I. Reid (Environmental Horticulture), Salvest (Vegetable Crops) Discussion—3 hours; laboratory—3 hours. Prerequisite: course 112 may be taken concurrently. Demonstrations and exercises following the subject matter of course 112. One or more field trips to observe commercial practices.

113. Plant Breeding (4) II. St. Clair (Vegetable Crops) Lecture—3 hours; demonstration-discussion—2.5 hours. Prerequisite: Genetics 100 (may be taken concurrently). The principles of plant breeding applied to vegetables and ornamentals. Fundamental mechanisms of reproductive biology of flowering plants and their impact on genetic variation, evaluation, and cultural practices. Offered in alternate years.

122. Physiological Genetics of Crop Plants (3) III. Jones (Vegetable Crops) Lecture—3 hours. Prerequisite: Genetics 100; Botany 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 in the development of plants. Offered in alternate years.

126. Physiology of Environmental Stresses in Plants (3) I. Lüdtke (Land, Air and Water Resources) Lecture—2 hours; discussion—1 hour. Prerequisite: Botany 112 (may be taken concurrently) or the equivalent. Principles and selected topics in physiology of 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: Botany 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 Botany 135.)

140. Principles of Plant Biotechnology (3) II. Danks (Pomology) Lecture—3 hours. Prerequisite: Biological Sciences 1A and Genetics 100. Principles and concepts of plant biotechnology and the application of recombinant DNA technology, plant molecular biology, plant cell and tissue culture, and crop improvement.

192. Internship (1-12) I, II, III, Summer. The Staff (Rains (Agronomy and Range Science) in charge) Internship—3-36 hours. Prerequisite: completion of 84 units and consent of instructor. Experiences off or on campus in all subject areas pertaining to Plant Science. Internships supervised by a member of the faculty. (P+NP grading only)

196. Postgraduate Technical Program in Horticultural Crops (3) I. Kader (Pomology) in charge Lecture-discussion—presentation—5 days; field trip—5 days. Prerequisite: upper division graduate student standing. Intensive study of current procedures for postharvest handling of fruits, nuts, vegetables, and ornamentals in California. Scheduled first two weeks immediately following last day of spring quarter. Considered a spring course for prereq- uirement. (P+NP grading only)

197. Tutoring in Plant Science (1-4) I, II, III. The Staff (Rains (Agronomy and Range Science) in charge) Prerequisite: upper division standing; completion of course 112 may be taken concurrently. Leading discussion sessions, conducting laboratory exercises or protocring in personalized-system-of-instruction-formal classes under faculty guidance. May be repeated once for credit if different course is tutored. (P+NP grading only)

Graduate Courses

221A-221B. Applied Crop Physiology (4-4) III. Shennan (Vegetable Crops), Jackson (Vegetable Crops) Lecture—1 hour; seminar—1 hour; laboratory—6 hours. Prerequisite: courses 101 and 102 or Botany 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 suitable reports.

270. Reproductive Biology of Flowering Plants (3) I. Wu (Environmental Horticulture) Lecture—2 hours; discussion—4 hours. Prerequisite: Botany 111 and Genetics 100. Fundamental mechanisms of reproductive biology of flowering plants and their impact on genetic variation, evaluation, and cultural practices. Offered in alternate years.

281. Seminar in Postharvest Biology (1-3) I, II, III. Salvest (Vegetable Crops) 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. (SU grading only)

298. Group Study (1-5) I, II, III. The Staff To be arranged.
Political Science
(1 Unit)

Elective in Political Science and Government internship placements in local, state and national government offices, providing students with actual experience in politics and government service while still attending school. A student who majors in political science should be aware of the availability of internships and job opportunities, often requiring specific skills and qualifications. Consequently, the majors offered in political science are valuable not only in providing students with a broader understanding of politics and political systems, but also as a first step toward careers in teaching, law, management, government, urban planning, journalism, politics, administration, or for graduate studies in numerous fields.

Political Science

A.B. Major Requirements:

1. Preparatory Subject Matter: 19-20 UNITS

Three courses from Political Science 1, 2, 3, 4, 5, 7. (Course 7 may not be taken if Course 5 is taken.)


2. Depth Subject Matter: 36 UNITS

Select two courses in each of three fields, listed below. The fields must be chosen from at least two of the three Groups, A, B, or C.

Group A

(1) Political theory: Political Science 113

Group B

(2) American government: Political Science 100-109, 171, 173-175, 191, 195

Group C

(3) Parties and political behavior: Political Science 160-170

4. Public Law: Political Science 150-156

5. Public administration: Political Science 180-189

6. Comparative government: Political Science 140-142, 145-149, 177-179

7. International relations: Political Science 120-139

Additional upper division units in political science to achieve a total of 36.

Only 5 units of Political Science 192 (internship) may be counted toward the 36-unit requirement; and Political Science 192A, 192B, or 192W may not be counted toward a field requirement.

Total Units for the Major: 55-56

Political Science—Public Service

A.B. Major Requirements:

1. Preparatory Subject Matter: 11-12 UNITS

One course from Political Science 1, 5, or 7.

Two courses from Political Science 2, 3, 4. Recommended: Economics 1A-1B.

2. Depth Subject Matter: 48 UNITS

Core program: 12 UNITS

Two courses from Political Science 100, 104, 105, 106, 113, 180, 181; and one course from Political Science 106, 109, 114.

Internship: Political Science 192A, 192B, or 192W. Research paper; Political Science 193.

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 18 of the units must be in political science. (Core Program courses may not be counted toward this requirement.)

Total Units for the Major: 59-60

Fields of Concentration


3. Policy interpretation: Substantive and procedures (public/pre-law): Political Science 150, 151, 152, 153, 155, 156.

4. Policy areas:

a. Urban policy and implementation: Political Science 100, 101, 102, 191, 192.


c. 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 advisor).

Major Advisers: Consult Departmental Office.

Minor Program Requirements:

Students electing a minor in Political Science may choose one of two plans:

1. Plan I: Upper division units in political science (may include 4 units of lower division course work) distributed among at least two of the three Groups, A, B, and C, or a 24-unit plan approved by a faculty advisor. Five units of internship may count toward the minor.

2. Plan II: Departmental Credit Subject Representative. Consult Departmental Office. See also the section on the Teacher Education Program.

Graduate Study: The Department offers programs of graduate study and research leading to the M.A. and Ph.D. degrees. Information concerning admission to these programs and requirements for completion are available in the department office.

Graduate Adviser: Consult Departmental Office.

Public Affairs Internship Program. This program is open to upper division students in any major who wish to obtain an internship in the area of government and public service. Information and applications are available from the Intern Coordinator, Political Science Department, 226 Vocheles Hall, 752-1989.

American History and Institutions. This University requirement may be satisfied by passing any one of the following Political Science courses: 1, 5, 101, 102, 103, 104, 105, 106, 108, 109, 113, 130, 151, 160, 183. (See also under University requirements.)

Courses in Political Science

Lower Division Courses

1. American National Government (4) L. Hill; II. The Staff; III. Segura. 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/Introducory. (CAN 2) 32

2. Introduction to Comparative Politics (4) I. Groth; III. The Staff. Lecture—3 hours; discussion—1 hour. Introduction to basic concepts. In this analysis of the political and governmental structures. General Education credit: Contemporary Societies/Introducory.
3. International Relations (4) I. Nicolic; II. Gartner; III. Siversson. Lecture—3 hours; discussion—1 hour. International conflict and cooperation, including the Cold War, nuclear weapons, and new techniques for understanding international relations.

4. Basic Concepts in Political Theory (4) II. Peterman. Lecture—3 hours; discussion—1 hour. Analysis of such concepts as the individual, community, liberty, equality, justice, and natural law as developed in the works of the major political philosophers. General Education credit: Civilization and Culture/Introductory.

5. Contemporary Problems of the American Political System (4) I. Sadowski. Lecture—3 hours; discussion—1 hour. In-depth treatment of selected problems and issues of American politics, governmental institutions, and policies.

6. Contemporary Issues in Law and Politics (4) II. Gates. Seminar—4 hours. A freshman-sophomore seminar which focuses on the political dimensions of American law and institutions. Examines the roles of courts in resolving contemporary issues of law and politics, including abortion, capital punishment, and civil rights. Limited enrollment.

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

Upper Division Courses

100. Local Government and Politics (4) I. Sadowski. Lecture—3 hours; discussion—1 hour. Prerequisite: upper division standing or consent of instructor. Politics and government of local communities in the United States, including cities, counties, and special districts. Emphasizes sources and varieties of community conflict, legislative and executive patterns, expertise, decision making, and the politics of structural change in local governing boards.

101. Urban Political Economy (4) II. The Staff. Lecture—3 hours; discussion—1 hour. Prerequisite: course 100 or consent of instructor. Historical development of urban political economies. Focuses on ways in which different groups have tried to use local government authority to achieve their objectives and why they succeeded or failed.

102. Urban Public Policy (4) III. The Staff. Lecture—3 hours; discussion—1 hour. Prerequisite: upper division standing in Political Science or consent of instructor. Political and economic relationships among central cities, suburbs, and regional, state, and federal governments. Focuses upon policy problems such as pollution, transportation, welfare, and housing, and upon who governs and who benefits from the policies in these areas.

103. American Federalism (4) III. Sadowski. Lecture—3 hours; research paper. Prerequisite: course 1 or 5 recommended. American politics and policy in the context of national-state-local relations. Constitutional roots of Federalism, centralizing and decentralizing tendencies, fiscal relations, current policy issues, and management of intergovernmental programs.

104. California State Government and Politics (4) II. Sadowski. Lecture—3 hours; research paper. The California political system. Political culture, constitution, elections and parties, direct democracy, legislature, governor, executive branch, courts, finances, state-local relations, and policy issues.

105. The Legislative Process (4) II. Segura. Lecture—3 hours; discussion—1 hour. Analysis of the legislative process with emphasis on the United States Congress; legislative organization and procedures, legislative leadership and policy making, legislation, and public relations between Congress and other agencies.

106. The Presidency (4) III. Berman. Lecture—3 hours; discussion—1 hour; optional term paper. The American presidency's origins and development; presidential power and influence as manifest in relationships with Congress, courts, parties, and the public in the formulation and administration of foreign and domestic policy; nominations, campaigns, and elections.

107. Environmental Politics and Administration (4) I. Wehrweine-Childs. Lecture—3 hours; discussion—1 hour. Introduction to the environment as a political issue in the United States and to the development of administrative mechanisms for handling environmental problems. Changing role of Congress, the presidency, the bureaucracy, and the courts in environmental policy formulation and implementation.

108. Policy Making in the Public Sector (4) I. The Staff. Lecture—3 hours; research paper. The theoretical rationale for governmental activity, program evaluation, PPBS, positive theories of policy making, the quantitative study of policy determinants, implementation, and proposals for improved decision making.

109. Public Policy and the Governmental Process (4) III. Wade. Lecture—3 hours; research paper. The processes of formulating public policy, including individual and collective decision making, political exchange, competition, bargaining, coalition formation and the allocation of public goods, resources and opportunities.

110. Systematic Political Science (4) II. The Staff. Lecture-discussion:3 hours. A major concern is to develop expertise in the foundational debates of modern political science; major approaches and key concepts are related to the development of political science; selected readings are recommended. Prerequisite: consent of instructor and research design and execution.

112. Contemporary Democratic Theory (4) I. Wade. Lecture—3 hours; discussion—1 hour. Major concern is to examine contemporary attempts to reformulate traditional democratic theory; attempts to replace traditional theory by conceptual models derived from modern systems thinking are examined. Prerequisite: consent of instructor.

113. American Political Thought (4) I. Sadowski. Lecture—3 hours; term paper. Prerequisite: upper division standing in Political Science or consent of instructor. Origins and nature of American political thought. Prerequisites: consent of instructor. Prerequisite: consent of instructor. Prerequisite: consent of instructor. Prerequisite: consent of instructor. Prerequisite: consent of instructor. Prerequisite: consent of instructor. Prerequisite: consent of instructor. Prerequisite: consent of instructor. Prerequisite: consent of instructor. Prerequisite: consent of instructor. Prerequisite: consent of instructor. Prerequisite: consent of instructor.

114. Quantitative Analysis of Political Data (4) I. Skelabian. Lecture—3 hours; term paper. Logic and methods for analyzing quantitative political data. Topics covered include central tendency, probability, correlation, and non-parametric statistics. Prerequisite: mathematics 51 or consent of instructor. Prerequisite: consent of instructor. Prerequisite: consent of instructor. Prerequisite: consent of instructor. Prerequisite: consent of instructor. Prerequisite: consent of instructor. Prerequisite: consent of instructor. Prerequisite: consent of instructor. Prerequisite: consent of instructor. Prerequisite: consent of instructor. Prerequisite: consent of instructor. Prerequisite: consent of instructor.

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 thought of the major political thinkers of the period, rather than upon political history.

116. Foundations of Political Thought: A Study in Depth of a Major Political Philosopher (4) III. Peterman. Lecture/discussion—3 hours; term paper. Intensive analysis and evaluation of the seminal works of a major political philosopher.

117. Marxism (4) III. The Staff. Lecture—3 hours; discussion—1 hour. Examination of the political and philosophical philosophy of Karl Marx, with reference to the development of Marxism in the nineteenth and twentieth centuries.


118B. History of Political Theory (4) II. Peterman. Lecture—3 hours; special assignments. Critical analysis of the works of major political philosophers. Modern political philosophy—Locke, Hobbes, Locke, Rousseau, Burke.


*119. Modern Political Thought (4) I. Sadowski. Lecture—3 hours; term paper. Prerequisite: upper division standing in Political Science or consent of instructor. Major contemporary and traditional studies of international political philosophy, including the works of major political philosophers. Emphasis will be upon the work of an individual philosopher or school of thought rather than upon a survey of modern political thought.

120. Theories of International Politics (4) I. Siversson. Lecture—3 hours; discussion—1 hour. Prerequisite: upper division standing or consent of instructor. Major contemporary and traditional studies of international relations, including the works of major political philosophers. Emphasis will be upon the work of an individual philosopher or school of thought rather than upon a survey of modern political thought.

121. War (4) II. Siers. Lecture—3 hours; discussion—1 hour. Prerequisite: course 3 recommended. An analysis of political processes involved in the initiation, conduct, and termination of modern international wars.

122. International Law (4) II. The Staff. Lecture—4 hours. Study of the development of international law; territory, sovereignty, immunity, responsibility, the peaceful settlement or non-settlement of international disputes.

123. The Politics of Interdependence (4) I. The Staff. Lecture—3 hours; term paper. Prerequisite: upper division standing or consent of instructor. The past several decades have seen a growing trend toward interdependence in international relations. Course deals with difficulties in managing complex interdependence and its impact on national policies and politics.

124. The Politics of Global Inequality (4) I. The Staff. Lecture—3 hours; term paper. Prerequisite: upper division standing or consent of instructor. The past several decades have seen a growing trend toward interdependence in international relations. Course deals with difficulties in managing complex interdependence and its impact on national policies and politics.

125. Ethnic Self-Determination and International Conflict (4) II. Pothold. Lecture—3 hours; individual meetings with students to discuss term papers. Prerequisite: one international relations course recommended. Compare the claims of the state and ethnic peoples in countries undergoing internal conflicts, e.g., South Africa, Northern Ireland. Analyzes the role of the international community in facilitating the peaceful resolution of conflicts.

*127. Nationalism and Imperialism (4) I. Kaligren. Lecture—4 hours. Prerequisite: upper division standing; course 3 recommended. Theory of nation building illustrated by Western and non-Western experiences. Offered in alternate years.

128. International Communism (4) II. Zinner. Lecture—4 hours. Prerequisite: upper division standing; course 2 or 3, or consent of instructor. International communist movement; ideology; organization; strategy. Relations among communist parties; problems of leadership and social composition; the Sino-Soviet conflict and its effects on revolutionary struggle. Offered in alternate years.

129. Special Studies In International Politics (4) III. The Staff. Lecture—3 hours; term paper. Prerequisite: upper division standing. Intensive examination of one or more special problems in international politics. May be repeated once for credit when different topic is studied.

130. Recent U.S. Foreign Policy (4) I, III, Gartner and staff. Lecture—3 hours; term paper. Prerequisite: upper division standing or consent of instructor. Broad survey of the development of U.S. foreign policy in...
twentieth century with emphases on transformation of policy during and after World War II, and the introduction to analytic tools and concepts useful for understanding of current foreign policy issues.

131. Analytic of U.S. Foreign Policy (4) I. The Staff Lecture—4 hours. Prequisite: course 1. Survey of U.S. foreign policy, making, implementation, division standing or consent of instructor. Detailed presentation and examination of the formulation of U.S. foreign policy. Survey of numerous factors influencing policy outcomes and how such determinants vary according to policy issue areas.


133. The American Role in East Asia (4) I. Kaligran Lecture—4 hours. Prerequisite: upper division standing; course 3 recommended. Survey of the role the United States has played in East Asia. Influence on Asian development and the potential for U.S. governmental and Asian policy, missionaries, traders, and returning students. Offered in alternate years.

134. Africa and U.S. Foreign Policy (4) I. Rothchild Lecture—3 hours; discussion—1 hour. Prerequisite: upper division standing. Development of Foreign Policy in Africa. Policies of non-intervention, non-aggression, and peace established. Orientation to the central theme of the course is the influence of the United States and the role of the United States in Africa's development and political decisions.


136. International Relations in Western Europe (4) I. Zinnor Lecture—4 hours. Prerequisite: upper division standing. Analysis of European unity, problems of the Atlantic alliance, Atlantic political economy, European West relations, Communist in Western Europe and the relationship between domestic politics and foreign policy.

137. Special Studies in Foreign Policy (4) I, III. Jantleison and staff Lecture—3 hours; term paper. Prerequisite: upper division standing or consent of instructor. Selective examination of special problems in foreign policy. May be repeated once for credit, when different topics are studied.


139. Communist Political Systems (4) I, III. Zinner Lecture—4 hours. Prerequisite: course 2 or consent of instructor. Systematic comparative analysis of the origin, structure and performance of communist political systems with emphasis on the Soviet Union and other nations.

140. Politics and Inequality (4) I. Jackman Lecture—3 hours; term paper or discussion—1 hour. Examine the linkages between politics and the distribution of social and economic goods. Topics include: political coalitions, the role of money in legislation, the politics of welfare states, and the effects of political participation on the distribution of goods.


142. Contemporary African Politics (4) I. Rothchild Lecture—3 hours; discussion—1 hour. Prerequisite: upper division standing in Political Science or consent of instructor. Analysis of African states and their political systems. The role of the United States in Africa's development.

143. Politics and Policy in Western Europe (4) I. The Staff Lecture—4 hours. The evolution of politics, political, and policy trends in selected countries and the relationship between government and political institutions.

144. Government and Politics in East Asia: China (4) I. Kaligran Lecture—4 hours. Prerequisite: course 2 recommended. Development of political institutions and political culture in China. Influence of the United States on China's development and political decisions. The role of the United States in China's development.

145. Government and Politics in East Asia: Pacific Rim (4) I. Kaligran Lecture—4 hours. Prerequisite: course 2 recommended. Establishment and development of political institutions and political decisions in selected countries of the Pacific Rim, including China, Japan, Korea, Taiwan, and the United States.

146. Government and Politics in East Asia: Southeast Asia (4) I. Kaligran Lecture—4 hours. Prerequisite: course 2 recommended. Establishment and development of political institutions and political decisions in selected countries of Southeast Asia, including Vietnam, Laos, Cambodia, and Thailand.


149. Electoral Systems and Voting Behavior (4) I. Segura Lecture—2 hours; discussion—1 hour. Prerequisite: course 2 recommended. Analysis of American elections and political participation. The role of the United States in political decisions.

150. Judicial Politics and Constitutional Interpretation (4) I. Case Lecture—4 hours; discussion—1 hour. Prerequisite: upper division standing. Political science in the United States. The role of the United States in political decisions.

151. The Constitutional Politics of the First Amendment and the Right to Privacy (4) I, III. Zinner Lecture—4 hours; discussion—1 hour. Prerequisite: course 2. Constitutional politics of the First Amendment and the Right to Privacy. The role of the United States in political decisions.

152. The Constitutional Politics of the Second Amendment and the Right to Privacy (4) I, III. Zinner Lecture—4 hours; discussion—1 hour. Prerequisite: course 2. Constitutional politics of the Second Amendment and the Right to Privacy. The role of the United States in political decisions.

153. The Constitutional Politics of the Justice System (4) I. The Staff Lecture—4 hours; discussion—1 hour. Prerequisite: course 2. Constitutional politics of the Justice System. The role of the United States in political decisions.

154. Legal Philosophy (4) I, II. Sipoloi Lecture—2 hours; discussion—1 hour. Prerequisite: upper division standing. The role of the United States in political decisions.

155. Judicial Process and Behavior (4) I, II. The Staff Lecture—4 hours; discussion—1 hour. Prerequisite: upper division standing. The role of the United States in political decisions.

156. Law and Society (4) I, II. Gates Lecture—4 hours; discussion—1 hour. Prerequisite: upper division standing. Social and political participation. The role of the United States in political decisions.

157. Political Behavior and Voting Behavior (4) I. Segura Lecture—4 hours; discussion—1 hour. Prerequisite: upper division standing. The role of the United States in political decisions.

158. Political Behavior and Voting Behavior (4) I. Segura Lecture—4 hours; discussion—1 hour. Prerequisite: upper division standing. The role of the United States in political decisions.

159. Political Behavior and Voting Behavior (4) I. Segura Lecture—4 hours; discussion—1 hour. Prerequisite: upper division standing. The role of the United States in political decisions.

160. American Political Parties (4) I. The Staff Lecture—4 hours; discussion—1 hour. Prerequisite: upper division standing. The role of the United States in political decisions.

161. Comparative Political Parties (4) I, II. The Staff Lecture—4 hours; discussion—1 hour. Prerequisite: upper division standing. The role of the United States in political decisions.

162. Mass Media and Politics (4) I. Costain Lecture—4 hours; discussion—1 hour. Prerequisite: upper division standing. The role of the United States in political decisions.

163. Political Socialization (4) I. Costain Lecture—4 hours; discussion—1 hour. Prerequisite: upper division standing. The role of the United States in political decisions.

164. Political Science (4) I, II. Riddick (Chicano Studies) Lecture—4 hours; discussion—1 hour. Prerequisite: upper division standing. The role of the United States in political decisions.
Chicano's political role as it has been historically defined by different groups in society and the Chicano's response to his/her political environment.

*169. Political Elites (4) I. The Staff
Lecture—3 hours; discussion—1 hour. Prerequisite: course 1, 2, or 4, or consent of instructor. Back-ground, behavior, beliefs, and influence of political leaders. Place of elites in a democratic polity: elite-mass differences; conflict and consensus among elites.

*170. Politics and Personality (4) III. Bermann
Lecture—3 hours; discussion—1 hour. How is the conduct of politics influenced by personal qualities of political actors? Course focuses on developing criteria for analyzing political personalities in psychological terms by examining selected autobiographies of twentieth-century statesmen and political leaders.

171. The Politics of Energy (4) II. Wandersfoerde-Smith
Lecture-discussion—4 hours. Prerequisite: upper division standing. Analysis of nature and performance of political processes for making energy choices at the international, national, and state levels. Emphasizes interaction of energy policy with other public policies and the political legitimacy of governmental institutions to overcome constraints on policy innovation.

*172. Community Power and Change (4) I. Jackman
Lecture—3 hours; discussion—1 hour. Exam-loading relationship between a general community context and the use of political power and policy outcomes in the United States. Alternative models of community political change are presented.

174. Government and the Economy (4) I. Skalaban
Lecture—3 hours; discussion—1 hour. Prerequisite: upper division standing in Political Science or consent of instructor. Political basis of economic policy (taxation, spending and regulation); impact of prices, employment and growth on political demands; elite responses to economic change; policy alternatives and the public interest.

175. Science, Technology, and Policy (4) III. 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 Politics in International Relations (4) II. Jackman
Lecture—4 hours. Prerequisite: course 1 or Sociology 1 recommended. Examination of the meaning, sources, and diverse expressions of power and coercion in our lives. Concepts are explored by applying theoretical arguments, examination of cases, such as sexual harassment, racial subordination, legislative policy-making, and ideological hegemony.

177. Modern Dictatorships (4) III. Grot
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 executive-legislative relationships, parties, courts, bureaucracies, communications, and public opinion with comparisons to U.S. processes.

178. Political Development in Modernizing Societies (4) I. Jackman
Lecture—3 hours; discussion—1 hour. Nature and sequence of political development; its economic and social consequences; role of elites, military, bureaucracy, and party systems; social stratification and group politics; social mobilization and political participation; instability, violence, and the politics of integration.

179. Special Studies in Comparative Politics (4) II. Bahr
Seminar—4 hours. Prerequisite: consent of instructor and upper division standing. Intensive examination of one or more special problems appropriate to comparative politics. May be repeated once for credit.

*180. Bureaucracy in Modern Society (4) III. The Staff
Lecture—3 hours; discussion—1 hour. Prerequisite: upper division standing in Political Science or consent of instructor. Role of bureaucracy in a complex society, with emphasis upon changing relationships between government and the economy; consequences of rapid technological and social change for bureaucratic structures and processes; the problems of designing a bureaucracy and democracy and increasing the responsiveness of public bureaucracy.

*181. The American Administrative System (4) I. The Staff
Lecture—3 hours; discussion—1 hour. Prerequisite: upper division standing in Political Science or consent of instructor. Introduction to the development and organization of administrative institutions in the American federal system: focus on planning, organization, and the dynamic of structure to performance, at the national, subnational, and local levels.

182. Administrative Decision Making and Public Policy (4) III. 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) I. The Staff
Lecture—3 hours; discussion—1 hour. The implications for American public administration of evolving concepts about behavior in organizations.

*184. Administrative Theory (4) I. The Staff
Lecture—3 hours; discussion—1 hour. Historical and critical analysis of the principal theories of organization and management of public agencies in the light of such concepts as decision making, bureaucracy, authority and power, communication and conflict, examination of the role of government bureaucracies in the total society.

*186. Manpower Policy and Personnel Administration (4) III. The Staff
Lecture—3 hours; discussion—1 hour. Politics and economics of effective manpower programs; planning manpower needs; recruitment, selection, and administration of public personnel; training and development; unions and collective bargaining; affirmative action; ethics and morality in the public service.

*189. Politics of Budgeting and Finance Administration (4) III. The Staff
Lecture—3 hours; discussion—1 hour. Fiscal role of government in mixed economy and democratic society: politics of revenue and resource allocation; tax policy; intergovernmental financial relations; budget formulation and execution; alternative models of resource allocation; budget as a tool of management.

190. International Relations (4) II. Jackman
Lecture—2 hours; discussion—2 hours. Prerequisite: open to majors in International Relations, or consent of instructor. Analysis and evaluation of substantive issues in contemporary international relations. Readings drawn from current academic and non-academic periodicals.

*191. Special Studies in Local Government and Politics (4) III. Sokolow
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 study. Graduates work in one or more municipalities are emphasized.

192A. Internship in Public Affairs (5) I, II, III. The Staff (Chairperson in charge)
Prerequisite: enrollment dependent on availability of internship positions with highest priority assigned to students with Political Science-Public Service major; upper division standing. Supervised internship and study in political, governmental, or related organizations. (P/N grading only.)

192B. Internship in Public Affairs (5) I, II, III. The Staff (Chairperson in charge)
Prerequisite: course 192A; enrollment dependent on availability of intern positions with highest priority assigned to students with Political Science-Public Service major; upper division standing. Supervised internship and study in political, governmental, or related organizations. (P/N grading only.)

*Course not offered this academic year.

192W. Internship in the UC Davis Washington Center Program (9-8) I, II. Jenisseton and staff
Internship—30-35 hours. Prerequisite: junior or senior standing and admission in the UC Davis Washington Center undergraduate program. Internship in Washington, D.C. with associated research project, under the supervision of a faculty sponsor. (P/N grading only.)

193. Research in Practical Politics (2) I, II. III. The Staff
Research project—6 hours. Prerequisite: courses 192A, 192B; open only to Political Science-Public Service majors for whom it is required. Supervised preparation of an extensive paper relating internship experience to concepts, literature, and theory of political science.

194HA-194HB-194HC. Special Study for Honors Students (2-3-5) I, II, III. The Staff
Directed research. Prerequisite: major in Political Science or Political Science-Public Service with junior standing and overall grade-point average of 3.5. Directed reading, research, and writing culminating in the preparation of a senior honors thesis under direction of faculty adviser. (Deferred grading only, pending completion of sequence.)

195. Special Studies in American Politics (4) I. Wandersfoerde-Smith
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 on different subject matter studied.

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

201. Urban Government and Politics (4) III. Sokolow
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. Sokolow
Seminar—4 hours. Survey and analysis of the literature in the field of state government, politics, and policy. Approaches to the study of the American states as political systems, including their governing institutions and processes and their role in the Federal system. Offered in alternate years.

203. American National Government (4) III. Bermann
Seminar—4 hours. Survey and analysis of the literature in the field of American Government. Emphasis upon development of methodologies for the study of American Government, and upon the development of theories and concepts for understanding the behavior and performance of major national institutions.

205. Field Research in Urban Politics and Policy (4) III. Sokolow
Seminar—5 hours; field research—2 hours. Examination of research design and methodologies appropriate to field research in community-level politics and policy, with an emphasis on elite interviewing and observation. Analysis of illustrative studies. Team participation in design, execution, and analysis of a field research project.

207. Environmental Public Policy (4) II. Wandersfoerde-Smith
Seminar—4 hours. Analysis of the interface between the world of academic reflection about ecological and environmental problems and the word of political action. Evaluation of alternative approaches to policy analysis and recommendation. Individual research, including field research, will parallel discussion of the literature.
208. Policy Analysis (4) I. Hill
Seminar—2 hours. Introduction to social science techniques applied to public policy formation and evaluation.

209. The American Political System (4) I. Wade
Seminar—4 hours. Analysis of selected theoretical and empirical issues posed by contemporary research in American government and politics.

211. Research Methods in Political Science (4) I. Jackman
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, hypothesis formulation, measures of association, and introduction to correlation and regression.

212. Quantitative Analysis in Political Science (4) II. Skalaban
Seminar—4 hours. Prerequisite: course 211. Topics usually covered in an introductory statistics course with an emphasis on applications in political science—descriptive statistics for samples, probability and probability distributions, hypothesis testing, ANOVA, bivariate regression, and introduction to multiple regression.

213. Quantitative Analysis in Political Science II (4) III. The Staff
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 (probit analysis, simultaneous models, time-series analysis, etc.).

218. Political Theory (4) II. Sinopoli
Seminar—3 hours. Prerequisite: course 211.

223. International Relations (4) I. Siverson
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.

300. American Foreign Policy (4) III. Ninio
Seminar—3 hours; term paper.

301. U.S. Political Culture and Foreign Relations (4) III. Rothchild
Seminar—3 hours; term paper. Relates U.S. political culture to foreign policy. Analyzes American ideological preferences in historical perspective, contemporary public opinion, decision-making and implementation. Concludes by examining the influence of foreign policy behavior and democratic process. Offered in alternate years.

241. Communist Political Systems (4) I. Bahry
Seminar—4 hours. Prerequisite: course 141 or the equivalent, or consent of instructor. Systematic analysis of selected topics dealing with the political process of Communist political systems.

242. Seminar in Comparative Politics (4) II. Groth
Seminar—3 hours; term paper. Prerequisite: graduate status or consent of instructor. Systematic survey of theories and methods used in the study of Comparative Politics.

246. Policymaking in Third-World Societies (4) II. Rothchild
Seminar—3 hours. Prerequisite: graduate standing or consent of instructor. Included in an analysis of policy-making process in Third-World countries are such topics as political resources, institutional resources, decision-making, resource allocations, planning and budgeting, implementation, and distribution of world resources. Offered in alternate years.

248. Politics of East Asia (4) III. Kägiyen
Seminar—3 hours; term paper. Selected contemporary problems of government and international relations in East Asia.

250. Political Parties (4) I. I. The Staff
Seminar—3 hours; term paper. Survey of selected topics in American and comparative parties.

251. Political Behavior (4) III. Costantini
Seminar—3 hours. Term paper. Survey of selected topics in political behavior and public opinion.

282. Concepts and Problems in Public Administration (4) I. Gable
Seminar—4 hours. Nature of administrative processes in public administration; analysis of complex organizations; contemporary management practices and processes; means of controlling bureaucracy. Offered in alternate years.

283. Organizational Behavior (4) II. The Staff
Seminar—4 hours. Organizational behavior as it relates to public sector decision-making.

286. Administrative Values (4) III. The Staff
Seminar—3 hours; term paper. Examination of administrative values. Offered in alternate years.

300A. Research in American Government and Public Policy (4) I, II, III. The Staff
Seminar—4 hours. Special research seminar on selected problems and issues in the study of American government and public policy.

300B. 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.

300C. 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.

300D. Research in Judicial Politics (4) I, II, III. The Staff
Seminar—4 hours. Prerequisite: graduate standing in political science or consent of instructor. Contemporary research on judicial politics, judicial institutions, jurisprudence, and judicial behavior.

300E. Research in Political Parties, Politics, and Political Behavior (4) 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.

300F. 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.

300G. 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.

307. 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. Deals with the application and evaluation of theoretical concepts through work experience or systematic observation in public and political agencies. May be repeated for credit.

286. Group Study (1-5) I, II, III. The Staff (Chairperson in charge)
(SU grading only)

289. Research (1-12) I, II, III. The Staff (Chairperson in charge)
(SU grading only)

295D. Directed Reading (1-12) I, II, III. The Staff (Chairperson in charge)
(SU grading only)

Professional Course

360. The Teaching of Political Science (1) I, II, III. The Staff
Seminar—1 hour. Prerequisite: graduate student standing in Political Science. Methods and problems of teaching political science at the undergraduate level. (SU grading only)

*Course not offered this academic year.

Pomology

(College of Agricultural and Environmental Sciences)

Chairperson of the Department
Department Office, 1046 Wickers Hall (931)752-0123

Faculty
Fredrick A. Blais, Ph.D., Professor
Royce S. Bringhurst, Ph.D., Professor Emeritus
Dillon S. Brown, Ph.D., Professor Emeritus
Patrick H. Brown, Ph.D., Assistant Professor
Robert M. Carton, Ph.D., Lecturer
Peter B. Cattin, Ph.D., Lecturer
Julian C. Clare, Ph.D., Professor Emeritus
Garis J. Colosallo, Ph.D., Lecturer
Abhaya M. Dandekar, Ph.D., Associate Professor
Theodore M. De Jong, Ph.D., Professor
Louise Fergusson, Ph.D., Lecturer
Thomas M. Gradziel, Ph.D., Assistant Professor
William H. Griggs, Ph.D., Professor Emeritus
Paul E. Hansche, Ph.D., Professor
Hudson T. Hartmann, Ph.D., Professor Emeritus
Scott Johnson, Ph.D., Lecturer
Adel A. Kader, Ph.D., Professor
Dale E. Kester, Ph.D., Professor Emeritus
John M. Labavitch, Ph.D., Professor Emeritus
Ormund Lillieand, Ph.D., Professor Emeritus
George C. Martin, Ph.D., Professor Emeritus
Gale McGranahan, Ph.D., Lecturer
Warren C. Mickle, M.S., Lecturer
D. Gordon Mitchell, M.S., Lecturer
Dan E. Parfitt, Ph.D., Professor Emeritus
Vito S. Polito, Ph.D., Professor Emeritus
David E. Ramos, Ph.D., Professor Emeritus
Roder J. Romani, Ph.D., Professor
Kay Ryugo, Ph.D., Professor Emeritus
Kenneth A. Shacklef, Ph.D., Assistant Professor
Douglas V. Shaw, Ph.D., Assistant Professor
Noel F. Sommer, Ph.D., Lecturer Emeritus
Stephen M. Southwick, Ph.D., Lecturer
Ellen G. Sutter, Ph.D., Associate Professor
Kiyoto Uru, Ph.D., Professor Emeritus
Steven A. Weinbaun, Ph.D., Professor

Related Major Programs. See the majors in Plant Science and in Agricultural Science and Management (Plant Science option).

Related Courses. See Plant Science 109, 112, 112L, 113, 140, 196.

Graduate Study. For graduate study related to the field of pomology, see the M.S. degree program in Horticulture. See also the Graduate Division section in this catalog.

Courses in Pomology

Lower Division Courses

10. The Art and Science of Fruit Production (3) I. The Staff
Lecture—2 hours; discussion—1 hour. Introduction to pomology including: climatic adaptation of deciduous fruits; orchard planning and management; tree nutrition and physiology; fruit development, maturation, and harvesting; protection from cold; quality, storage, transportation, and marketing. One all-day Saturday field exercise in lieu of discussion meeting for last 5 weeks of quarter. General Education credit: Natural and Environmental Introductions.

92. Internship in Pomology (1-12) I, II, III. The Staff (Chairperson in charge)
Internship—3.36 hours. Prerequisite: consent of instructor. Work experience on and off campus in the production and management of orchard crops or closely related enterprises. (P&N grading only)

Upper Division Courses

101. Tree Growth and Development (4) I, II. De Jong, Brown
Lecture—3 hours; laboratory—3 hours. Prerequisite: Biological Sciences 102 or consent of instructor. Physiology of fruit plant growth and maintenance; species adaptation; responses to envi-
102. Principles of Fruit Production (4) III. Weinbaum, Gradziel
Lecture—3 hours; laboratory—3 hours. Prerequisite: Biological Sciences 101 or Plant Science 102. The course covers principles underlying cultural practices associated with fruit and nut production, including morphology and physiology of the developing buds, flowers and fruits. The course emphasis is on techniques for the intensive care of grapevine and temperate zone species.

103. Citrus and Other Subtropical Fruits (3) II. Shackel in charge
Lecture—3 hours; field trip(s). Prerequisite: Biological Sciences 101. Subtropical fruits as important economic and nutritional resources; their origin, distribution, botanical nature, culture, production and utilization with particular emphasis on citrus but including avocados, dates, macadamias and various other species. Offered in alternate years.

107. Small Fruit Production (2) II. Shackel
Lecture—2 hours; field trips arranged at mutual convenience. Prerequisite: Biological Sciences 101 or the equivalent.berries, blackberries—raspberries (Rubus), blueberries—strawberries (Vaccinium), currants—gooseberries (Ribes) as important nutritional resources; their origin, production and utilization with emphasis on recent progress in integrated management. Offered in alternate years.

170A-170B-170C. Applied Pomology (2-2-2) II-II-II. Rabinovitz, Martin
Lecture—seven 2-hour sessions; two full-day field trips. Prerequisite: introductory course in pomology or consent of instructor. Overview of production and handling of major pomological crops including a clinical study of important cultural and harvesting activities and problems associated with commercial fruit growing. Offered in alternate years.

192. Internship in Pomology (1-12) I, II, III. The Staff (Chairperson in charge)
Internship—3-36 hours. Prerequisite: consent of instructor. Work experience on and off campus in the production and management of orchard crops or closely related enterprises. (P/NP grading only)

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

199. Special Study for Advanced Undergraduates (1-12) I, II, III. The Staff (Chairperson in charge) (P/NP grading only)

Graduate Courses

203. Current Perspectives in Fruit Tree Physiology (3) I. Weinbaum, De Jong
Lecture—2 hours; discussion—1 hour. Prerequisite: Biological Sciences 101, Botany 111, 112 or Plant Science 102; courses 101 and 102. Current advances/concepts regarding physiological bases of developmental phenomena specific to and/or characteristic of deciduous perennial fruit plants. Offered in alternate years.

205. Water Relations and Mineral Nutrition of Deciduous Fruit Crops (4) III. Carlson, Shackel
Lecture—3 hours; two full-day field trips. Prerequisite: Soil Science 100, Botany 111, 112 or Plant Science 102. Development and distribution of roots, irrigation and water relations, mineral nutrient status, deficiencies and excesses, symptoms, use of tissue analysis, chelates and deficiency corrections as factors in orchard management. Offered in alternate years.

210. Plant Reproductive Morphology (4) III. Polito
Lecture—2 hours; discussion—1 hour; laboratory—3 hours. Prerequisite: Botany 105, or Botany 111A and 111B. Biology and morphology of flowering plant sexual reproduction. Specific topics include evocation of 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, Mitchell
Lecture—3 hours. Prerequisite: Plant Science 112 or the equivalent. Review of postharvest biology of fruits and nuts in relation to biotechnological procedures utilized in handling, emphasizing research needs. Offered in alternate years.

220. Quantitative Genetics and Fruit Crop Improvement (3) II. Sheaw
Lecture—3 hours; discussion—3 hours. Prerequisite: Genetics 105, Plant Science 113, and 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. Offered in alternate years.

221. Principles and Practices of Line Cultivar Breeding (3) III. Bliss
Lecture—3 hours. Prerequisite: Genetics 100, Plant Science 113, Agronomy 205A. Application of genetic principles and selection theory to the production and testing of inbred lines in self- and cross-pollinated crops. Topics include types of cultivars, genetic parameters of inbred populations and breeding methods to produce superior inbreds. Offered in alternate years.

290. Seminar II, III, III. The Staff (McGranahan, Polito). HRBI 170 in charge
Seminar—1 hour. (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, Summer. The Staff (Chairperson in charge) (SU grading only)

Portuguese
See Spanish

Preventive Veterinary Medicine (A Graduate Program)

Group Office, 112 Surge-IV (916-752-2375/8174)
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, Department of Epidemiology and Preventive Veterinary Medicine.

Director, Richard Yamamoto (Epidemiology and Preventive Medicine).

Psychiatry
See Medicine, School of

Psychology

(College of Letters and Science)

Donald H. Owings, Ph.D., Chairperson of the Department

Department Office, 149 Young Hall (916-752-1850)

Faculty

Linda P. Acredolo, Ph.D., Professor

*Course not offered this academic year.

Janie R. Bastian, Ph.D., Professor Emeritus
Leo M. Chelapa, Ph.D., Professor
Richard G. Goss, Ph.D., Professor Emeritus
William F. Duke, Ph.D., Professor Emeritus
Rebecca A. Edler, Ph.D., Assistant Professor
Alex C. Elms, Ph.D., D.O., Professor
Robert A. Emmons, Ph.D., Associate Professor
Karen P. Erickson, Ph.D., Professor
Albert A. Horstein, Ph.D., Professor
Kathleen R. Hennessey, Ph.D., Professor
Joel T. Johnson, Ph.D., Associate Professor
Neal A. Kroll, Ph.D., Professor
Debra L. Long, Ph.D., Assistant Professor
Joseph Lyons, Ph.D., Professor Emeritus
Peter R. Martier, Ph.D., Professor (Zoology)
William A. Mason, Ph.D., Professor
Sally L. Mendoza, Ph.D., Associate Professor
G. Mitchell, Ph.D., Professor
Robert M. Murphy, Ph.D., Professor
Thomas Natsoulas, Ph.D., Professor
Donald H. Owings, Ph.D., Professor
Theodore E. Parke, Ph.D., Professor
Robert B. Post, Ph.D., Associate Professor
Stephanie A. Shields, Ph.D., Professor
Dean K. Simonot, Ph.D., Professor
Robert Sommer, Ph.D., Professor
Charles T. Tiet, Ph.D., Professor
Neil G. Waller, Ph.D., Assistant Professor

The Major Programs

Psychology provides knowledge of and means of studying human and animal behavior.

The Program. The Department offers the Bachelor of Arts degree for the student interested in the liberal arts and the Bachelor of Science program designed for students with an interest in either biology or mathematics. The psychology program is extremely broad and represents a wide variety of topics. The courses are organized around three focal points: Personality/Social emphasizes the individual in the social environment and includes such topics as personality theory, social psychology, abnormal psychology, individual differences, developmental psychology, humanistic psychology, and motivation. Psychobiology emphasizes the biological correlates of behavior and includes such topics as sensory psychology, physiological psychology, and comparative psychology. Perception/Cognition emphasizes how information from the physical world is sensed, perceived and used and examines the roles of consciousness, language, perception, and learning in behavior.

Preparatory Requirements. Before declaring a major in psychology, students must complete the following courses with a combined grade point average of at least 2.50 (all courses must be taken for a letter grade):

Psychology 1, 41..........................8 units
Statistics 13 or 102..........................4 units
Biological Sciences 1A or Biological Sciences 10 and one course from Anthropology 1, Genetics 10, Psychology 10A..........................5 or 8 units
Sociology or cultural anthropology..........................4 units

Career Alternatives. A degree in psychology provides broad intellectual foundations which are useful to the graduate for the development of careers in a variety of areas, including social work, the ministry, teaching, business, and counseling. An undergraduate education in psychology also provides excellent preparation for graduate study. Individuals with degrees in psychology may enter graduate programs to prepare for teaching, research, or clinical/counseling careers in psychology, or they may go on to professional schools for training in veterinary and human medicine, law, and other professions.

A.B. Major Requirements:

Preparatory Subject Matter..........................21-25
Psychology 1 or the equivalent..........................4
Psychology 41

Statistics 13a or 13b

Biological Sciences 1a or 1b

One course in sociology or cultural anthropology

Psychology 133

Stanford requirement

Psychology 133 is to be completed before enrolling in upper division courses.

Depth Subject Matter: 40

Two courses out of the following three groups and one course from the remaining twelve.

Group A: Psychology 130, 131, 132, 135, 136

Group B: Psychology 108, 129, 134, 150

Group C: Psychology 112, 143, 145, 147, 168

Additional units to achieve a total of 40 upper division units in psychology: 18-19

Total Units for the Major: 61-65

B.S. Major Requirements:

Biological Emphasis

Preparatory Subject Matter: 46-53

Psychology 1 or the equivalent: 4

Psychology 41: 4

Statistics 13 or 132: 4

Mathematics 16A-16B or 21A-21B: 6-6

Physics 10 or 20A-20B: 4-4

Biological Sciences 1a or 1b: 10

Chemistry 1a: 10

One course in sociology or cultural anthropology (may be lower or upper division), minimum of 4 units: 4-5

Psychology 133 is to be completed before enrolling in upper division courses.

Depth Subject Matter: 52-53

Seven Psychology courses distributed as specified: Group A: two courses from 130, 131, 132, 135, 136: 3

Group B: three courses from 108, 129, 134, 150: 15

Group C: two courses from 112, 143, 145, 147, 168: 8

Additional units to achieve a total of 40 upper division units in psychology: 11-12

Genetics 100: 4

Zoology 125 or 148: 3-4

Physiology 110: 3

Total Units for the Major: 98-106


Mathematics Emphasis

Preparatory Subject Matter: 44-58

Psychology 1 or the equivalent: 4

Psychology 41: 4

Statistics 13 or 102: 4

Mathematics 21A, 21B, 21C: 12

Computer Science Engineering 30 or Engineering 5: 5

Chemistry 10 or 1A-1B or 4A-4B: 4-10

Physics 10 or 5A-5B: 4-8

Biological Sciences 1a or a combination of Biological Sciences 10 and one course from Anthropology 1, Psychology 10, Genetics 10: 5-8

One course in sociology or cultural anthropology (may be lower or upper division), minimum of 4 units: 4-5

(Strongly recommended that Psychology 41 or Psychology 133 be completed before entering in upper division courses.)

Depth Subject Matter: 47-48

Five Psychology courses, distributed as specified:

Group A: two courses from 130, 131, 132, 135, 136: 8

Group B: two courses from 108, 129, 134, 150: 10

Group C: one course from 112, 143, 145, 147, 168: 4

Psychology 133: 4

One course from Psychology 105, 206, 207: 2

Additional units to achieve a total of 40 upper division units in psychology: 9

One course sequence from Statistics 106-108, 130A-130B, 131A-131B: 7-8

Total Units for the Major (Mathematics Emphasis): 91-106

Recommended for All Majors

Psychology 103 is strongly recommended for students who plan to do graduate work in any area of psychology. Psychology 104 is a prerequisite for most upper division courses.


Honors and Honors Program: In order to be eligible for high or highest honors in Psychology, the student must both meet the college criteria and complete a research project involving a minimum of six units of course work over at least two quarters which represents an original analysis of data on psychological phenomena. This project is to be written in the approved format and approved by the department. The quality of the thesis work will be the primary determinant for designating high or highest honors at graduation.

Minor Program Requirements:

Psychology 1 or the equivalent: 4

One course from each of the following three groups: 13

Group A: Psychology 130, 131, 132, 135, 136

Group B: Psychology 108, 129, 134, 150

Group C: Psychology 112, 143, 145, 147, 168

Additional units to achieve a total of 20 upper division units: 7

Graduate Study: The Department offers programs of study and research leading to the Ph.D. degree in psychology. Detailed information regarding graduate study may be obtained by writing the Graduate Adviser, Department of Psychology.

Graduate Adviser: See Class Schedule and Room Directory.

Courses in Psychology

Lower Division Courses

1. General Psychology (4) I, II, III. The Staff
   Lecture—4 hours. Introduction emphasizing empirical approaches. Focus on perception, cognition, personality and social psychology, and biological aspects of behavior. Only 2 units allowed to those who have taken courses 15 or 16; no credit allowed to those who have taken both courses 15 and 16. (CAN Pay 2)

2. Introductory Psychobiology (3) I, II, III. The Staff
   Lecture—3 hours. Survey of genetic, evolutionary and physiological factors affecting behavior. Emphasis on biological and biosocial mechanisms for understanding people and their interaction with their environment. No credit allowed to students who have completed course 1. General Education credit for two-semester sequence of non-GE courses (15-16) which will satisfy requirement for one GE course: Contemporary Societies/Introductory.

3. Psychology and Modern Life (3) I, II, III. The Staff
   Lecture—3 hours. Personality development, interpersonal relationships, and the relevance of psychology to social processes. No credit allowed to students who have completed course 1. General Education credit for two-semester sequence of non-GE courses (15-16) which will satisfy requirement for one GE course: Contemporary Societies/Introductory.

4. Freshman Psychology Seminar (4) I, II, III. The Staff
   Lecture—4 hours. Prerequisite: freshman standing. Instructor will acquaint students with his or her program of research, the development of scientific questions from the literature, and the application of research methods to examine these questions. Critical thinking will be encouraged via expository writing and brief presentations.

   Lecture—4 hours. Prerequisite: course 1 or the equivalent, completion of Statistics 13 or 102 strongly recommended. Introduction to experimental design, interviews, questionnaires, field and observational methods, reliability and statistical inference.

6. Directed Group Study (1-5) I, II, III. The Staff (Chairperson in charge)
   Primarily for lower division students. (FNP grading only)

7. Special Study for Lower Division Students (1-5) I, II, III. The Staff (Chairperson in charge)
   (FNP grading only)

Upper Division Courses

8. Advanced Research Design and Data Analysis (5) I. Kroll, Johnson, Mitchell
   Lecture—5 hours. Prerequisite: course 41 and either Statistics 13 or 102. Design and analysis of psychological investigations and the interpretation of quantitative data in psychology.

9. Statistical Inference from Psychological Experiments (4) 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 sensory, perceptual, comparative, physiological, and social areas of psychology.

    Lecture—4 hours—laboratory—2 hours. Prerequisite: courses 1, 41; at least one year of mathematics. Course recommended. Relationship of brain structure and function to emotion, motivation, perception, states of consciousness, language, learning, and memory in humans and other animals; introduction to methods of physiological psychology.

    Lecture—4 hours. Prerequisite: courses 1, 41. An ontogenetic account of human behavior through adolescence with emphasis on motor skills, mental abilities, motivation, and social interaction.

12. Gender and Social Development (4) I, II, III. Shields
    Lecture—4 hours. Prerequisite: courses 1, 41. Biological and social factors that influence when and how psychological sex-related differences will be expressed in human development. Special attention to the scientific and social rationale which underlies the study of gender.

13. Maturity and Aging (4) I, II. The Staff
    Lecture—4 hours. Prerequisite: courses 41, 112. Biological, cognitive, personality, and social aspects of the human life span between early maturity and death. In this theoretical, methodological, and empirical aspects.

14. History of Psychology (4) I, II, III. The Staff
    Lecture—3 hours—term paper. Prerequisite: courses
1.41; upper division standing or consent of Instructor. Development of psychological thought and research in context of history of philosophy and science.

129. Sensory Processes (5) I, II. Henry, Mendoza Lecture—4 hours; discussion, project, or term paper—1 hour. Prerequisite: courses 1 or Biological Sciences 1B or consent of Instructor, and course 41. Psychobiology of sensory systems in man and other animals. Relationship of behavior to physiology, structure, and function of sensory processes.

130. Human Learning and Memory (4) I, II, Kroll, Parks Lecture—3 hours; discussion—1 hour. Prerequisite: course 41, and either Statistics 13 or 102, or consent of Instructor. Concentration of major theories of human learning and memory with critical examination of relevant experimental data.

131. Perception (4) I, II, III. Natsoulas, Parks, Post Lecture—3 hours; independent library work. Prerequisite: courses 41, 1. The cognitive organizations related to measurable physical energy changes mediated through sensory channels. The perception of objects, space, motion, events.

132. Language and Cognition (4) I, Long Lecture—4 hours. Prerequisite: course 4, and an equivalent or consent of Instructor, course 41. General theories of phytic differences in learning and motivation drawing upon data from laboratory and field observations. Innate physiological mechanisms, developmental changes, effects of conditioning and other environmental influences.


136. Cognitive Psychology (4) I, II, Kroll, Long Lecture—4 hours; term paper. Prerequisite: courses 1, 1A. Introduction to the processes of information, processing, mental representation and transformation. Imagery, attention, concept formation, problem solving, and computer simulation.

137. Altered States of Consciousness (4) I, II, III. Tart Lecture—4 hours; project. Prerequisite: courses 4, 1, 41. Characteristic, uses, and abuses of altered states of consciousness from experiential, behavioral, physiological, and methodological perspectives. Topics typically include sleep, borderline states, dreams, meditation, hypnosis, autohypnosis, marijuana intoxication, psychopharmacologic drugs, and mystical experiences.


144. Environmental Awareness (4) I, II, III. Sommer, Coso 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. Simonton, Johnson Lecture—4 hours. Prerequisite: courses 1, 41. Behavior of the individual in the group. Examination of basic psychological processes in social situations, such as: (a) analysis of processes of social interaction; group tensions, norm-development, attitudes, values, public opinion, status.

147. Personality Theory (4) I, II, III. Elms, Emmons, Erikson Lecture—4 hours. Prerequisite: courses 1, 41. The theories of Freud, Erikson, and other major twentieth-century approaches to personality.

149. Gender and Human Reproduction (4) I. Erickson Lecture—4 hours. Prerequisite: courses 1, 41. The social psychology of human reproduction. Examines gender roles and the course of the individual's reproductive cycle.

150. Comparative Psychology (5) I, II, III. Mason, Okwings, Mitchell Lecture—4 hours; discussion or project—1 hour. Prerequisite: course 1 or consent of instructor; course 41. Perspectives in animal behavior: psychological, ethological, and social systems, with an emphasis on fundamental behavioral categories from the standpoint of adaptation and evolution.

154. Primate Psychology (4) I, III. Mitchell Lecture—4 hours. Prerequisite: course 41; course 150 or an equivalent course in biological sciences, and consent of instructor. Comparative survey of primate psychology, based primarily on laboratory experimentation in learning, communication, cognition, sensation, motivation, emotion, perception, and effects of early experience in many species of primates.

160. Health Psychology (4) I, II, III. Emmons Lecture—3 hours; discussion—1 hour. Prerequisite: course 1 or 150, and course 41 Psychological factors influencing health and illness. Topics include stress and coping, physiological and psychological perception and reporting, heart disease, cancer, compliance, and health maintenance and promotion. Application of principles in laboratory exercises.

165. Introduction to Clinical Psychology (4) I, II, III. The Staff Lecture—4 hours. Prerequisite: courses 1, 41, 168, and either 112 or 145. Major theoretical formulations in the history of clinical psychology, from classical psychanalysis to contemporary existentialism and behavioral models. A survey, based on lecture, films, and tapes, of what clinical psychologists do, including methods of appraisal, professional roles, and approaches to treatment.

171. Humanistic and Transpersonal Psychology (4) I, II, III. Tart Lecture—4 hours. Prerequisite: courses 41, 165. Or the equivalent and consent of instructor. Survey of humanistic and transpersonal movements in contemporary psychology. Theory, data, and techniques in the work of Maslow and others who emphasize creativity, self-actualization, and realization of human potential.

175. Genius, Creativity, and Leadership (4) I, III. Simonton Lecture—4 hours. Prerequisite: course 1 or 16; course 41. The phenomenon of genius is examined from a diversity of theoretical, methodological, and disciplinary perspectives, with an emphasis on outstanding creativity and leadership in art, music, literature, philosophy, science, war, and politics. General Education credit: Contemporary Societies/Non-Introductory. Recommended GE preparation: Psychology 15 and 16.

177. Psychobiography and Life History (4) I. Emms Lecture—4 hours. Prerequisite: course 1 or 16 or consent of instructor; course 41. Case-history research as a nonquantitative approach to studying personality. Psychobiographical interpretation of life histories of outstanding individuals in the arts, politics, science and other areas. General Education credit: Contemporary Societies/Non-Introductory. Recommended GE preparation: Psychology 15 and 16.

180A. Research in General Experimental Psychology (4) I, III. The Staff Lecture—2 hours; laboratory—4 hours. Prerequisite: course 41, and four upper division Psychology courses and consent of Instructor. Empirical research on selected topics in general experimental psychology (general research design and analysis, perception, cognition, cognitive development, etc.). Specific content will vary from quarter to quarter. May be repeated once for credit when the content differs.

180B. Research in Psychobiology (4) I, III. The Staff Lecture—2 hours; laboratory—4 hours. Prerequisite: course 41, and four upper division Psychology courses and consent of Instructor. Empirical research on selected topics in psychobiology (animal learning and motivation, comparative psychology, physiological psychology, sensory mechanisms, etc.). Specific content will vary from quarter to quarter. May be repeated once for credit when the content differs.

180C. Research in Personality and Social Psychology (4) I, III. The Staff Lecture—2 hours; laboratory—4 hours. Prerequisite: course 41, and four upper division Psychology courses and consent of Instructor. Empirical research on selected topics in personality and social psychology (personality assessment, psychodynamic psychology, etc.). Content will vary from quarter to quarter. May be repeated once for credit when the specific content differs.

183. Organizational Psychology (4) I, II. Harrison Lecture—4 hours. Prerequisite: Introductory psychology course. Explains organizational processes among psychological processes, interpersonal dynamics, and organizational forms. Topics include motivation, communication, decision making, leadership, personal selection and training, stress and conflict, career development, organizational development, and organization-community relations.

190 Seminar in Psychology (4) I. The Staff Seminar—4 hours. Prerequisite: junior or senior standing; major in psychology or consent of Instructor. Intensive treatment of a special topic or problem of psychological interest. May be repeated for credit in different subject area.

194. Fieldwork in Psychology (1-6) I, II, III. Harrison Internship—2-16 hours; term paper. Prerequisite: upper division standing in psychology and consent of instructor. Supervising internships, off- and on-campus, in community and institutional settings. Credit not applicable toward 40, social psychology, or instructional psychology required of majors. May be repeated once for credit. Limited enrollment. (P/NP grading only).

197T. Tutoring in Psychology (1-3) I, II, III. The Staff Prerequisite: upper division standing and consent of instructor. Tutoring in the areas of Intermediate courses. This course is intended for advanced undergraduate students who will lead discussion sections in Psychology courses. May be repeated for credit for a total of 8 units. Not more than 8 units may be counted toward the Psychology major requirement. (P/NP grading only).

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

199. Special Study for Advanced Undergraduates (1-5) I, II, III. The Staff (Chairperson in charge) (P/NP grading only)

Graduate Courses

200. Current Research Topics in Psychology (1) I. The Staff Seminar—1 hour. Prerequisite: consent of instructor. A seminar designed to introduce students entering graduate work in the department to ongoing research activities. (S/U grading only)

201. Research Preceptorship (1) I, II, III. The Staff Laboratory-discussion—6-9 hours. Prerequisite: consent of Instructor. (S/U grading only)

204. Advanced Applied Psychometrics: An Introduction to Measurement Theory (4) I. Walker Lecture—4 hours. Prerequisite: course 41, 103, Statistics 13. Examination of the basic principles and applications of classical and modern test theory. Topics include test construction, reliability theory, validity theory, factor analysis and latent trait theory.

*Course not offered this academic year.
Radiology

See Medicine, School of

Radiological Sciences

(School of Veterinary Medicine)

Timothy R. O'Brien, D.V.M., Ph.D., Chairperson of the Department
Department Office, 1114 Medical Science-1A
(916-752-0184)

Faculty

Marvin Goldman, Ph.D., Professor
William J. Hornof, D.V.M., M.S., Associate Professor
Phillip D. Kobil, D.V.M., M.S., Associate Professor
John S. Mattoon, D.V.M., Associate Clinical Professor
Joe P. Morgan, D.V.M., Veterinarian, Professor
Thomas A. Nyland, D.V.M., Professor
Timothy R. O'Brien, D.V.M., Ph.D., Professor
Alain P. Tilton, D.V.M., Veterinarian, Assistant Professor
Part-Time Clinical Faculty
Larry Y. Kerr, D.V.M., Associate Clinical Professor

Courses in Radiological Sciences

Upper Division Courses

115. Bioenvironmental Consequences of Nuclear Technology (3) II. Goldman
Lecture—3 hours; field trips to nuclear power stations. Prerequisite: a course in biology. Bioenvironmental implications of nuclear technology. Hazards evaluation based on predictions of the most sensitive radiological response. Offered in alternate years. (Same course as Environmental Studies 115.)

199. Special Study for Advanced Undergraduates (1-5) I, II. Radiology Staff
(F/P grading only)

Graduate Courses

269. Medical Radiology (3) III. Goldman
Lecture—3 hours. Prerequisite: introductory courses in physics, biochemistry, and physiology, or consent of Instructor. Biological effects of radiation including genetic, teratogenic, and carcinogenic responses in terms of dose and intensity. Related to decision-making and protection. (F/P grading only)

299. Research (1-12) I, II, III. Radiology Staff
(S/U grading only)

Professional Courses

408. Special Procedures Rounds (2) I, II, III. The Staff
Discussion—2 hours. Prerequisite: at least one of the above courses in radiology. Review of selected cases suspicious of disease processes. (S/U grading only)

409. Case Studies in Radiology (3) I, II, III. The Staff
Seminars—2 hours. A course for graduate students and residents in radiology. Case studies of patients with complex clinical problems. (F/P grading only)

410. Recent Advances in Radiology (3) I, II, III. The Staff
Lecture—2 hours. Prerequisite: at least one of the above courses in radiology. Review of recent advances in radiology. (F/P grading only)

Range and Wildlands Science

See Range and Wildlands Science, below; and Range Science
Range and Wildlands Science
(College of Agricultural and Environmental Sciences)

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, water-sheds, 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, extension managers, or rangers. They may also qualify for certification as Range Conservationist in governmental agencies such as the Forest Service, Soil Conservation Service, and the Bureau of Land Management. Career work with such an agency is desirable. It is recommended that training for a professional degree experience with these agencies be included in the major program of study as an internship. In addition, the training provided by this major should give an excellent background for natural resource management positions.

B.S. Major Requirements:
(For convenience in program planning the usual courses taken to satisfy the requirements are shown in parentheses. Equivalent or more comprehensive courses are acceptable. Courses shown without parentheses are required)

UNITS

English Composition Requirement: 0-8

Soil Science Requirement: 14-18

Preparatory Subject Matter: 53-67

Animal science (Animal Science 2) 4

Biology courses (Biology Sciences 1A, 1B, 1C) 16

Chemistry courses (Chemistry 1A, 1B, 1C) 16

Computer Science courses (Computer Science 1, 2, 3) 16

Economics courses (Economics 1, Economics 1A, 1B) 16

Geology courses (Geology 1A, 1B) 8

Mathematics courses (Mathematics 1A, 2A) 16

Physics courses (Physics 1A, 1B) 16

Soil Science courses (Soil Science 101) 6

Statistics courses (Statistics 101) 6

Breadth/General Education Requirement: 8-24

Satisfaction of General Education requirement to include two non-introductory courses in Agricultural Economics, Economics, Environmental Studies, or Geography

Depth Subject Matter: 51-56

Plant physiology (Botany 111 or Water Science 104) 3-4

Plant ecology (Botany 117 or Plant Science 101) 3-4

Meteorology (Geography 3, Atmospheric Science 105) 3-4

Soil science (Soil Science 101) 3-4

Watershed management (Water Science 141) 3

Wildlife ecology or management, one upper

division course in wildlife and fisheries biology, or zoology 3-4

Forage crops (Agronomy 112) 3

Select units from Range Science: 18

Range and wildlands plants (Range Science 100) 18

Range ecology (Range Science 133, 134, 135) 18

Range field course (Range Science 105) 18

Range livestock production (Range Science 180) 18

Revegetation of disturbed lands (Range Science 145) 18

Range Science 192, 193, 194, 195 (not more than 3 units can be selected) 18

Aerial photo interpretation and remote sensing (Geography 106) 4

Restricted Electives: 8-8

Two upper division natural science or applied biological science courses in one of two of the following: animal science, botany, entomology, genetics, geography, mathematics, meteorology, plant pathology, plant science, resource sciences, water science, or weed science.

Unrestricted Electives: 17-47

Total Units for the Major: 180

Major Adviser: C. A. Raguse (Agronomy and Range Science)

Advising Center is in 137 Hunt Hall.

Graduate Study. See under Ecology Graduate Group.

Range Science
(College of Agricultural and Environmental Sciences)

Faculty. See under the Department of Agronomy and Range Science.

Major Program. See the major, Range and Wildlands Science.

Related Courses. See Agronomy 112, Nutrition 115, Resource Sciences 100, Soil Science 105, 120, Wildlife and Fisheries Biology 151.

Courses in Range Science

Questions pertaining to the following courses should be directed to the instructor or to the Advising Center, 137 Hunt Hall.

Lower Division Course
92. Range Science Internship (1-12) I, II, III, summer. The Staff (Department Chairperson in charge). Internship—3-36 hours. Prerequisites: completion of 4 units and consent of instructor. Work experience off or on campus in all subject areas pertaining to range management. Internships supervised by a member of the faculty. (P/NP grading only)

Upper Division Courses
100. Range and Wildland Plants (4) III. Rice Lecture—2 hours; laboratory—2 hours; two Saturday field trips. Prerequisite: Biological Sciences 1C and Junior standing recommended. Systematics, evolution, ecology, and use of plants within range and wildland ecosystems. Taxonomy and identification of range and wildland grasses, woody perennials, legumes, and forbs.

105. Field Course (2) III. Menke Lecture—10 hours total; laboratory—30 hours total (given weekly following and of spring quarter). 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, seeding of improved species, and prescribed fire. Considered a spring quarter course for preenrollment. Offered in alternate years.

133. Grassland Ecology (3) II. Raguse Lecture—3 hours; one Saturday field trip. Prerequisite: course in plant ecology or consent of instructor. Structure, function, and environment of North American grasslands, with emphasis on the California annual type. Concepts and problems in productivity and secondary productivity. Principles of grassland and management including vegetation improvement, utilization by animals, and recreation and aesthetic values. Offered in alternate years.

194. Comparative Ecology of Major Rangeland Systems (3) II. Menke Lecture—3 hours; one Saturday field trip. Prerequisite: course 100 or the equivalent; general ecology course recommended. Study of vegetation structure, composition, and succession in representative North 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. Demment 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 herbivores, communities, and ecosystems. Optimal foraging, interspecific interactions, and primary productivity are considered as factors structuring natural and managed grassland and savanna systems. Offered in alternate years.

196. Range Livestock Production (3) III. Raguse Lecture—3 hours. Prerequisite: Animal Science 2 and course 133. Application of principles of animal and range science to the extensiva production of livestock and rangelands satisfying the needs of beef and sheep production systems from perennial and annual ranges. (Same course as Animal Science 160)

192. Range Science Internship (1-12) I, II, III, summer. The Staff (Department Chairperson in charge). Internship—3-36 hours. Prerequisites: completion of 84 units and consent of instructor. Work experience off or on campus in all subject areas pertaining to range management. Internships supervised by a member of the faculty. (P/NP grading only)

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

196. Special Study for Advanced Undergraduates (1-5) I, II, III. The Staff (Department Chairperson in charge). Prerequisite: senior standing and consent of instructor. (P/NP grading only)

Graduate Courses

205. Seminar in Range Science (1-2) II. Raguse; III. Demment Seminar—2 hours. Topics of current interest in grassland ecology, range and wildlands management, and related modeling and systems analysis.

298. Group Study (1-5) I, II, III. The Staff (Chairperson in charge).

299. Research (1-22) I, II, III. The Staff (Chairperson in charge). (S/U grading only)

*Course not offered this academic year.
Religious Studies
(College of Letters and Science)
Waven W. Lei, Ph.D., Program Director
Program Office, 922 Sprout Hall (918-728-8932)
Committee in Charge
William Bossart, Ph.D. (Philosophy)
Manfred P. Fleischer, Ph.D. (History)
John R. Hall, Ph.D. (Sociology)
Lincoln D. Hurst, Ph.D. (Religious Studies)
Naomi Janowitz, Ph.D. (Religious Studies)
Jay Meichling, Ph.D. (American Studies)
Barbara Metcalf, Ph.D., Professor (History)
Lynn Roller, Ph.D. (Classics)
Faculty
Lincoln D. Hurst, Ph.D., Assistant Professor
Naomi Janowitz, Ph.D., Assistant Professor
Waven W. Lei, Ph.D., Professor
Barbara Metcalf, 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 religious and philosophical systems. Students may select from options in the major in one of the following areas: Biblical studies, Judaism, Christianity, Hellenism, Judaism and Christianity, or the study of prophets and prophetic literature.
Minor Program Requirements:
The following four minor program options and others responsive to students' needs are subject to approval by the major adviser or the Curriculum Committee.

Religious Studies

Minor Program Requirements

Religious Studies

RELIGIOUS STUDIES

Prerequisites:


Religious Studies 20, 30, 40, 50, 60, 70, 80, 90

Religious Studies 100, 110, 115, 150

Total Units for the Major:

68

Course Equivalents

The major adviser has a list of lower and upper division courses that can be substituted for courses suggested above.

Recommended

A reading knowledge of a foreign language is highly recommended. Consult major adviser for a complete list of recommended upper division courses.

Major Advisers:

Waven W. Lei, Naomi Janowitz, Lincoln D. Hurst


Lecture—3 hours; discussion—1 hour. Myth, ritual, and symbolic expression found in a variety of religious traditions. Includes examples from the Bible, the Koran, Plato and early Buddhist writings. General Education credits: Contemporary Societies/Introductory.

4. Eastern Religions (4) L. I. I. I. The Staff

Lecture—3 hours, discussion—1 hour. Eastern religious traditions, Buddhism, Hinduism, and Confucianism from their origins to the present.

10. Introduction to Religious Studies (2) L. I. I. I. The Staff

Lecture—2 hours. Topic of topics in more than one religious tradition as an illustration of the problems and methods of religious study. May be repeated for credit in a different subject area.

21. Old Testament (4) L. I. I. The Staff

Lecture—4 hours. An introduction to the Old Testament. Topics include the minds and customs of the Hebrews, the historical and cultural context of the Hebrew Bible, and the influence of the Hebrew Bible on the development of Islamic, Jewish, and Christian thought. General Education credits: Civilization and Cultures.

23. Basic Judaism (4) L. I. I. The Staff

Lecture—4 hours. An introduction to the basic beliefs and practices of Judaism. Topics include the history of Judaism, the role of the rabbi, the study of Jewish law, and the role of the Jews in the development of Western civilization. General Education credits: Civilization and Cultures.

16. Introduction to Islam (4) L. I. I. The Staff

Lecture—4 hours. An introduction to the beliefs and practices of Islam. Topics include the history of Islam, the role of the Imam, the study of Islamic law, and the role of the Muslims in the development of Islamic civilization. General Education credits: Civilization and Cultures.

30. Special Study for Lower-Division Undergraduates (1-5) I. I. I. I. The Staff (Chairperson in Charge)

Upper Division Courses


Lecture—3 hours, term paper. Principal issues and methods of Religious Studies and related fields.

120. Christian Origins (4) L. I. I. The Staff

Lecture/discussion—3 hours, term paper. Prerequisite: Religious Studies 102. An introduction to the early Christian church, the development of Christian doctrine, and the impact of the Christian faith on the development of Western civilization. General Education credits: Civilization and Cultures.

Courses in Religious Studies

Lower Division Courses

Survey of Religion (4) L. I. I. The 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, Ezekiel, etc.); readings from the Bible, the Koran, Plato and early Buddhist writings. General Education credits: Contemporary Societies/Introductory.

Minor Program Requirements:
The following four minor program options and others responsive to students' needs are subject to approval by the major adviser or the Curriculum Committee.

Religious Studies


Religious Studies 20, 30, 40, 50, 60, 70, 80, 90

Religious Studies 100, 110, 115, 150

Total Units for the Major:

68

Course Equivalents

The major adviser has a list of lower and upper division courses that can be substituted for courses suggested above.

Recommended

A reading knowledge of a foreign language is highly recommended. Consult major adviser for a complete list of recommended upper division courses.

Major Advisers:

Waven W. Lei, Naomi Janowitz, Lincoln D. Hurst
117. A. E. Undergraduate Proseminar in Religion and Culture (2). Castelfranco
Lecture/discussion—2 hours. Prerequisite: upper division standing and one course in religious studies or consent of instructor. Individual topics are discussed by lecturers from this campus and elsewhere. Each student writes a term paper in one of these areas. Content alternates among the following: (A) ideals of Pope Pius XII, (B) Cultural and Social Context of Religion, (C) Religion and Mind, (D) Religion and Visual Arts, (E) Religion, Music, and Drama. (P/NP grading only)

189. Special Study for Advanced Undergraduates (1-5) I, II, III. The Staff (Chairperson in charge)
Prerequisite: upper division standing and consent of instructor. (P/NP grading only)

190. Special Study for Advanced Undergraduates (1-5). I, II, III. The Staff (Chairperson in charge)
Prerequisite: upper division standing and consent of instructor. (P/NP grading only)

Reproduction

(School of Veterinary Medicine)
George H. Stabenfeldt, D.V.M., Ph.D., Chairperson of the Department
Department Office, 1138 Medical Science I (816-752-1356)

Faculty
David M. Baldwin, Ph.D., Associate Professor in Reproduction
Domenico Bernocco, D.V.M., Libero Dencerza, Associate Professor
Robert H. BonDurant, D.V.M., Professor
Ann Thonemann, Susan Bowling, Ph.D., Adjunct Professor
Edward C. Feldman, D.V.M., Professor
John F. Hughes, D.V.M., Professor Emeritus
Bill L. Lasley, Ph.D., Professor in Reproduction
Irvin K. M. Li, D.V.M., Ph.D., Professor
James Murray, Ph.D., Associate Professor
(Reproduction, Animal Science)
Joan D. Rowe, D.V.M., Ph.D., Assistant Professor
George H. Stabenfeldt, D.V.M., Ph.D., Professor
Cluye I. Stornont, Ph.D., Professor Emeritus
Part-Time Clinical Faculty
Conrad Ferreira, D.V.M., Assistant Clinical Professor
Walter Guberneck, D.V.M., Assistant Clinical Professor
Bob Harmon, D.V.M., Assistant Clinical Professor
James R. Howard, D.V.M., Ph.D., Associate Professor
Michael G. Kerfoot, D.V.M., Assistant Clinical Professor
Gregory A. Ledbetter, D.V.M., M.V.M., Assistant Clinical Professor
Terry Lanthausser, D.V.M., Assistant Clinical Professor
Michael McElroy, D.V.M., Assistant Clinical Professor
Gerald R. Mitchell, D.V.M., Assistant Clinical Professor
Frank A. Monghni, D.V.M., Assistant Clinical Professor
Jack W. Morse, D.V.M., Associate Clinical Professor
Carlos Rient, D.V.M., Assistant Clinical Professor
Frank N. Walton, D.V.M., Assistant Clinical Professor
John E. Zimmerman, D.V.M., Assistant Clinical Professor

Courses in Reproduction

Lower Division Courses
92. Immunology and Veterinary Science (1-4) I, II, III. The Staff (Chairperson in charge)
Discussion/laboratory—1—4 hours. Prerequisites: Genetics 700 (or the equivalent), consent of instructor. Immunologic and epidemiologic techniques used in the evaluation of heritable differences in red cell antigens, serum proteins, and enzymes of domestic animals.

Upper Division Courses
111. Immunogenetics and Electrophoretic Techniques (2). Bernocco
Lecture—1 hour; laboratory—3 hours. Prerequisite: Genetics 700 (or the equivalent), consent of instructor. Immunologic and electrophoretic techniques used in the evaluation of heritable differences in red cell antigens, serum proteins, and enzymes of domestic animals.

122. Internship in Veterinary Science (1-12). I, II, III. The Staff (Chairperson in charge)
Prerequisite: upper division standing, approval of program. Supervised work experience in Reproduction. May be repeated for credit. (P/NP grading only)

Graduate Courses
231. Pathophysiology of Mammalian Reproductive Processes (3). Stabenfeldt
Lecture—3 hours. Prerequisite: fourth-year standing in School of Veterinary Medicine or consent of instructor. Physiological and pathological aspects of reproductive failure in mammals concerning gonadal function, fertilization, implantation, preimplantation mortality, neonatal mortality, environmental factors, anatomical and histological defects, and dis ease behavior. Offered in alternate years.

290. Seminar (1-3) I, II, III. The Staff
Seminar—1 hour. Discussion of current topics in animal reproduction and medicine, as well as presentation of research findings by graduate students and faculty. May be repeated for credit. (S/U grading only)

298. Group Study (1-5) I, II, III. The Staff (Chairperson in charge)

299. Research (1-12) I, II, III. The Staff (S/U grading only)

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 resource sciences major studies the physical, chemical, and biological features of renewable natural resources, and the economic and social considerations associated with their utilization and management. The Program. All majors must complete a lower division program that includes chemistry, biology, geology, and other sciences necessary for the study of resource management. After completing this prepa ration, students progress to an upper division program that requires a general resource sciences course, a resource economics course, and a specified number of units of resource-oriented courses. The resource-oriented courses are selected in consultation with and approval of the student’s adviser. Advisers can also help students take advantage of the flexibility within the resource sciences major that makes it possible for students to meet their individual academic and career objectives. In addition, the major provides a number of unrestricted elective units that students may use to acquire additional knowledge.

Internships and Career Alternatives. Positions now held by graduates in resource sciences are quite
variety, but many are engaged 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

English Composition Requirement 3-12
See College requirement 0-3
Additional English (English 103D, 103E or 104) 3-4
Preparatory Subject Matter 59-67

Atmospheric science (Geography 3 or Atmospheric Science 60) 4
Biological sciences (Biological Sciences 1A-1B) 15-20
Chemistry (Chemistry 1A-1B) 10
Computer science (Introduction to Computer Science and Management 121, Civil Computer Science Engineering 10 or 50) 10
Environmental Geology (Geology 101 or 102) 6
Geology (Geology 1 or 50) 4
Mathematics (Mathematics 16A or 16B) 6
Physics (Physics 1A-1B, 1A-1B-1C or 5A-6B-6C) 12-16
For quantitative resource management emphasis 8-12
Other (additional courses in animal and plant sciences, mathematics and physical sciences with adviser's approval) 4

Breadth/General Education 6-24
Satisfaction of General Education requirement to include two non-introductory courses in Agricultural Economics, Economics, Environmental Studies, or Geography 6-24

Depth Subject Matter 64-58

Resource Sciences 100 4
Soil Science 100 4
Water Sciences 100 4
Agricultural Economics 147 or 148 3-4
Agricultural Policy Analysis 138 4

Resource-oriented courses selected with adviser's approval 24
Written expression (in addition to college requirement) (English 103D, 103E, 104) 3
Quantity skills (Agricultural and Resource Management 103, Environmental Studies 123, Statistics 106, 108, 109) 3-4
Social-political awareness in resource sciences (Environmental Studies 165, 166, Environmental Toxicology 138, Geography 161, Geology 134, Water Science 150, Wildlife and Fisheries Biology 151) 6-10

Plant or animal ecology (Botany 117, Entomology 104, Environmental Studies 100, Plant Science 101, Zoology 125) 3-4
Special study or internship (Resource Sciences 180, 192, 198, 199) 3

Unrestricted electives 19-50

Total Units for the Degree 180

Related Courses. For courses that are related to this major see course listings for Agricultural Economics, Agricultural Science and Management, Animal Science, Botany, Environmental Biology and Management, Environmental Toxicology, Geography, Geology, Ranges Management, Soil Science, Water Science, Wildlife and Fisheries Biology, and Zoology.

Major Adviser: J. Stasulat 201 South Hall.
Advising Center for the major is located in 122 Haagland Hall (916-752-1669).

Courses in Resource Sciences

Questions pertaining to the following courses should be directed to the instructor or to the Resource Sciences Teaching Center, 122 Haagland Hall (916-752-1669).

Lower Division Courses

2. Concepts In Forestry (3) J. Harasug 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 credit: Natural Environment/Non-introductory. Recommended GE preparation: Biological Sciences 10 or Chemistry 10.

3. Energy and the Environment (3) J. II. Pfohner, Lecture—3 hours. Prerequisite: Biological Sciences 10 or Chemistry 10. Introduction to energy resources, their global distribution and the social, economic and political and environmental factors influencing utilization. Roles of hydrocarbon, biomass, geothermal, nuclear and fossil fuels in meeting California's energy requirements. General Education credit with concurrent enrollment in course 30: Natural Environment/Non-introductory. Recommended GE preparation: Biological Sciences 10, Chemistry 10, or Physics 10.


31. Energy, Society and Environment Laboratory (2) J. II. Pfohner Discussion—2 hours; laboratory—2 hours; field trips—2 hours. Prerequisite: course 3. Field trips to examine nuclear, solar, fossil fuel, hydroelectric, wind, geothermal and cogeneration energy conversion facilities.


10G. California: The State (Discussion) (1) I, II.


92. Resource Sciences Internship (1-12) I, II, Internship—3-6 hours. Prerequisite: lower division standing and consent of instructor. Work experience off or on campus in resource sciences. Internship supervised by a member of the faculty. (P/NP grading only.)

98. Directed Group Study (1-6) I, II, III. The Staff (Chairperson in charge) Prerequisite: consent of instructor. (P/NP grading only)

98. Special Study for Undergraduates (1-4) I, II, III. The Staff (Chairperson in charge) (P/NP grading only)

Rhetoric and Communication

College of Letters and Science

John L. Vosk, Chairperson of the Department

Department Office, 224 AOB 4 (916-752-1221)

Faculty

Don P. Abbott, Ph.D., Associate Professor
John V. Flaherty, Ph.D., Assistant Professor
Leslie R. Baxter, Ph.D., Professor
Robert A. Bell, Ph.D., Associate Professor
Charles R. Berger, Ph.D., Professor
Carole Blair, Ph.D., Assistant Professor
Michael T. Metz, Ph.D., Professor
James J. Murphy, Ph.D., Professor
Emeritus
John L. Vosk, M.A., Senior Lecturer

The Major Program

The major in rhetoric and communication centers on human beings and communications, on the ways in which messages and their uses influence our lives.
3. Group Communication (4) I, II, III. The Staff (Chairperson in charge)
Lecture-discussion—4 hours. Study of communica-
tion in small group situations. Role of communication
in various group processes, including leadership
and decision-making. Participation in group activities
and simulation exercises.

45. Introduction to Argument (4) II, III. The Staff
Lecture—4 hours. Arguments are the heart of
the art of rhetoric. Understanding the meaning
and construction of arguments is key.

69. 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) II. Baxter
Lecture—4 hours. Examination of elements of the
communication process, including sources, mes-
ages, media, and receivers. Study of the role of
these elements as they are influenced by various
communications situations.
105. Semantics and Pragmatics of Language
(4) I, III. Molley
Lecture—4 hours. Prerequisites: course 115. The
role of language in shaping attitu de s and perceptions of
self and others. The use and abuse of verbal sym-
ols in communication situations. Concepts of mean-
ing in discourse.
110. Origins of Rhetoric (4) II, II. Abbott
Lecture-discussion—4 hours. Prerequisite: course in
ancient history recommended. Issues in the develop-
ment of rhetoric from its origins in ancient Greece to
A.D. 430. Special attention to works of Plato, Aris-
tote, Cicero, and Quintillian. Role of grammar and
rhetoric in schools of Roman Empire. The Christian
rhetoric of Saint Augustine. General Education cred-
it: Civilization and Culture/Non-Introductory. Recom-
manded: GE preparation; History 4A.
113. Current Humanistic Trends in Rhetorical
Theory (4) II. Abbott
Lecture—4 hours. Contemporary developments in tra-
ditional rhetorical concepts such as style, mean-
ing, theory of argument, and persuasion.
114. Contemporary Theories of Human Communica-
tion (4) I, III. The Staff
Lecture-discussion—4 hours. Rhetoric as a social
science, characteristics of social theories, compo-
nents of theories, development and testing of
hypothesis, patterns, and research.
115. Empirical Methods in Communication (4) I,
Baxter; III. Molley
Lecture—4 hours. Interpretation of formal and infor-
mal scientific reports via the logic and methods of
scientific inquiry supported by experiments and
descriptive research in communication.
120. Rhetorical Criticism (4) II, III. 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. The Staff
Lecture-discussion—4 hours. Noteable and represen-
tative speeches from antiquity to the present.
Speeches are examined both as dynamic and signif-
icant 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 con-
tributed to and is influenced by American culture.
Variable content; may be repeated once for credit.
124. Rhetoric of Social Issues (4) II. The Staff
Lecture—4 hours. Overview of nature and function
of rhetoric in public controversy. Analysis and evalua-
tion of argumentative discourses and other rhetorical
strategies used in the social issues and movements.
Study of how rhetoric structures and informs opin-
i ons on controversial matters in the public realm.

*Course not offered this academic year.
linguistic analysis, iconographic criticism, and theories of popular culture.

145. Mass Communication and Social Change (4) I. Alcyone

Lecture—4 hours. Prerequisite: course 115 or the equivalent. Study of communication campaigns as a way to effect social change. Emphasis on people's behaviors which occur via mass media and interpersonal communication channels. Focus on theories of how, if at all, mass communication and interpersonal communication can be used to change social behavior.

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. Emphasis on writing, oral presentation, and public presentation.

152. Theories of Persuasion (4) I. Bell

Lecture—4 hours. Prerequisite: course 114 or 115 recommended. Theoretical and practical approaches to persuasion. Emphasis on logical and nonlogical methods of persuasion.

180. Current Topics in Rhetoric (4) II. III. The Staff

Seminar—4 hours. Prerequisite: upper division standing with a major in Rhetoric and Communication. Group study of a special topic in Rhetoric. May be repeated once for credit. Consent of instructor required.

190. Senior Honors Thesis (4) I. II. III. The Staff

Seminar—1 hour; independent study of research project. Prerequisite: senior standing and approval by Honors Committee. Directed reading, research, and writing culminating in the preparation of a thesis under directorship of faculty adviser.

197. Tutorials 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. Consent of Department Chairperson. Tutorial for advanced students in 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/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

Seniors may take graduate courses with consent of instructor.

210. Contemporary Rhetorical Theory (4) II. Abbott

Lecture—4 hours. Prerequisite: upper division standing. In historical theory/constructivism or the equivalent. Rhetorical thought in the twentieth century. Processes of rhetorical invention, arrangement, style, and delivery in the works of Kenneth Burke, J.A. Richards, Richard Weaver, Chaim Perelman, and Stephen Toulmin.

212. Perspectives on Rhetorical Communication Theory (4) I. Berger

Seminar—4 hours. Prerequisite: graduate standing in Rhetoric and Communication. Nature and role of paradigms and theories in developing knowledge about communication. Examination of current theoretical perspectives in rhetoric and communication.

214. Mass Communication Theory and Research (4) I. Alcyone

Seminar—4 hours. Prerequisite: course 220 or the equivalent. Examines the mass communication theories, models, and assumptions of mass communication. Reviews the current orientation and major research developments. Emphasis on research regarding media and violence, women and minorities, political communication, and new technologies.

215. Mass Communication and Social Change (4) II. Alcyone

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) I. Molety

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, causal, and experimental design, and statistics.

222. Practicum in Rhetorical Criticism (4) I. Blair

Seminar—4 hours. Prerequisite: course 120, an equivalent course in criticism, or consent of instructor. Analysis of selected persuasive messages. Particular attention to the rhetorical situation and the elements in the rhetorical process.

240. Advocacy in Contemporary Society (4) III. The Staff

Seminar—4 hours. Prerequisite: course 151 or the equivalent. Rhetorical and communication theories of argumentation and advocacy. Analysis of the persuasive impact of argumentation in contemporary public controversies. Offered in alternate years.

242. Proseminar in Symbolic Rhetoric (4) I. Baxerman

Seminar—4 hours. Prerequisite: course 220. Examination of language and other symbolic codes in communication. Investigated phenomena may include stylistic variation, speech acts, cognitive processing, communication rules, and audience effects. Offered in alternate years.

243. Persuasion Theory (4) I. III. The Staff (Chairperson in charge)

Seminar—4 hours. Prerequisite: course 152, 221, or consent of instructor. Major theoretical frameworks of persuasion. Research programs related to persuasion theory.

244. Organizational Communication (4) I. Vohra

Seminar—4 hours. Prerequisite: graduate standing and consent of instructor. Theory and research on communication processes in organizations.

245. Classical Rhetorical Theory (4) I. Abbott

Lecture—4 hours. Prerequisite: course 110 or the equivalent. Recurring issues in 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. Beatty

Seminar—4 hours. Prerequisite: course 212. Critical survey of the current state of inquiry on communication in personal relationships, i.e., friendship, romance, and marital relationships. Issues examined include the role of invention in constructing, maintaining, and dissolving relationships.

247. Theories of Rhetorical Criticism (4) I. Blair

Discussion—4 hours. Prerequisite: one course in rhetorical theory or criticism. Historical evolution of critical standardization from pre-Socrates to the twentieth century. Emphasis on contemporary questions of textuality, objectivity, intentionality, and justification.

248. Media Criticism (4) III. The Staff

Seminar—4 hours. Prerequisite: a course in criticism. Examines broadcast, print, and visual media by means of rhetorical, psychological, sociological, and critical-theoretical methods. Comparison of media and of critical theory to identify understanding of media messages. Offered in alternate years.

249. Interpersonal Communication Theory (4) II. Beatty

Lecture—4 hours. Prerequisite: course 134, 212, or consent of instructor. Major theories of interpersonal communication and related research.

250. Special Topics in Rhetoric (4) Discussion—4 hours. Selected topics in rhetoric and communication. May be repeated for credit if different topic is studied.

251. Special Topics in Interpersonal Communication (4) III. The Staff

Seminar—4 hours. Prerequisite: graduate standing and consent of instructor. Selected topics in interpersonal communication. May be repeated for credit if topic is changed.

255. Modern and Renaissance Rhetorical Theory (4) Seminar—4 hours. Prerequisite: course in Classical or Historical rhetoric. The study of English and continental theories of rhetoric, 1000-1500. Emphasis on the works of Persius, Pliny, and others. Special attention to psychological, epistemological, and aesthetic elements. Offered in alternate years.

256. Early Modern Rhetorical Theory (4) Seminar—4 hours. Prerequisite: course in Classical or Historical rhetoric. Development of English and continental theories of rhetoric, 1500-1800. Emphasis on the works of Shakespeare, Jonson, and others. Special attention to psychological, epistemological, and aesthetic elements. Offered in alternate years.

257. 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.

259. Group Study (1-5) I. II. III. The Staff (Chairperson in charge)

Lecture—3 hours.

259. Individual Study (1-3) I. II. III. The Staff (Chairperson in charge)

(SU or P/NP grading only)

259R. Thesis Research (1-3) I. II. III. The Staff (Chairperson in charge)

Independent study—3-9 hours. Prerequisite: graduate standing in Rhetoric and Communication. (SU or P/NP grading only)

Professional Course

390. Teaching Communication Skills at the College Level (4) I. The Staff (Chairperson in charge)

Seminar—2 hours; discussion—4 hours. Prerequisite: graduate standing or consent of instructor. Problems and techniques of teaching basic communication skills courses at the college level. (SU or P/NP grading only)
Russian

(College of Letters and Science)

James Gallant, Ph.D., Program Director
Program Office, 422 Sproul Hall (916-752-4171)

Committee in Charge
Robert O. Curtmeyer, Ph.D. (History)
James Gallant, Ph.D. (Russian)
Lawrence J. Grant, M.A. (Russian)
Harriet Murav, Ph.D. (Russian)
Daniel Rancour-Lafonniere, Ph.D. (Russian)

Faculty
Yuri Druzhnikov, Ph.D., Assistant Professor
James Gallant, Ph.D., Lecturer
Lawrence J. Grant, M.A., Lecturer
Harriet Murav, Ph.D., Assistant Professor
Daniel Rancour-Lafonniere, Ph.D., Professor
Valerie A. Turnis, Ph.D., Professor Emeritus

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 (diplomacy), 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 exposure to and study of the Russian language. The Russian Literature emphasis concentrates on the evaluation of Russian literary movements and cultural trends. The second area of study, the Russian Language emphasis, focuses on linguistics and practical language skills. The third area, the Russian Area Studies emphasis, provides an interdisciplinary program offering training in the Russian language and literature and in the historical development and contemporary social, political, and economic conditions of the 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 at the Leningrad Herzen Pedagogical Institute. Many of our students also participate in summer, semester, and year programs, sponsored by CIEE and AICR. In Leningrad 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 of our majors enter the international relations field or enter graduate programs in Slavic studies and international relations. The department encourages students to supplement their Russian studies with courses in related fields such as international relations, political science, computer science, or economics in order to maximize their career possibilities.

A.B. Major Requirements:

**Units**

Preparatory Subject Matter ........................................... 0-32

Literature/Language emphasis

Russian 1 through 6 (or the equivalent) ........................................... 0-32

Russian 41, 42 ........................................................................... 0-32

Recommended, Linguistics 1.

Area Studies emphasis

Russian 1 through 6 (or the equivalent) ........................................... 0-32

Russian 41, 42 or the equivalent course in basic literary analysis .................. 0-32

Depth Subject Matter ............................................................... 36-44

Russian Literature emphasis

Russian 101A, 101B, 101C ........................................................................... 12

Russian 102 or 103 or 105 ........................................................................... 12

Russian 121, 122, 123 ........................................................................... 12

Russian 127 or 128 ........................................................................... 12

Additional upper division units chosen in consultation with adviser .......... 0-32

Russian Language emphasis

Russian 101A, 101B, 101C ........................................................................... 12

Russian 102 or 105 ........................................................................... 12

Russian 103 or 104 ........................................................................... 12

Russian 180 ........................................................................... 12

Additional upper division units chosen in consultation with adviser .......... 0-32

Russian Area Studies emphasis

Russian 101A, 103, or 104 ........................................................................... 4

Russian 121, 122 or 123 ........................................................................... 4

Three literature courses to be chosen from Russian 121, 123, 126, 128, 140, 141, 142, 143 ........................................... 12

History 137B, 137C ........................................................................... 8

Three courses, with no more than two in one area, to be chosen from the following two areas: (a) History 137A, 138, 139, 146, (b) Social sciences—Political Science 136, Economics 117, Geography 124 ........................................................................... 12

(To meet special interest course needs, a student should obtain written approval from an adviser.)

Total Units for the Major ................................................................. 44-78

Major Adviser: L.J. Grant.

Honors and Honors Program. The honors program comprises at least one quarter of study under course 194H, which will include a research paper. See also the University and College requirements.

Minor Program Requirements:

Two minor programs are available to students interested in obtaining a solid background in Russian language or literature. The literature minor does not require a knowledge of the Russian language. Individual minor programs may be designed in consultation with the undergraduate adviser.

**Units**

Russian Literature emphasis ........................................................... 20

Russian Language emphasis ........................................................... 20

Russian 6 ........................................................................... 4

Russian 101A, 101B, 101C ........................................................................... 12

Three courses chosen from Russian 121, 123, 126, 150, 154, 140, 141, 142, 143 ........................................... 12

One course from Russian 102, 103, 104, 105, 160 ........................................................................... 12

Russian Literature emphasis ........................................................... 20

Russian 41 or 42 ........................................................................... 4

Russian 101A, 101B, 101C ........................................................................... 12

Three courses chosen from Russian 121, 123, 126, 150, 154, 140, 141, 142, 143 ........................................... 12

One course from Russian 120, 122, 126, 150, 154 ........................................................................... 4

Russian Area Studies emphasis ........................................................... 20

Three courses chosen from Russian 137A, 137B, 137C, 137D, 137E, 137F, 137G, 137H ........................................... 12

One course from Russian 137A, 138, 139, 146 ........................................................................... 12

One course from Political Science 136, Economics 117, Geography 124 ........................................................................... 4

Teaching Credential Subject Representative: J. Gallant.

Saw also under Teacher Education Program.

Graduate Study. The Department offers two programs of study (one with emphasis on language and culture, the other with emphasis on literature) leading to the M.A. degree. Detailed information may be obtained by writing to the Graduate Adviser.

Graduate Adviser: Y. Druzhnikov.

Courses in Russian

Lower Division Courses

Course Placement. Students with two years of Russian in high school normally continue in Russian 2, with three years, Russian 3, with four years, Russian 4.

1. Elementary Russian (5) I, II. Grant in charge.

Discussion—5 hours; laboratory—1 hour. Introduction to Russian grammar and development of all language skills in a cultural context with special emphasis on conversation. (Students who have successfully completed Russian 2 or 3 in the 10th or higher grade in high school may receive unit credit for this course on a P/NP grading basis only, although a passing grade will be charged to the student's P/NP option, no petition is required. All other students will receive a letter grade unless a P/NP petition is filed.)

2. Elementary Russian (5) II. Grant in charge.

Discussion—5 hours; laboratory—1 hour. Prerequisite: course 1. Continuation of grammar and language skills developed in course 1.

3. Elementary Russian (5) III. Grant in charge.

Discussion—5 hours; laboratory—1 hour. Prerequisite: course 2. Continuation of grammar and language skills developed in course 2.


5. Intermediate Russian (4) II. Grant and staff discussion—4 hours; laboratory—1 hour. Prerequisite: course 3. Grammar review. Introduction to literature. Conversational practice.

6. Intermediate Russian (4) III. Grant and 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. Grant discussion—2 hours. Prerequisite: course 1; course 2 or 3 (or 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). Murav Lecture—3 hours. Introduction to dominant literary trends, major literary figures and landmarks of Russian prose and poetry from the period of Sentimentalism through Romanticism and Realism to the beginnings of Modernism. Offered in alternate years.

42. Survey of Twentieth-Century Russian Literature (In English) (4). Rancour-Lafonniere Lecture—3 hours. Introduction to major literary trends, such as Symbolism, Acsamt, Futurism, Neorealism, and Socialism. Readings by representative writers such as Gorky, Dostoievsky, Solzhenitsyn, and Tertz. Offered in alternate years.

44. Children's Literature in Russia (4) 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 literary critics. General Education credit: Civilization and Culture/Introductory.

98. Directed Group Study (1-5) I, II, III. The Staff Discussion—1.5 hours. (P/NP grading only.)

99. Special Study for Undergraduates (1-5) I, II, III. The Staff (Chairperson in charge) (P/NP grading only.)

Upper Division Courses

101A. Advanced Russian (4) Gallant Lecture—2 hours; discussion—1 hour; oral reports. Prerequisite: course 203. Topics in Russian grammar for the advanced student. Reading and discussion of contemporary Russian literary and journalistic texts. Conversation exercises utilizing literary and colloquial variants of current Soviet speech.

101B. Advanced Russian (4) 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 Russian literary and journalistic texts. Conversation exercises utilizing literary and colloquial variants of current Soviet speech.

101C. Advanced Russian (4) 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 Russian literary and journalistic texts. Conversation exercises utilizing literary and colloquial variants of current Soviet speech.

102. Russian Composition (4) II. The Staff Lecture—3 hours; individual tutorial with instructor. Prerequisite: course 6. Practice in writing Rus-
sian. One composition on a different topic each week. Topics include: history, geography, politics, and literature of Russia; comparison of Soviet and American societies and current events. Conducted in Russian. Offered in alternate years.

103. Literary Translation (4) II. Murav Lecture—3 hours; 3 periods weekly. Prerequisite: course 101C. Translation of Russian literary texts into stylistically and content-accurate equivalent idiomatic English. Offered in alternate years.

104. Scientific Translation (4) II. Rancour-Laferrière Discussion—3 hours; individual translation projects—1 hour. Techniques of translating Russian scientific texts. Science students will select articles from their fields of interest; Russian students will work on materials assigned by instructor. Offered in alternate years.

105. Advanced Russian Conversation (4) II. Druzhnikov Conversation—3 hours; preparation of texts—1 hour. Prerequisite: course 6. Intensive conversational practice and discussion based on current events and contemporary texts. Offered in alternate years.

120. Medieval Literature and Eighteenth-Century Classicism (In English) (4) III. The Staff Lecture—3 hours; discussion—1 hour. Survey of medieval epicas, chronicles, and tales; of the early development of Baroque literature. Also Classicism and Sentimentalism will be studied. Offered in alternate years.

121. Nineteenth-Century Russian Prose (In English) (4) II. Rancour-Laferrière Lecture—3 hours; term paper. Development of prose from Pushkin and Gogol, through Dostoevsky and Tolstoy, to Maxim Gorky. Other writers are selected sequentially: Turgenev, Goncharov, Plisemsky, Saltykov, Chekhov, Romandik, and Gogol. Offered in alternate years.

122. Twentieth-Century Russian Prose (In English) (4) III. The Staff Lecture—3 hours; term paper. Examination of various trends including Acsenkov, Karlova, Vasilenko, Mayakovskiy, Bulgakov, Shvarts. Offered in alternate years.

126. The Russian Theater (In English) (4) III. The Staff Lecture—3 hours; discussion—1 hour. The main works of Russian dramatists from Gogol to the present, including Chekhov, Korneychuk, Gorky, Mayakovskiy, Bulgakov, Shvarts. Offered in alternate years.

127. Nineteenth-Century Russian Poetry (4) I. Rancour-Laferrière Discussion—3 hours; term paper. Prerequisite: course 6. Introduction to the principles of Russian versification followed by historical and poetic analysis of the following figures: Derzhavin, Zhukovskiy, Pushkin, Derzhavin, Korneychuk, Mayakovskiy, Pasternak, Evtushenkov, Voznesenskii, and Brodsky. Conducted in Russian. Offered in alternate years.

128. Twentieth-Century Russian Poetry (4) I. Rancour-Laferrière Discussion—3 hours; term paper. Prerequisite: course 6. Introduction to principles of Russian versification followed by historical and poetic analysis of the following figures: Brjusov, Blok, Akhmatova, Man- del'shtam, Eizen, Mayakovskiy, Kheinblum, Pasternak, Evtushenkov, Voznesenskii, and Brodsky. Conducted in Russian. Offered in alternate years.

130. Contemporary Soviet Culture (4) II. Murav Lecture—3 hours. Prerequisite: upper division standing or consent of instructor. Knowledge of Russian not required. Investigation of current trends in Soviet culture and the intricate relationship between artists and the government. Topics include: history of censorship, official and dissident art, recent changes in the cultural scene. General Education credit: Civilization and Culture/Non-Introductory.

131. Literature of Revolution (4) II. Murav Lecture—3 hours; essays. Prerequisite: History 3 or 4C, and/or any introductory literature course. Study of impact of revolution on society and culture; the major artistic, political and historical works surrounding the Russian revolutions of 1905 and 1917. General Education credit: Civilization and Culture/Non-Introductory. Recommended GE preparation: any course from the GE Literature Preparation List or History 3 or 4C. Offered in alternate years.

132. Nature and Culture in the Soviet Union (4) I. The Staff Lecture—3 hours; discussion—1 hour. Prerequisite: any introductory course in environmental studies. Presents a history of the Soviet environmental movement from the 1920s to the present, showing the influence of Stalinism on environmental ethic; concepts of society and nature in Soviet literature and film; and international implications of Soviet environmental policy. No knowledge of Russian required. General Education credit: Contemporary Societies/Non-Introductory. Recommended GE preparation: any course from the GE Literature Preparation List.

140. Dostoevsky (In English) (4) II. Murav Lecture—3 hours. Reading and analysis of Dostoevsky's principal work: Crime and Punishment, The Idiot, The Brothers Karamazov, and The Diary. Study of social and political views as reflected in Dostoevsky's works. Offered in alternate years.

141. Tolstoy (In English) (4) II. Murav Lecture—3 hours. Study of Leo Tolstoy's literary evolution and moral quest. Readings include his Confession, a major novel such as War and Peace or Anna Karenina, and representative shorter fiction. Offered in alternate years.

150. Russian Culture (4) III. The Staff Discussion—3 hours; term paper. Knowledge of Russian not required. Study of Russian culture in nineteenth and twentieth centuries. Brief introduction of the beginnings up to nineteenth century. Russian art, literature, philosophy, and daily life. Offered in alternate years.

151. Soviet Writers and Censorship (4) II. Druzhnikov Lecture—3 hours; discussion—1 hour. Prerequisite: any introductory course from the GE Literature Preparation List or consent of instructor. Literature and censorship in the Soviet Union. Personal responsibility of the author vs. conformity to state morality. Soviet myths and stereotypes; state education; credit: Civilization and Culture/Non-Introductory. Recommended GE preparation: any course from the GE Literature Preparation List.

154. Russian Folklore (4) II. Rancour-Laferrière Lecture—3 hours; term paper. Knowledge of Russian not required. Russian folklore, rituals, and history will be analyzed and compared with folklore of other peoples. Sociological implications of attitudes toward family unit, children, etc. Influence of folklore on Russian literature and historiography. Offered in alternate years.

160. Russian Phonology and Morphology (4) II. Galant 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.

166. Representations of Sexuality in Russian Literature (4) I. Rancour-Laferrière Lecture—3 hours; term paper. Prerequisite: Women's Studies 50 or introductory psychology. Sexuality in Russian oral and written culture and its depiction in the novel from the late Russian poet's perspective. Monogamy, free love, sexuality, homosexuality, incest, androgyny, and others as depicted by such writers as Pushkin, Gogol, Tolstoy, Dostoevsky, Akhmatova, Blok, Tolstoy, and Pasternak. General Education credit: Civilization and Culture/Non-Introductory. Recommended GE preparation: Women's Studies 50 or introductory psychology.

192. Research Essay (2) II, III. The Staff Prerequisite: a Russian literature course (may be taken concurrently). A research essay, based on primary and secondary sources, dealing in depth with a topic arising from or related to the Russian literature course. May be repeated for credit.

194H. Special Study for Honors Students (5) I, II, III. The Staff (Chairperson in charge) Prerequisite: open only to honors students. Guided research leading to an honors paper.

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

199. Special Study for Advanced Undergraduates (1-5) I, II, III. The Staff (Chairperson in charge) (P/NP grading only)

Graduate Courses

200. Old Church Slavonic (4) I. Gallant Lecture—3 hours; reading projects. A synchronic and diachronic analysis of Old Church Slavonic. Offered in alternate years.

202. History of the Russian Language (4) II. Gallant Seminar—3 hours; individual reading projects—1 hour. Prerequisite: course 200 or consent of instructor. Survey of Russian historical grammar and development of the Russian literary language. Reading in the original texts from eleventh to eighteenth century. Offered in alternate years.

204. Descriptive Russian Grammar (4) II. Gallant Lecture—3 hours; reading projects—1 hour. Introduction to modern Russian morphology and grammar. Offered in alternate years.

210A. Style and Syntax (4) I. Druzhnikov Discussion—3 hours; reading projects—1 hour. Examination of stylistic differences between spoken and written Russian.

210B. Style and Syntax (4) II. Druzhnikov Discussion—3 hours; reading projects—1 hour. Examination of stylistic differences between spoken and written Russian.

210C. Classical Style and Syntax (4) III. Druzhnikov Discussion—3 hours; term paper. Prerequisite: course 210A or consent of instructor. Examination of stylistic differences between spoken and written Russian.

220. Old Russian Literature (4) II. The Staff Seminar—3 hours. Advanced study of intellectual movements and literary styles of works such as The Song of Igor's Campaign, Zadonschina, Epifan's Lives, and the life of a 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 or poetry. The works of writers such as Kantemir, Lomonosov, Sumarokov, Radiechev and Karamzin will be analyzed. May be repeated for credit when different topics are studied. Offered in alternate years.

222. Nineteenth-Century Russian Literature (4) I. Rancour-Laferrière, Murav Seminar—3 hours. Advanced study of the works of one or several writers or movements of the period. May be repeated for credit with consent of instructor when different topics are studied. Offered in alternate years.

223. Early Twentieth-Century Russian Literature (4) I. Rancour-Laferrière 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 studied. Offered in alternate years.

224. Soviet Russian Literature (4) III. Rancour-Laferrière, Druzhnikov Seminar—3 hours. Analysis of selected works of Russian prose and poetry with particular emphasis
Scandinavian  

(Course of Letters and Science)  
Department Office (German and Russian), 422  
Sprague Hall (916-752-2114)  

Faculty  
Fritz Sammen-Frankenegg, Ph.D., Lecturer  
(Scandinavian, German)  

Courses in Scandinavian  

Upper Division Courses  
110. Masterworks of Scandinavian Literature in Translation  
Lecture—3 hours; written reports. Readings in English translation from Icelandic Sagas to  
the present, to include such authors as Ludvig Holberg, Sören Kierkegaard, Henrik Ibsen,  
Sigríður Undset, August Strindberg, Selma Lagerlöf, and Jørn Lier. Contents of year vary  
from year to year. May be repeated twice for credit.  

111. Swedish Film as Narrative  
Lecture—3 hours; term paper. Swedish films studied as narratives in the cinematic  
medium and compared to their literary sources. Offered in alternate years.  

Courses in Swedish  

Lower Division Courses  
1. Elementary Swedish  
Lecture—6 hours. Introduction to Swedish gram-  
mar and development of all language skills in a  
cultural context with special emphasis on communi-  
cation. (Students who have successfully completed  
Swedish 2 or 3 in the 10th or higher grade 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  
picture is required. All other students will receive a  
letter grade unless a PNP petition is filed.)  

2. Elementary Swedish  
Discussion—5 hours. Prerequisite: course 1.  
Continuation of course 1 in the areas of grammar  
and basic language skills.  

3. Intermediate Swedish  
Discussion—5 hours. Prerequisite: course 2.  
Completion of grammar sequence and continuing  
practice of all language skills through cultural texts.  

4. Intermediate Swedish  
Discussion—3 hours; weekly reports. Prerequisite:  
course 3. Review of grammatical principles by  
means of written exercises, reading, and discussion  
of modern Swedish literary and nonliterary texts.  

5A. Spoken Swedish  
Discussion—2 hours. Prerequisite: course 2.  
Conversational practice based on everyday vocabulary  
of modern spoken Swedish. (PNP grading only.)  

5B. Spoken Swedish  
Discussion—2 hours. Prerequisite: course 2.  
Conversational practice based on everyday vocabulary  
of modern spoken Swedish. (PNP grading only.)  

89. Directed Group Study  
Prerequisite: consent of instructor. (PNP grading  
only.)  

99. Special Study for Undergraduates  
Prerequisite: consent of instructor. (PNP grading  
only.)  

Sociology  

(Course of Letters and Science)  
Lawrence E. Cohen, Ph.D., Chairperson of  
the Department  
Department Office, 109 Young Hall (916-752-0782)  
Advising Office, 113 Young Hall (916-752-0784)  

Faculty  
Nicole W. Biggert, Ph.D., Associate Professor  
(Sociology, Management)  
Fred Block, Ph.D., Professor  
Lawrence E. Cohen, Ph.D., Professor  
James C. Cranmer, Ph.D., Associate Professor  
Diane H. Felmlee, Ph.D., Associate Professor  
Jack A. Goldstone, Ph.D., Professor  
Bruce M. Hackett, Ph.D., Professor  
John R. Hall, Ph.D., Professor  
Gary G. Hamilton, Ph.D., Professor  
Mary Jackman, Ph.D., Professor  
Carole E. Joffe, Ph.D., Professor (Sociology,  
Women's Studies)  
Carl C. Jorgensen, Ph.D., Associate Professor  
Edwin M. Lerner, Ph.D., Professor Emeritus  
John F. Loffreda, Ph.D., Professor  
Lyn H. Lofland, Ph.D., Professor  
Leon H. Mayhew, Ph.D., Professor  
Darío Meloski, Ph.D., Associate Professor  
Belinda Moncton, Ph.D., Assistant Professor  
Julius A. Roth, Ph.D., Professor  
John F. Scott, Ph.D., Professor  
Judith Stacey, Ph.D., Professor (Sociology, Woman's Studies)  
John T. Wilcox, Ph.D., Professor (Anthropology,  
Sociology)  
Diane L. Wolf, Ph.D., Assistant Professor  

The Major Programs  

Sociology is the study of human society in all its  
manifestations. Its aim is to discover the process and  
structure of human interaction, to identify the main  
forces that sustain or weaken social groups, and  
determine the conditions that transform social life.  
Sociology, like any science, is a disciplined, intellec-  
tual 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  
Sociology emphasis allows students to focus  
and practice basic social sciences methods,  
and theories of sociology. This option is designed for  
students desiring a social 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 Politics  
and World Development emphasis offers a sociologi-  
cal perspective on social and economic changes  
throughout the world, with a stress on  
relationships between "developed" and "underdeveloped"  
nations. It is designed to 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 broad understanding of  
the political, social, and economic organizations  
that comprise modern society. This major provides  
students with an understanding of the  
relationships between the individual and society.  
The major emphasizes the importance of  
the role of the individual in society. Students  
are encouraged to consider the Education Abroad  
Program for their junior year, especially one in  
the United States.  

SOCILOGICAL MAJOR  

A.B. Degree Requirements  

General emphasis:  

UNITS  

Preparatory Subject Matter  

Sociology 1, 2, or 3; 46A, 46B (or the equivalent)  

Select units from Anthropology 2, 3, 4  

Select units from History, Political Science,  

Select units from Philosophy, 1, 2, 3, 4  

Politi- 

ical  

ical Science  

Depth Subject Matter  

Sociology 126, 140, 165A, 165B, 170, 180  

Select two courses each from the following seven clusters and one additional  

Family, Gender, and Social Interaction  

Law and Social Services  

Sociology 122, 127, 131, 132, 143B  

Law and Society  

Sociology 123, 150, 152, 154, 155, 158, 168  

Societal Conflict and Change  

Sociology 102, 121, 131, 142, 143A, 145, 147, 148, 156, 157, 160B, 181, 182  

Race and Ethnicity  

Sociology 110, 128, 129, 130, 134, 169  

Gender and Politics  

Sociology 118, 119, 133, 139, 144, 159  

Knowledge and Communication  

Sociology 124, 125, 146, 173, 175  

Methodology  

Sociology 103, 166, 169, 192  

Total Units for the Major  

(General emphasis)  

Law and Society option:  

UNITs  

Preparatory Subject Matter  

Sociology 1, 2, 46A, 46B (or the equivalent)  

17
Select units from Anthropology 1, 2, Economics 1A, 1B, History 3, 4B, 4C, 17A, 17B, Philosophy 1, 12, 21, 22, 23, Political Science 1, 2, 3, 4, Psychology 1, 15, 16A, 16B, 16C, 16D, 16E, 16F, 16G, 16H ...

Depth Subject Matter

Sociology 155...

Select units from Sociology 120, 150, 153, 154, 155...

Select units from Sociology 118, 125, 130, 131, 139, 140, 141, 143A or 143B, 156, 159B, 180A or 180B, 185...

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 option:

Preparatory Subject Matter

Sociology 2, 3, 46A, 46B (or the equivalent)...

Psychology 1...

Select units from Afro-American Studies 10, 15; Asian American Studies 1, 2; Chicano Studies 10, 20; Native American Studies 10, 70...

Depth Subject Matter

Sociology 131, 140, 185, 186...

Select units from upper division human psychology...

Select six courses distributed as specified...

Social Issues

Sociology 102, 119, 120, 122, 124, 139, 143A, 144, 146, 150, 152, 154, 155, 170...

Social Interaction

Sociology 126, 127, 128, 143B, 148, 157...

Race and Ethnicity

Afro-American Studies 100; Applied Behavioral Sciences 17B; Asian American Studies 110, 111, 152; Native American Studies 112, 124; Sociology 110, 129, 130, 134...

Gender

Sociology 132, 133...

Organizational Behavior

Sociology 158, 180A, 180B, 181, 182, 183...

Methodology

Sociology 103, 106, 169, 192...

Total Units for the Major...

72 (Social Services option)

Comparative Studies and World Development option:

Preparatory Subject Matter

Sociology 1, 46A, 46B...

Economics 1A, 1B...

Psychology 1...

At least 4 units from Geography 2-2G, History 10, Political Science 2...

Course work in a modern foreign language equivalent to 26 units of UCD...

Depth Subject Matter

Sociology 141, 145, 165A, 170...

Economics 115A, 115B, 116...

At least twelve units from Sociology 118, 130, 131, 143A, 144, 156...

Regional focus, three courses from one of the following groups...

(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...


Total Units for the Major...

70-105 (Comparative Studies and World Development)

SOCIOLOGY—ORGANIZATION STUDIES

A.B. Degree Requirements:

Preparatory Subject Matter

Sociology 1, 46A...

Economics 1A, 1B...

Mathematics 16A...

Recommended: Engineering-Computer Science 10, Mathematics 168B...

Depth Subject Matter

Sociology 180A, 180B...

Sociology 103...

Sociology 106 or the equivalent...

(Note prerequisite: Sociology 46B or Statistics 13)

Economics 100 or Agricultural Economics 100A...

Units from Applied Behavioral Sciences 162, 163, 164, Agricultural Economics 112...

Units from History 174A, 179, 187A, 187B, 194D, Anthropology 122...

Units from Political Science 180, 181, 183, 187, 188...

Units from Political Science 180, 181, 183, 187, 188...

Units from Political Science 180, 181, 183, 187, 188...

Total Units for the Major...

66-67

Minor Advisers. Consult the Departmental Advising Office, 113 Young Hall.

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 Adviser. Consult the Graduate Administrative Assistant, 113 Young Hall.

Courses in Sociology

Lower Division Courses

1. Introduction to Sociology (5). Hackett, Ill. The Staff Lecture—4 hours; discussion—1 hour. Principles and basic concepts of sociology. The study of groups, culture, collective behavior, classes and caste, community and ecology, role, status, and personality. (CAN Soc 2)

2. Self and Society (4) Lecture—3 hours; discussion—1 hour. Principles and basic concepts of sociological social psychology. Includes the study of the character of the self, identity, roles, socialization, identity change, emotion and social interaction. General Education credit: Contemporary Societies/Introductory.


46A. Introduction to Social Research (4) I, Ill. The Staff Lecture—3 hours; discussion—1 hour or term paper or project (instructor's option). Examination of the methodology of social research. Selection and definition of problems in social research, data-gathering techniques, and sampling.

49A. Introduction to Social Research (4) I. J. Lofland, Robbenn. Lecture—3 hours; discussion—1 hour or term paper or project. Data analysis techniques, measurement, scaling, multivariate analysis, and quantitative measures of association.

98. Directed Group Study (1-5) I, Ill. The Staff (Chairperson in charge) Prerequisite: consent of instructor. Primarily intended for lower division students. (P/NP grading only)

99. Special Study for Undergraduates (1-5) I, Ill. The Staff (Chairperson in charge) Prerequisite: consent of instructor. (P/NP grading only)

*Course not offered this academic year.
126. Social Interaction (4) III. Robinett Lecture—3 hours; discussion—1 hour or term paper or project. Prerequisite: course 2. Everyday interaction in natural settings; ethnographic approaches to the understanding of social meanings, situations, personal identity and human relationships. \textit{Particular attention to the work of Erving Goffman and the principles of field observation and qualitative analysis.}

127. Sociology of Death (4) III. L. Lofland Lecture—3 hours; discussion—1 hour or term paper or project (instructor's option). Prerequisite: course 1 or the equivalent. Overview of attitudes toward, structural effects of, and methods of coping with, death and death-related behaviors. Particular attention to social psychological aspects of death and dying, to death occupations and to death rituals in various cultures.

128. Intercultural Interpersonal Dynamics (4) I. Jorgensen Lecture—3 hours; discussion—1 hour or term paper or project (instructor's option). Prerequisite: one course from courses 1, 2, 3, Afro-American Studies 10, Asian American Studies 1, 2, Chicano Studies 10, Native American Studies 1, 10. Analysis of the intercultural aspects of social systems and racial strategy, emphasis on interpersonal interaction in institutional settings (e.g., work, education, political action) and intimate settings (e.g., friendship, love, marriage, family). Minorities, class, and ethnicity.

129. Sociology of Black Experience in America (4) III. Robinett Lecture—3 hours; discussion; research, or term paper (instructor's option). Survey of historical and contemporary theoretical sociological perspectives on the Black experience in the United States. Emphasis on comparisons of Black sociological perspectives and mainstream perspectives of specific sociologies.

130. Race Relations (4) III. Jorgensen Lecture—2 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 United States.

131. The Family (4) II. Stacey Lecture—3 hours; discussion—1 hour. Contemporary family life in historical and cross-cultural perspectives. How different family forms arose, their significance today and prospects for further family change. Attention to power relations within and between the family end to the social implications of family transformation.

132. The Sociology of Gender (4) I. Felmlee; II. Robinett Lecture—3 hours; discussion—1 hour. Analysis of biological, psychological, cultural and structural conditions underlying 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) Stacey 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 of classical and contemporary theorists such as Engels, Freud, J.S. Mill, de Beauvoir, Juliet Mitchell, D. Dinnerstein. Attention to selected issues in social movements for and against sexual equality.

134. Sociology of Religious Ethnic Families (4) III. Pesquera Lecture—3 hours; discussion—1 hour or term paper. Asian American, Black, Chicano, and Native American family life in comparative historical perspective. Family structures are considered in relation to socio-historical dynamics. Offered in alternate years.

135. Corporations and Society (4) I. Block Lecture—2 hours; research project. The study of the history and contemporary forms of the modern corporation; corporate society; profit motivation; corporation; the state, and the corporation; labor unions and the labor process; complications, regulation and international markets; the multinational and conglomerate corporation; and mass markets and consumers.

140. Social Stratification (4) III. Hackett Lecture—2 hours; discussion—1 hour or term paper or research project. Instructed and selected technological and social factors. Preconditions of economic development and industrialization. Social, political, and cultural issues at various levels of economic development. Major historical differences and major current trends. Emphasis in the late industrialized countries or less developed countries.

142. Sociology of Transportation (4) Scott Lecture—3 hours; discussion—1 hour or term paper or research project. Sociological factors in transport. Consequences of transport mode development on social organization, sociological influences in transport mode choice. Transportation issues in public policy.

143A. Urban Society (4) I. L. Lofland Lecture—3 hours; discussion—1 hour or term paper or project (instructor's option). Prerequisite: course 1 or the equivalent. Historical and contemporary issues of the urban process of urbanization and of varying city types. Comparison of American and European experience of metropolization, counterurbanization, and neighborhood change. Consideration of competing theories of urban growth and current planning and the urban future. Offered in alternate years.

143B. Sociology of City Life (4) I. L. Lofland Lecture—3 hours; discussion—1 hour or term paper or project (instructor's option). Prerequisite: course 1 or the equivalent. Course 143A recommended. Critical dissection of the "loss of community" issue. Analytical organization of primary ties in the city, the culture of urban public life and of the learning of city skills. Offered in alternate years.

144. Agriculture and Society (4) Walton, Wolf Lecture—2 hours; discussion—1 hour or term paper or research project. Prerequisite: advanced standing in the social sciences. Course work in agricultural and environmental sciences. Development of agriculture as a major enterprise in modern society with the concomitant reduction in the labor force for family and the family farm. Problems of de-mechanization, migrant labor, corporate farming, and public resource policy. Offered in alternate years.

145A. Sociology of Third World Development (4) I. Wolf Lecture—3 hours; discussion—1 hour. Prerequisite: courses 1; upper division standing. Introduction to theories and contemporary issues in the sociology of development: topics such as urbanization, rural agrarian change, class, status groups, international division of labor, sectoral shifts, international capital, informal economy, gender, and political processes are analyzed within a comparative-historical framework.

145B. Gender and Rural Development in the Third World (4) III. Wolf Seminar—4 hours. Prerequisite: course 1; upper division standing. Political-economic analysis of women and work during the process of socio-economic change in the world with particular attention to the family/household context. Offered in alternate years.

146. Sociology of Religion (4) Hall Lecture—2 hours; discussion—1 hour or term paper or research project. Relationship between social structures and religions. The social setting of the major world religions. Religious innovators and institutions of religious authority (churches, sects, cults). Secularization in the modern West. Various theories of secular ideologies. Offered in alternate years.

*Course not offered this academic year.*
147. Sociological Perspectives on East Asia (4) II. Hamilton  
Lecture—3 hours; discussion—1 hour or term paper or problem. Sociological theories and concepts applied toward understanding East Asian society. Emphasis on the political structure, stratification, and economy in China and Japan. Analysis of historical and contemporary similarities and differences. Offered in alternate years.

148. Collective Behavior (4) B. The Staff  
Lecture—3 hours; discussion—1 hour or term paper or project (Instructor's option). Prerequisite: course 1 or the equivalent. Behavior of human crowds and masses in extraordinary circumstances, including crowd panics, mass scares, collective protests, riots, revolutionary situations, ecstatic and revivalist gatherings, crazes, fads, and fashions.

149. Religion and American Society (4) III. Hall  
Lecture—3 hours; class project. Historical, contemporary survey of religious traditions and organizations and their relation to U.S. social and cultural patterns. Issues of religious pluralism, minority and deviant communities, religious migration, U.S. religion as a social institution, and religion, politics, and social stratification. Offered in alternate years.

150. Criminology (4) I. Cohen  
Lecture—3 hours; discussion—1 hour or term paper or research project. Sociological analysis of criminal behavior in relation to social structure and the criminalization process.

152. Juvenile Delinquency (4) II. Cohen  
Lecture—3 hours; discussion—1 hour or term paper or research project. Study of juvenile delinquency in relation to the family, peer groups, community, and institutional structures. Consideration of processing of the delinquency of control.

154. Sociology of Health Care (4) II. Roth  
Lecture—3 hours; discussion—1 hour or term paper or research project. Overview of sociological research in medicine and health care, with emphasis on the organizational, institutional, and social psychological aspects.

155. Sociology of Law (4) II. Melossi  
Lecture—3 hours; discussion—1 hour or term paper or research project. Law considered as social control; relation of legal institutions to society as affecting judicial decision making and administration of justice. Lawyers as an occupational group. Legal reform.

156. Social Movements (4) II. J. Lofland  
Lecture—3 hours; discussion—1 hour or term paper or research project. Analysis of the social psychological aspects of social movements: mobilization, forms of organization, ideology, recruitment, leadership, strategies and tactics, development, effects. Frequent use of illustrative case studies.

157. Social Conflict (4) III. J. Lofland  
Lecture—3 hours; discussion—1 hour or term paper or project. Analysis of the causes, dynamics, and regulation of social conflict within and between various kinds of social groupings with particular reference to nonviolent methods of waging and regulating conflict.

158. Consumer-Vendor Relationships (4) III. Roth  
Lecture—3 hours; discussion—1 hour. Examine the relationship between consumers and the vendors of goods and services using case material, student projects, and relevant literature in sociology and related fields. Emphasis will be on organizational structure and bargaining power.

159. Sociology of Occupations (4) II. Roth  
Lecture—3 hours; discussion—1 hour or term paper or research project. Natural history of occupations; the institutional matrix of occupations; colleague and client relationships; occupational social controls; career lines; and occupational-related self-definitions; occupational politics.

165A. Sociological Theory (4) I. Melossi  
Lecture—3 hours; discussion—1 hour or term paper or research project. Historical introduction to sociological theories and concepts, influence by the European origins. The development of modern sociological theory in Europe by Durkheim, Weber, Simmel, Pareto, Mosca, and others.

165B. Sociological Theory (4) II. Block  
Lecture—3 hours; discussion—1 hour or term paper or research project. Contemporary sociological theory with special reference to the history of American sociology and the emergence of contemporary schools of thought in the United States. Schools discussed will be functionalism, symbolic interactionism, exchange theory, and ecology.

170. Population (4) I. Cramer  
Lecture—3 hours; discussion—1 hour or term paper or research project. Introduction to the study of human population. Measures of size and change; population distribution; ecological measures; social causes and consequences of population trends; changes in population structure; geographical distribution, migration, socio-psychological factors affecting family size and fertility. Offered in alternate years.

172. Ideology of Class, Race and Gender (4) Jackman  
Lecture—4 hours. Examination of popular belief systems that accompany relations between social classes, whites and blacks, and men and women in the United States. How do dominant groups attempt to justify such relationships, and is there ideological conflict or consensus between groups.

173. Sociology Through Literature (4) Walton  
Lecture—3 hours; discussion—1 hour or term paper or research paper. Introduction to analysis of literature as sociological data. Reading of numerous works on American and other societies by authors such as Steinbeck, Zola, Hochschild, Orwell, etc. Offered in alternate years.

180A. Complex Organizations (4) II. Hamilton  
Lecture—3 hours; discussion—1 hour or term paper or research project. Prerequisite: course 1; Economics 1A and 1B recommended. Development of sociological theories to organization theory. Designed to introduce sociological concepts, address the alternative psychological and economic models, and involve students in the practice of organizational analysis.

180B. Complex Organizations (4) III. Hamilton  
Lecture—3 hours; discussion—1 hour or term paper or research project. Prerequisite: course 180A or consent of Instructor. Builds on concepts and skills developed in course 180A. Deals with issues of organizational decision making, design, and survival. Emphasis on relations between organizations and the effects of those relations in both the public and private sectors.

182. Experimental and Utopian Communities (4) III. Hackett  
Lecture—3 hours; discussion—1 hour. The social structure of experimental or utopian settlements and communal movements, including comparison with other small settlement forms: villages, communities, monasteries, encampments and nonstate communities based on occupation, ethnicity, and religion.

183. Comparative Organizations (4) III. Biggart  
Lecture—discussion—3 hours; term paper. Prerequisite: course 180A or 180B. Upper division standing. Examination of economic and political organizations of major industrial nations. Discussion of historical, cultural, social, and political influences on industrial patterns and practices, alternative theoretical models for explaining differential development, Sociology may include Sweden, Japan, Germany, Taiwan, and South Korea. Offered in alternate years.

185. Sociology of Social Welfare (4) III. Joffe  
Lecture—3 hours; discussion—1 hour or term paper or research project. Sociological analysis of the evolution and current organization of welfare functions in modern societies.

192. Internship and Research Practicum (2-12) I., II. The Staff  
Internship—3-33 hours; discussion—1 hour. Prerequisite: upper division standing; course 46A; approval of proposed internship. Supervision of internship and study in an agency, organization or institution; application of core concepts in sociology to the work experience. May be repeated for credit only by permission. Maximum of 4 units of 192 may be counted toward the Sociology major. (P/NP grading only.)

194A-194B. Special Study for Honors Students (4-4) 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 completion of a Senior Honors Thesis under the 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 (Hamilton in charge)  
Prerequisite: consent of Instructor. (P/NP grading only)

199. Special Study for Advanced Undergraduates (1-5) I., II, III. The Staff (Hamilton in charge)  
Prerequisite: open to seniors only. (P/NP grading only)

Graduate Courses

207A-207B. Methods of Quantitative Research (4-4) I., II. Cohen, Fairbairn  
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 course sequence.)

215. Economy, Polity, and Society (4) I. Block  
Seminar—3 hours; paper. Prerequisite: consent of Instructor. Open to graduate students in sociology and related disciplines. Course introduces students to topics and selected issues in the related fields of economic and political sociology and political economy.

220. Deviance, Law, and Social Control (4) J. Cohen  
Seminar—3 hours; projects. Prerequisite: course 120 or consent of Instructor. Report and discussion of literature on selected forms of deviance in relation to law and formal social control. Agency contacts and exploratory research projects.

226. Sociological Social Psychology (4) I. Lofland  
Seminar—3 hours; seminar paper—1 hour. Prerequisite: graduate standing or consent of Instructor. Advanced study of the varying approaches, methods, issues and topical concerns of sociological social psychology. Analyzes the role of social organization and representative historical and contemporary works.

230. Ethnic (Race) Relations (4) II. Jorgensen  
Lecture—3 hours; paper. Advanced study of the determinants of ethnic groupings and their interrelationships. Major theme will be the patterns of ethnic stratification and causes of ethnic conflict. Specific focus upon dominance and resistance to dominance. Influence of social science research.

234. Gender, Family, and Society (4) Stacey  
Seminar—3 hours; seminar—1 hour. Prerequisite: graduate standing or consent of Instructor. Major theoretical traditions and concerns in family sociology and sociology of gender. Analysis of selected classical and contemporary works representative of functionalists, Marxists, psychoanalytic, feminist and critical-theoretical approaches to these subjects (e.g., Engels, Parsons, Freud, Horkheimer, Goode, Lasch, Mitchell). Emphasis on macro and historical questions.

242A-242B. Comparative Methods in Historical Sociology (4-4) II. Goldstone  
Seminar—3 hours; term paper. Prerequisite: graduate standing or consent of Instructor. Comparative approaches to major historical phenomena such as nationalism, bureaucratization, revolution, capitalism, the relevance of psychological and sociological.
The Major Program
Soil and water science is concerned with the use and protection of our land and water resources. The major teaches students the salutary principles for managing soil and water resources to benefit agriculture and the environment.

The Program. Major programs are designed to include land use, soil survey, soil management and conservation, plant nutrition, diagnostic technology, irrigation and drainage, water resources management, water quality, and related environmental problems. For example, the emphasis on water quality would include more than the minimum number of units of physical and biological sciences, while an emphasis in resource allocation and land-use planning would include more courses in the social, political, and economic areas.

Internships and Career Alternatives. Before they graduate, many students receive practical work experience through student internships with state and federal agencies, soil and plant labs, and growers. Students also have the opportunity to work on research projects with faculty members and to develop individual research or study topics. Graduates are qualified for managerial and technical positions with environmental and agricultural businesses. They are also prepared for positions in advising, planning, land appraisal, and research and teaching with private, government, and international organizations involved with soil and water development, use, and conservation. Some graduates also continue in master's and doctoral programs in soil science, water science, ecology, and plant physiology.

B.S. Major Requirements:
For convenience in program planning the usual courses taken to satisfy the requirements are shown in parentheses where possible. Equivalent or more comprehensive courses are acceptable. Courses shown without parentheses are required.

UNITS

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Title</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>English Composition</td>
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<tr>
<td>Preparatory Subject</td>
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</tr>
<tr>
<td>Biological sciences</td>
<td>1A, 1B, 1C</td>
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<tr>
<td>Chemistry</td>
<td>Chemistry 1A-1B-1C and a more advanced course</td>
<td>16</td>
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<tr>
<td>Computer science</td>
<td>(Agricultural Science and Management 21, Engineering 5)</td>
<td>3</td>
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<tr>
<td>Economics</td>
<td>Economic and agricultural economics (Economics 1A, 1B)</td>
<td>6</td>
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<tr>
<td>Mathematics</td>
<td>Mathematics (Mathematics 6A, 6B)</td>
<td>3</td>
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<tr>
<td>Physics</td>
<td>Physics (Physics 5A-5B-6C)</td>
<td>12</td>
</tr>
<tr>
<td>Statistics</td>
<td>Statistics 13 (Agricultural Science and Management 150)</td>
<td>4</td>
</tr>
<tr>
<td>Additional physical sciences, biological sciences, and/or mathematics with approval of adviser.</td>
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<tr>
<td>Breath/General Education</td>
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<td>15-33</td>
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</tbody>
</table>

Satisfaction of General Education requirement:

At least one upper division course from each of the following areas with the approval of adviser, (1) resource management, (2) environmental law, (3) environmental economics and decision making.

*Course not offered this academic year.

Soil Science
See Soil Science, below; Soil Science (A Graduate Group); and Soil and Water Science
Upper Division Courses

100. Principles of Soil Science (4) I. Munns
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 materials; interaction of plant and soil; water, air, temperature, and biological components. Soil-plant-organism relationships. Soil development and geography, management, and conservation.

102. Soil and Water Chemistry (5) II. Burau
Lecture—3 hours; discussion—1 hour; laboratory—3 hours. Prerequisite: consent of instructor. Course 100 or consent of instructor. Analysis of plant nutrients, soils, and water. Analysis of soil by wet and dry methods. Identification of soil and water constituents by chemical and instrumental methods.

105. Field Studies of Soil Resources (8) Extra-semester
Deighton, Singer, Southard
On campus—daily 1 week; study tour—daily 5 weeks. Prerequisite: consent of instructor; course 120 recommended. In situ studies of soils with emphasis on the interactions between soil characteristics and human activities, such as land use, farming, and soil development. Field identification and evaluation of soils for agricultural and natural resource management.

107. Soil Physics (4) I. Rolston
Lecture—3 hours; laboratory—3 hours. Prerequisite: course 100 or consent of instructor. Course 100, Water Science 100, Mathematics 1A, or consent of instructor. Description of soil physical properties. Principles of water, gas, heat, and solute movement in soil with selected examples related to soil and water management. Influence of soil physical properties on transfer processes.

109. Soil Fertility and Fertilizers (4) III. The Staff
Lecture—3 hours; laboratory—3 hours. Prerequisite: consent of instructor. Course 100 or consent of instructor. Analysis of plant nutrients, soils, and water. Analysis of soil by wet and dry methods. Identification of soil and water constituents by chemical and instrumental methods.

111. Geomicrobiology (4) II. Singh
Lecture—3 hours; laboratory—3 hours. Prerequisite: general chemistry and an introductory course in biology. Major groups of microorganisms in the geosphere and their responses to environmental variables, including climate, pH, and nutrient availability. Methods of analysis, including enrichment and isolation techniques.

116. Soils in Land Use and the Environment (4) III. Singer
Lecture—3 hours; discussion—1 hour; two one-day field trips. Prerequisite: course 100 or consent of instructor. Soils are considered as elements in land use planning and environmental quality. Topics include soil survey, remote sensing, land capability classification, soil erosion/care, and soil degradation.

120. Soil Genesis, Morphology, and Classification (5) III. Southard
Lecture—4 hours; laboratory—3 hours (includes five one-weekend field trips). Prerequisite: course 100 and Geology 1; or consent of instructor. Recognition and description of soils; chemical and physical properties of soils; factors of soil formation; and introduction to soil classification with emphasis on soil taxonomy.

123. Soil Taxonomy (3) II. The Staff
Lecture—1 1/2 hours; discussion—1 1/2 hours. Prerequisite: consent of instructor. Analysis of soil data; intermediate course in soil classification. Study and analysis of the current system of classification used by the National Cooperative Soil Survey of the United States. Practice in classifying soil samples with emphasis on their placement in the system. Offered in alternate years.

182. 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/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 Undergraduate (1-5) I, II, III. The Staff (Chairperson in charge)
(P/N grading only)

Graduate Courses

207. Transport Processes in Soils (4) II. Rolston
Lecture—3 hours; discussion—1 hour. Prerequisite: course 100 or consent of instructor. Analysis of plant nutrients, soils, and water. Analysis of soil by wet and dry methods. Identification of soil and water constituents by chemical and instrumental methods.

208. Soil-Plant Interrelations (3) II. The Staff
Lecture—3 hours. Prerequisite: consent of instructor. Course 100, Botany 112; or consent of instructor. Analysis of plant nutrients, soils, and water. Analysis of soil by wet and dry methods. Identification of soil and water constituents by chemical and instrumental methods.

211. Advanced Soil Microbiology (3) II. Scow
Lecture—3 hours. Prerequisite: consent of instructor. Course 100, Botany 112; or consent of instructor. Analysis of plant nutrients, soils, and water. Analysis of soil by wet and dry methods. Identification of soil and water constituents by chemical and instrumental methods.

214. Soil Mineralogy (5) III. Deighton
Lecture—3 hours; laboratory—3 hours. Prerequisite: course 100, Chemistry 107B or 107C; or consent of instructor. Analysis of plant nutrients, soils, and water. Analysis of soil by wet and dry methods. Identification of soil and water constituents by chemical and instrumental methods.

215. Physical Chemistry of Soils (3) III. Burau
Lecture—3 hours. Prerequisite: consent of instructor. Course 100, Chemistry 107B or 107C; or consent of instructor. Analysis of plant nutrients, soils, and water. Analysis of soil by wet and dry methods. Identification of soil and water constituents by chemical and instrumental methods.

218. Soil Erosion and Conservation (3) II. Singer
Lecture—2 hours; discussion—1 hour. Prerequisite: consent of instructor. Course 100, Botany 112; or consent of instructor. Analysis of plant nutrients, soils, and water. Analysis of soil by wet and dry methods. Identification of soil and water constituents by chemical and instrumental methods.

220. Pedology (3) II. Southard
Lecture—1 hour; discussion—2 hours. Prerequisite: courses 120 and 123 or any equivalent, or consent of instructor. Soil genesis and classification; soil-forming processes; soil properties; soil mapping; soil survey; soil science in the desert; soil and water relations; soil and water quality; soil and water management; soil and water conservation; soil and water pollution; soil and water degradation; soil and water reclamation.

290. Special Topics in Soil Science (1-5) I, II, III. The Staff
Seminar—1 hour. Prerequisite: consent of instructor. Current topics in soil science; critical review of recent literature; and special issues in soil science.
and for a more detailed understanding of the language's sound system and grammatical structure. Other courses afford a broad overview of the main currents in Spanish and Spanish-American literature and culture. Many students combine the Spanish major with another academic major such as Chicano studies, linguistics, international relations, comparative literature, economics, a social science, or another foreign language. The department encourages its majors to consider a study abroad experience or to spend their junior year in Spain or Mexico with the University of California's Education Abroad Program.

Career Alternatives. The program, alone or in combination with another major, may lead to advanced study of the language or literatures of Spain and Spanish America, and to careers not only in teaching, but also in other professional fields such as library science, law, medicine, and in government, social service, or business. Spanish majors are strongly encouraged to complement their work in the department through studies in related areas such as Chicano studies, international relations, linguistics, comparative literature, art, history, and philosophy.

A.B. Major Requirements:

<table>
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<tr>
<th>Preparatory Subject Matter</th>
<th>UNITS</th>
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<tr>
<td>Spanish 1, 2, 3, or 4</td>
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<td>33</td>
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<tr>
<td>Spanish 109 109A or 109B</td>
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<table>
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<tr>
<th>Depth Subject Matter</th>
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<td>Spanish 103A 103B 103C 103D</td>
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<tr>
<td>Spanish 110A 110B 110C</td>
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<td>Spanish 131</td>
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<td>Spanish 132</td>
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<tr>
<td>Additional upper division units to be selected as follows</td>
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<td>24-36</td>
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</tbody>
</table>

Plan 1: Spanish Literature Emphasis
Spanish 134 | | 4 |
Spanish 104A 104B | | 8 |
Three electives in literature (at least one must be in Spanish-American literature) | | 12 |

Plan 2: Spanish-American Literature Emphasis
Spanish 135 136 | | 12 |
Spanish 105A 105B | | 8 |
Three electives in literature (at least two must be in Spanish-American literature) | | 12 |

Plan 3: Chicano Literature Emphasis
Spanish 124 | | 4 |
Spanish 126A 126B 126C | | 12 |
Spanish 128 or 135 | | 4 |
One course from Spanish 105A 105B 106A 106B 108A 108B 137 | | 4 |

Plan 4: Language Emphasis
Spanish 139 139A 139B | | 3 |
Spanish 137 | | 4 |
Three electives (at least one must be in literature) | | 12 |

Total Units for the Major | | 45-79 |


Minor Program Requirements:

<table>
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<th>Portuguese</th>
<th>24</th>
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<tbody>
<tr>
<td>Portuguese 101A or 101B</td>
<td></td>
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<tr>
<td>Portuguese 109A 109B</td>
<td></td>
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<tr>
<td>Portuguese 106</td>
<td></td>
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<tr>
<td>Portuguese 106A or 106B</td>
<td></td>
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</table>

| One course from Portuguese 114, 115, 116, 117, 119 | | 4 |

† Minor Program and courses in Portuguese not offered in 1991-92.

Spanish

<table>
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<th>Spanish</th>
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<tbody>
<tr>
<td>Spanish 100</td>
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<tr>
<td>One course in Hispanic literature (any course)</td>
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</table>

One course in culture from Spanish 134, 135, 136 | | 3 |
One course in advanced composition from Spanish 110A 110B | | 4 |
One course from Spanish 131, 132, 133 | | 3 |
Two elective courses acceptable for the Spanish major chosen in consultation with a major adviser | | 6-8 |
Note: Students majoring in Chicano Studies or Chicano Studies and minor in Spanish should bear in mind that if Spanish courses are used to satisfy the major requirements, only one of these courses may be applied to the minor.

Teaching Credential Subject Representative. The major program in Spanish is designed to meet the requirements of the California Commission on Teacher Credentials. Students interested in obtaining teaching credentials should consult the Department of Education for specific requirements.

The Master of Arts Degree. The Department offers the degree of Master of Arts 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 study in Spanish provided they meet the requirements of the Graduate Division and the Department of Spanish. Details will be obtained by writing to the Chairperson of the Spanish Department.

The Doctor of Philosophy Degree. The Department offers programs of study and research leading to the Ph.D. degree. Details will be obtained by writing to the Chairperson of the Spanish Department.

Graduate Adviser. H. Verani.

Courses in Portuguese

Lower Division Courses

1. Elementary Portuguese (5). I. The Staff Lecture—three hours, discussion—1 hour. Prerequisite: course 4 of the equivalent. Historical survey of the Portuguese language and culture, with emphasis on the seventeenth century. Offered in alternate years.

2. Elementary Portuguese (5). II. The Staff Lecture—three hours, discussion—1 hour. Prerequisite: course 4 of the equivalent. Historical survey of the Portuguese language and culture, with emphasis on the seventeenth century. Offered in alternate years.

3. Elementary Portuguese (5). III. The Staff Lecture—three hours, discussion—1 hour. Prerequisite: course 4 of the equivalent. Historical survey of the Portuguese language and culture, with emphasis on the seventeenth century. Offered in alternate years.

4. Intermediate Portuguese (5). I. The Staff Lecture—four hours, discussion—1 hour. Prerequisite: course 4 or the equivalent, or consent of instructor. Continuation of course 4. Offered in alternate years.

5. Intermediate Portuguese (5). II. The Staff Lecture—four hours, discussion—1 hour. Prerequisite: course 4 or the equivalent, consent of instructor. Continuation of course 4. Offered in alternate years.

Upper Division Courses

101A. Advanced Grammar and Composition In Portuguese (4). I. The Staff Lecture—three hours, discussion—1 hour. Prerequisite: course 5 of the equivalent. Offered in alternate years.

101B. Advanced Grammar and Composition In Portuguese (4). II. The Staff Lecture—three hours, discussion—1 hour. Prerequisite: course 4 of the equivalent, consent of instructor. Offered in alternate years.

Courses in Spanish

Lower Division Courses
1. Elementary Spanish (5). I, II, III. The Staff (Samaniego in charge) Discussion—five hours, laboratory—1 hour. Introduc-
tion 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 (Samaniego in charge)
Discussion—5 hours; laboratory—1 hour. Prerequisite: course 1. Completion of course 1 in the areas of grammar and skills will be required.

3. Elementary Spanish (5) I, II, III. The Staff (Samaniego in charge)
Discussion—5 hours; laboratory—1 hour. Prerequisite: course 2. Completion of grammar sequence and continuing practice of all language skills through cultural texts.

7A-7B. Grammar and Composition for Native Speakers (4-4) III. Chabram
Discussion—3 hours; compositions. Prerequisite: course 3 or the equivalent, or consent of instructor. Intensive grammar review and composition. Open to students whose native language is Spanish or to those who are bilingual. Not open to graduates of high schools where Spanish was the language of instruction. Open to majors and non-majors.

7C. Reading and Composition for Native Speakers (4) III. The Staff
Discussion—3 hours; term paper. Prerequisite: course 5 or 7B before enrolling in this course. Reading and discussion of selected Chicano and Latin American prose masterpieces, to acquaint bilingual students, or students whose native language is Spanish, with a variety of writing styles in prose. Written essays will be assigned regularly. Open to majors and non-majors.

8. Elementary Spanish Conversation (2) I, II, III. The Staff (Scott in charge)
Discussion—3 hours. Prerequisite: course 3; course 21 (concurrently) recommended. Designed to develop oral communication skills. Emphasis on increasing vocabulary, improving listening comprehension, pronunciation, accuracy and grammar control. Practice of everyday situations. Not open to native speakers or upper division students.

9. Intermediate Spanish Conversation (2) I, II, III. The Staff
Discussion—3 hours. Prerequisite: course 8 or 22; course 21 (concurrently) recommended. Continuation of course 8. Designed to develop oral communication skills at a more advanced level. Practice of more complex situations. Not open to native speakers or upper division students.

21. Intermediate Spanish (5) I, II, III. The Staff (Scott in charge)
Lecture/discussion—5 hours; laboratory—1 hour. Prerequisite: course 3. Designed to review and develop the grammar, vocabulary and composition acquired in the first year through exercises and reading of modern texts. It is recommended that students transferring from other institutions start the second-year program at this level.

22. Intermediate Spanish (5) I, II, III. The Staff (Scott in charge)
Lecture/discussion—5 hours; laboratory—1 hour. Prerequisite: course 21. Continuation of Spanish 21. Focus on more difficult grammatical concepts and further practice on composition. Development of all language skills through exercises and reading of modern texts.

23. Spanish Composition (4) I, II, III. The Staff (Scott in charge)
Lecture/discussion—3 hours. Development of writing skills by way of writing original compositions, preparing summaries from original texts, and further grammar review.

24. Introduction to Literature (3) I, II, III. The Staff (Scott in charge)
Lecture/discussion—3 hours. Prerequisite: course 22; course 23 (concurrently) recommended. Reading and discussion of selected masterpieces—drama and prose—to acquaint the student with a variety of writing styles and literary genres. Written essays will be assigned.

34. Mexico in Its Literature (3) III. Chabram
Lecture—3 hours. Introduction to significant literary trends in Mexican literature. Lectures and discussions in English, readings in either English or Spanish of representative works by major contemporary authors. May not be counted as part of the major or minor in Spanish.

35. Survey of Mexican Culture (3) III. Chabram
Lecture—3 hours. Indian cultural patterns before the discovery of Mexico; development of Mexican civilization during the Spanish conquest, the national period, and the Revolution of 1910. Conducted in English. May not be counted as part of the major or minor in Spanish.

98. Directed Group Study (1-5) I, II, III. The Staff (Chairperson responsible)
Prerequisite: consent of instructor and Department Chairperson. Primarily for lower division students. (P/NP grading only)

Upper Division Courses
Course 100 is prerequisite to all upper division literature courses.

100. Introduction to Principles of Criticism (3) I, II, III. Alston in charge
Lecture—3 hours. Prerequisite: course 28. Designed to provide students with the skills to recognize the basic principles involved in literary criticism and a useful terminology to analyze the different genres of Hispanic literature.

103A. Hispanic Literature I: Medieval and Golden Age (4) I, II, III. Armstead, Díaz-Migoyo, Sánchez-Romerano
Lecture—3 hours; written reports. Prerequisite: course 100. Introduction to the study of the principal authors, works, and movements of Medieval and Golden Age literature of Spain, and of Spanish-American colonial literature.

103B. Hispanic Literature I: Medieval and Golden Age (4) I, II, III. Armstead, Díaz-Migoyo, Sánchez-Romerano
Lecture—3 hours; written reports. Prerequisite: course 100. Introduction to the study of the principal authors, works, and movements of Medieval and Golden Age literature of Spain, and of Spanish-American colonial literature.

104A. Hispanic Literature II: Modern Spanish Literature (4) I. Alston, Gullón, Sánchez-Romerano, Scott
Lecture—3 hours; written reports. Prerequisite: course 100. Introduction to the study of the principal authors, works, and movements of modern Spanish literature from 1700 to 1900. Offered in alternate years.

104B. Hispanic Literature II: Modern Spanish Literature (4) I. Alston, Gullón, Sánchez-Romerano, Scott
Lecture—3 hours; written reports. Prerequisite: course 100. Introduction to the study of the principal authors, works, and movements of modern Spanish literature from 1800 to 1900. Offered in alternate years.

Lecture—3 hours; written reports. Prerequisite: course 100. Introduction to the principal authors, works, and movements of Spanish-American literature of the Nineteenth and twentieth centuries. Offered once every four quarters.

Lecture—3 hours; written reports. Prerequisite: course 100. Introduction to the principal authors, works, and movements of Spanish-American literature of the Nineteenth and twentieth centuries. Offered once every four quarters.

108A. Spanish-American Prose of the Twentieth Century (4) I, II, III. Gertel, Jaén, Verani
Lecture—3 hours; conferences and reports. Prerequisite: course 100. Emphasis on the development of the novel. Offered in alternate years.

108B. Spanish-American Prose of the Twentieth Century (4) I, II, III. Chabram, Jaén
Lecture—3 hours; conferences and reports. Prerequisite: course 100. Emphasis on the essay. Offered in alternate years.

Lecture—3 hours; conferences and reports. Prerequisite: course 100. Offered in alternate years.

110A. Advanced Spanish Composition I (4) I. The Staff
Discussion—3 hours; term paper. Prerequisite: course 100. Practice in expository writing, with an aim toward refinement and expansion of vocabulary.

110B. Advanced Spanish Composition II (4) II. The Staff
Discussion—3 hours; written reports. Prerequisite: course 28. Practice in creative writing, with an aim toward refinement and appreciation of written expression and expansion of vocabulary.

111. Don Quijote (4) I, II, III. Díaz-Migoyo
Lecture—3 hours; written reports. Prerequisite: course 100.

112. Medieval Masterworks (4) I, II, III. Armstead
Lecture—3 hours; term paper. Prerequisite: course 100. Study of major works of Medieval Spanish literature from its origins up to the thirteenth century. Offered in alternate years.

114. Spanish Romantic Literature (4) I, II, III. Gullón, Scott
Lecture—3 hours; conferences and reports. Prerequisite: course 100. Readings and lectures on romantic writers of the first half of the nineteenth century with emphasis on drama and poetry. Offered in alternate years.

Lecture—3 hours; term paper. Prerequisite: course 100. Offered in alternate years.

119. Spanish Novel of the Nineteenth Century (4) I, II, III. Gullón, Scott
Lecture—3 hours. Prerequisite: course 100. Offered in alternate years.

120A. Twentieth-Century Spanish Fiction (4) I, II, III. Alston, Díaz-Migoyo, Gullón
Lecture—3 hours; term paper. Prerequisite: course 100. Study of the major literary trends and authors of the modern Spanish novel and short story. Selected works by Unamuno, Valle-Inclán, Blasco Ibáñez, Cela and others will be covered.

120B. Twentieth-Century Spanish Drama (4) I, II, III. Alston
Lecture—3 hours; term paper. Prerequisite: course 100. Offered in alternate years.

120C. Twentieth-Century Spanish Poetry (4) I, II, III. Sánchez-Romerano
Lecture—3 hours; term paper. Prerequisite: course 100. Offered in alternate years.

124. Chicano Culture (4) I. Chabram
Lecture—3 hours; term paper. Prerequisite: course 2 or consent of instructor. Study of Chicano culture in the Southwest from 1598 to the present, emphasis on the period after 1848. Lectures and discussions in English; readings in English and Spanish. May not be counted as part of major in Spanish. Offered in alternate years.

Lecture—3 hours; term paper. Prerequisite: course 100. Study of the poetry and prose of Spanish-American modernismo (1880 to 1916). Offered in alternate years.

126A. Chicano Literature (4) I, II, III. Chabram
Lecture—3 hours; term paper. Prerequisite: course 100; consent of instructor. Intensive study of select topics in Chicano literature including Chicano novel, bilingual readings, Lectures, discussions, and writing. Offered in alternate years.

126B. Chicano Literature (4) I, II, III. Chabram
Lecture—3 hours; term paper. Prerequisite: course 100; consent of instructor. Intensive study of select topics in Chicano literature including Chicano novel, bilingual readings, Lectures, discussions, and writing. Offered in alternate years.
225C. Medieval Spanish Epic (4) III. Armistead Seminar—3 hours; term paper. Prerequisite: graduate standing or consent of instructor. Study of major works of Medieval Castilian heroic poetry from its origins through the decadence of the genre in the fifteenth century. Offered in alternate years.

225D. Medieval Lyric (4) III. Armistead Seminar—3 hours; term paper. Prerequisite: graduate standing or consent of instructor. Study of representative early lyric poetry in the various peninsular languages. Offered in alternate years.

226. El libro de buen amor (4) I. Armistead Seminar—3 hours; term paper. Prerequisite: graduate standing or consent of instructor. Study of the fourteenth-century Castilian poem, El libro de buen amor (The Book of Good Love) by Juan Ruiz, Archbishop of Hita. Offered in alternate years.

227. El Romancero (4) III. Armistead Seminar—3 hours; term paper. Prerequisite: graduate standing or consent of instructor. Study of the fourteenth-century Castilian epic, El romancero. Offered in alternate years.

228. Folk Literature of the Hispanic World (4) I. Armistead Seminar—3 hours; term paper. Prerequisite: graduate standing or consent of instructor. Study of the various genres of oral traditional literature among the Hispanic peoples. Offered in alternate years.

229. Spanish Literature of the Early Renaissance (4) III. Armistead Seminar—3 hours; term paper. Spanish literature, 1450-1550, with emphasis on Las Celestinas.


231B. Spanish Literature of the Golden Age: Lyric Poetry (4) II. Sánchez-Romeralo Seminar—3 hours; term paper. Sixteenth-century currents in Spanish poetry. Offered in alternate years.

231C. Spanish Literature of the Golden Age: Literature of Ideas (4) II. Díaz-Migoyo Seminar—3 hours; term paper. Prerequisite: graduate standing or consent of instructor. Offered in alternate years.

231D. Spanish Literature of the Golden Age: Narrative (4) II. Díaz-Migoyo Seminar—3 hours; term paper. Prerequisite: graduate standing or consent of instructor. Offered in alternate years.

231E. Spanish Literature of the Golden Age: The Drama (4) II. Sánchez-Romeralo Seminar—3 hours; term paper. Offered in alternate years.


234B. Twentieth-Century Spanish Poetry (4) II. Sánchez-Romeralo Seminar—3 hours; term paper. Prerequisite: graduate standing or consent of instructor. Study of the modern Spanish novel until the Civil War. Emphasis on Modernism, Generation of 1898, Vanguardism, and other literary trends through selected works by Valle-Inclán, Barría, Azorín, Gómez de la Serna, and others. Offered in alternate years.

235B. Twentieth-Century Spanish Novel (4) II. Allisent, Guillén Seminar—3 hours; term paper. Prerequisite: graduate standing or consent of instructor. Study of the main narrative trends in the contemporary Spanish
null
Related elective courses ..........................6
  Two upper division courses approved by major advisor. These may be in
  mathematics, computer science or in quantitative aspects of a substantive
  discipline.
Total Units for the Major ......................75-85
  (General option)

Computer Science option

Depth Subject Matter .............................49-53
  Analysis of variance, multiple regression, Statistical
  software (the equivalent) ..............................8
  Introduction to probability, mathematical
  statistics, Statistics 131A, 131B, 131C .........5-12
  Two courses having Statistics 131B as a
  prerequisite .............................................6-7
  Statistical computing, Statistics 141 ..........................4
  Operating systems and System program-
  ming, Computer Science Engineering
  150 ..................................................................4
  Data structures, Computer Science Engi-
  neering 110 ..................................................4
  Data base systems, Computer Science Engi-
  neering 165 or Mathematics 160 .....................3-4
  Mathematics, two courses from Math-
  Computer Science Engineering 122, or
  Computer Science Engineering 175 ..........................3
Total Units for the Major ......................73-84
  (Computer Science option)

Major Adviser. W.O. Johnson

Students are encouraged to meet with an adviser to plan a program as early as possible. Sometimes beforehand or during the first quarter of the junior year, students planning to major in Statistics should consult with a faculty adviser to plan the remainder of their undergraduate programs.

Minor Program Requirements:
The Division offers a minor program in Statistics that consists of a survey at the upper division level of the fundamentals of mathematical statistics and of the most widely used applied statistical methods.

UNITS
Statistics ......................................................19-20
  Statistics 106, 108, and 130A-130B or .........16
  131A-131B ......................................................16
  One course in Statistics having Statistics
  130A or 131B as a course prerequisite ..........3-4
  Preparation: Statistics 13 or 32.

Graduate Study. The Graduate Group in Statistics offers study and research leading to the M.S. and Ph.D. degrees in Statistics. Detailed information concerning these degree programs, as well as information on admissions and on financial support, is available from the Division of Statistics.

Graduate Adviser. F.J. Samaniego

Statistical Consulting. The Division provides a consulting service for researchers on campus. For more information, call the Statistical Laboratory Office (916-752-6006).

Courses in Statistics

Lower Division Courses
12. Introduction to Discrete Probability (3) I. The
  Staff
  Lecture—3 hours. Prerequisite: two years of high
  school algebra. Random experiments; countable
  sample spaces; elementary probability axioms;
  counting formulas; conditional probability; indepen-
  dence; Bayes theorem; expectation; gambling prob-
  lems; binomial; hypergeometric; Poisson, ignition;
  negative binomial and multinomial models; limiting
  distributions; Markov chains. Applications in the
  social, biological, and engineering sciences. Offered
  in alternate years.

13. Elementary Statistics (4) II, III. The Staff
  Lecture—4 hours. Prerequisite: two years of high
  school algebra. Measures of central tendency and
  dispersion; binomial, normal, Student-t, and chi-
  square distributions; testing hypotheses; nonpara-
  metric statistics; regression and correlation theory.
  (Students who have had courses 130A or 131A may
  not receive credit for Statistics 13.)

32. Basic Statistical Analysis Through Computers
  (3) I, III. The Staff
  Lecture—3 hours. Prerequisite: Mathematics 16B or
  21B; ability to program in a high-level computer
  language such as Pascal. Overview of probability
  modeling and statistical inference. Problem solution
  through mathematical analysis and computer simul-
  ation. Recommended as alternative to course 13 for
  students with some knowledge of calculus and com-
  puter programming.

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

Upper Division Courses
102. Introduction to Probability Modeling and Statis-
  tical Inference (4) II, III. The Staff
  Lecture—3 hours; discussion—1 hour. Prerequisite:
  two years high school algebra, and upper division
  standing. Introductory probability and statistics at
  a rigorous yet precalculus level. Topics Include:
  probability models; geometrical, normal and
  sampling distributions; graphics; exploratory data
  analysis; parametric and nonparametric estima-
  tion and testing; analysis of variance; regression;
  computing with Minitab. Students who have
  had course 13 may receive only 2 units of credit
  for course 102.

103. Applied Statistics for Business and Econo-
  mics (4) I, II, III. The Staff
  Lecture—3 hours; discussion—1 hour. Prerequisite:
  course 13, 32, or 102. Descriptive statistics;
  probability; random variables; expectation; binomial,
  normal, Poisson, other univariate distributions; joint
  distributions; sampling distributions, central limit theo-
  rem; properties of estimators; linear combinations
  of random variables; testing and estimation; Minitab
  computing package.

104. Applied Statistical Methods: Nonparametric
  Statistics (3) III. The Staff
  Lecture—3 hours. Prerequisite: course 13, 32, or
  102. Sign and Wilcoxon tests, Welch averages.
  Two-sample procedures. Inferences concerning scale.
  Kruskal-Wallis test of association. Chi-square
  and Kolmogorov-Smirnov tests. Offered in
  alternate years.

105. Applied Statistical Methods: Analysis of Var-
  iance (4) I, II. The Staff
  Lecture—4 hours. Prerequisite: course 13, 32, or
  102. One-way and two-way fixed effects analysis
  of variance models. Randomized complete and
  incomplete block design, Latin squares. Multiple
  comparisons procedures. One-way random effects
  model.

106. Applied Statistical Methods: Regression
  Analysis (4) II, III. The Staff
  Lecture—3 hours; discussion—1 hour. Prerequisite:
  course 13, 32 or 102. Simple linear regression,
  variable selection, stepwise regression, analysis of
  covariance, influence measures, computing
  packages.

110. Applied Statistical Methods: Multivariate
  Analysis (3) I. The Staff
  Lecture—3 hours. Prerequisite: courses 13, 32, or
  102, and 106 or 108. Estimation of the mean vector
  and covariance matrix of a multivariate population.
  Multiple comparison methods. Estimation of simple,
  multiple, and partial correlation coefficients. One-
  way MANOVA. Linear discriminant functions. Princi-
  pal component analysis. Factor analysis. Offered in
  alternate years.

120. Probability and Random Variables for Engi-
  neers (4) I. The Staff
  Lecture—3 hours; discussion—1 hour. Prerequisite:
  Mathematics 21A, 21B, 21C, and 22A. Basic con-
  cepts of probability theory with applications to elec-
  trical 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.
  The Staff
  Lecture—3 hours; discussion—1 hour. Prerequisite:
  Mathematics 15B. Concepts of a probability space,
  conditional probability and independence, discrete
  and continuous random variables, moments and
  moment generating functions, transformation of ran-
  dom variables, commonly used probability models,
  joint distribution of random variables, correlation,
  marginal and conditional distributions.

130B. Mathematical Statistics: Brief Course (4) II.
  The Staff
  Lecture—3 hours; discussion—1 hour. Prerequisite:
  Mathematics 16B and course 130A. Sampling dis-
  tributions, sums of random variables, t, F, and K
  distributions, central limit theorem and applications,
  fundamentals of point and interval estimation, one-
  sample and two-sample hypotheses testing. Introduc-
  tion to regression analysis, and analysis of variance.

131A. Introduction to Probability Theory (4) I. The
  Staff
  Lecture—3 hours; discussion—1 hour. Prerequisite:
  Mathematics 21A, 21B, 21C, and 22C. Fundamental
  concepts of probability theory, discrete and continu-
  ous random variables, standard distributions,
  moments and moment-generating functions, laws of
  large numbers and the central limit theorem. Stu-
  dents who have had Mathematics 131 may not receive
  credit for Statistics 131A.

131B-131C. Introduction to Mathematical Statis-
  tics (4-4) I, III. The Staff
  Lecture—3 hours; discussion—1 hour. Prerequisite:
  upper division standing; one course from courses
  130A, 131A, Engineering 118, or Mathematics 131A.
  Not open to Statistics majors. Statistical estimation,
  hypotheses testing, correlation, simple linear regres-
  sion, least squares estimation, confidence intervals,
  prediction intervals, multiple regression, goodness-
  of-fit, analysis of variance, factorial design, contin-
  gency tables, chi-square tests, applications to engi-
  neering problems.

133. Applied Stochastic Modeling and Statistical
  Theory (6) I. Sanamiego
  Lecture—5 hours; discussion—1 hour. Prerequisite:
  course 103 and Mathematics 168B, or their equiva-
  lent. Probability laws, random variables, mathemati-
  cal expectation, univariate and multivariate proba-
  bility models; convergence concepts, the theory of
  estimation, topics in hypothesis testing.

134. Nonparametric Inference (3) II. The Staff
  Lecture—3 hours; discussion—1 hour. Prerequisite:
  course 130B or 131B. Selected topics in nonparametric
  statistical inference from a one-sample and a k-sample point
  of view. Topics include Kolmogorov-Smirnov type tests;
  confidence intervals for quantiles, location and scale
  parameters; rank tests, dispersion tests, efficiency.
  Offered in alternate years.

135. Multivariate Data Analysis (3) I. The Staff
  Lecture—3 hours. Prerequisite: course 130B or
  131B. Qualitative descriptive analysis of social
  and biological problems. Multivariate statistical
  procedures implemented through computer methods.
  Applied time series, factor and cluster analysis.
  Offered in alternating years.

136. Applied Linear Models (4) III. The Staff
  Lecture—3 hours; discussion—1 hour. Prerequisite:
  Mathematics 22A; and either course 130B or 132; or
  course 131B. Introduction to regression analysis and
  analysis of variance within the framework of linear
  models: general linear model; simple and multiple

*Course not offered this academic year.
Linear regression, polynomial regression; one-factor and multi-factor analysis of variance; nested models, multiple comparisons; analysis of covariance.

137. Applied Time Series Analysis (3) III. The Staff Lecture—3 hours, discussion—1 hour. Prerequisite: course 130B or 131B or the equivalent. Time series analysis, frequency domain analysis, stationarity, non-stationarity, spectral analysis, forecasting, Box-Jenkins methods, state-space models, analysis of variance, and signal detection and discrimination methods.

138. Analysis of Categorical Data (4) I. The Staff Lecture—3 hours; discussion—1 hour. Prerequisite: course 130A or 131B, or courses 106 and 108. Analysis of categorical data, frequency tables, contingency tables, tests for independence. Multidimensional tables and log-linear models, maximum likelihood estimation, tests of goodness-of-fit. Logit models, linear logistic models. Analysis of incomplete tables. Packaged computer programs, analysis of real data.

140. Introduction to Biostatistics (4) III. The Staff Lecture—3 hours; discussion—1 hour. Prerequisite: course 130B, 131B, or 132. Clinical trials, diagnostic tests, epidemiology, observational studies, epidemiology of infectious diseases, longitudinal studies, survival analysis, toxicology and dose-response analysis.

141. Spatial Statistics (3) III. The Staff Lecture—3 hours. Prerequisite: course 130A or 131A or the equivalent; one course from Computer Science Engineering 30 or Engineering 5; knowledge of regression analysis and matrix algebra. Computational aspects of spatial models and nonlinear models; development of packaged statistical programs; simulation techniques; graphics.

142. Reliability (3) III. The Staff Lecture—5 hours. Prerequisite: course 130B or 131B or consent of instructor. Analysis of inferential accuracy and reliability models and inference for reliability systems. Topics include: coherent systems, statistical failure models, notions of aging, maintenance policies, and their optimization.

144. Sampling Theory of Surveys (3) II. III. The Staff Lecture—3 hours. Prerequisite: course 130B or 131B or consent of instructor. Design and analysis of sample surveys with applications in the social and biological sciences. Simple random sampling, ratio estimation, problem of nonresponse. Offered in alternate years.

145. Bayesian Statistical Inference (3) III The Staff Lecture—3 hours. Prerequisite: courses 130A or 130B or 131A or 131B or 131C or the equivalent. Subjective probability, Bayes Theorem, conjugate priors, non-informative priors, decision theory, estimation, testing, prediction, empirical Bayes methods, Bayesian robustness, properties of Bayesian procedures, comparisons with classical procedures, approximation techniques, hierarchical Bayesian analysis, applications. Offered in alternate years.

146. 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)

147. Directed Undergraduate Research (1-5) I. II. III. The Staff (Chairperson in charge)
Prerequisite: consent of instructor. (P/NP grading only)

149. Special Study for Advanced Undergraduates (1-5) I. II. III. The Staff (Chairperson in charge)
Prerequisite: consent of instructor. (P/NP grading only)

205. Statistical Methods for Research (3) III. The Staff Lecture—3 hours. Prerequisite: course 106 or the equivalent. An experimental design. Latin squares, Youden squares, balanced and partially balanced incomplete block designs, factorial experiments, confounded designs, split-plot designs, lattice designs, fractional factorial designs, repeated measurements designs, optimal designs based on various criteria, analysis of covariance.

210. Biostatistics I (4) I. Muller Lecture—4 hours; discussion—1 hour. Prerequisite: one of the following courses: 231A, 231B, 230B, 132, or 133; and either course 136 or 139, or course 106 and 108. Clinical trials, cross-over design, randomization devices, sequential monitoring methods, applications to clinical trials, observational studies, case-control and cohort studies, estimation of risks, diagnostic procedures, dose-response relations, combination of drugs, low-dose extrapolation.

211. Biostatistics II (4) II. Muller Lecture—4 hours; discussion—1 hour. Prerequisite: course 231A, 231B, and 231C; or course 230 and consent of instructor. Parametric survival models; nonparametric survival models; semiparametric survival models. Techniques of survival analysis, methods of survival analysis, epidemiology data analysis, computer packages.

212. Biostatistics III (4) III. Muller Lecture—5 hours; discussion—1 hour. Prerequisite: course 231A, 231B, and 231C; or course 230 and consent of instructor. Parametric survival models; nonparametric survival models; semiparametric survival models. Techniques of survival analysis, methods of survival analysis, epidemiology data analysis.

213. Brief Advanced Mathematical Statistics (4) I. The Staff Lecture—3 hours; discussion—1 hour. Prerequisite: courses 131A, 131B, 131C, and Mathematics 167, or their equivalent. Distribution theory, modes of convergence, laws of large numbers, central limit theorem, Slutsky's Theorem, strong consistency, asymptotic normality of maximum likelihood estimates, methods of scoring, hypothesis testing based on likelihood ratio, Pitman efficiency, concepts of decision theory, Bayesian inference. Students who have not received credit for courses 213A, 231A, 231B, or 231C may receive only 2 units, 1 unit, or no credit respectively for course 230.

213A-213B-231C. Mathematical Statistics (4.4-4.1) I-III. The Staff Lecture—3 hours; discussion—1 hour. Prerequisite: course 131C and Mathematics 127A-127B or the equivalent. Distribution theory, decision theoretic methods, estimation and hypothesis testing, multivariate techniques, large sample theory. (Graduate students may repeat this course for credit.)

232A-232B. Linear Model Theory (4-4) II. III. The Staff Lecture—3 hours; discussion—1 hour. Prerequisite: course 131C. Estimation and testing for the general linear hypothesis, components of variance, multiple comparisons.

233. Design of Experiments (3) III. The Staff Lecture—3 hours. Prerequisite: course 131C. Topics from balanced and partially balanced incomplete block designs, fractional factorial designs, and response surfaces. Offered in alternate years.

235A-235B-235C. Probability Theory (3.3-3.3) I. II. III. The Staff Lecture—3 hours. Prerequisite: Mathematics 127C and courses 131A-131B or the equivalent. Measure theoretical foundations, abstract integration, modes of convergence, limit theorems, independence, laws of large numbers, characteristic functions, central limit theorem, conditional expectations; topics from discrete time, Markov and stationary processes, ergodic theory, Brownian motion, weak convergence, Wiener and Poisson processes. (Same course as Mathematics 235A-235B-235C.)

237A. Time Series Analysis: Foundations (3) I. The Staff Lecture—3 hours. Prerequisite: course 131A or Mathematics 131 or the equivalent. Basic structure of stationary and non-stationary time series. Differentiation, integration, spectral representations, linear filtering, mean square estimation, the discrete Fourier transform, laws of large numbers, autoregressive moving average processes. Offered in alternate years.

237B. Time Series Analysis: Statistical Inference (3) II. The Staff Lecture—3 hours. Prerequisite: courses 131B-131C and 237A. Multivariate normal processes, spectral analysis, tests of hypotheses, regression, discrimination, factor analysis, spectral analysis of variance, ARIMA processes, state space models, and maximum likelihood estimates. Offered in alternate years.

238A. Theory of Multivariate Analysis I (3) II. The Staff Lecture—3 hours. Prerequisite: course 231C or consent of instructor. Review of matrix algebra, Jacobians, methods of multivariate normal distribution theory: multiple, partial, and canonical correlations; maximum likelihood estimation; properties of the Wishart distribution; Hotelling's T^2 test; union intersection properties; simultaneous linear compounds; likelihood ratio testing procedure; multivariate regression analysis. Offered in alternate years.

238B. Theory of Multivariate Analysis II (3) III. The Staff Lecture—3 hours. Prerequisite: course 238A. Multivariate analysis of variance; profile analysis, growth curve analysis; principal component analysis; inferences on covariances, factor analysis. Classification and discrimination, distribution of characteristic roots. A Bayesian approach to multivariate analysis, testing independence of sets of variables, canonical correlations, cluster analysis. Offered in alternate years.

250. Advanced Data Analysis (4) I. The Staff Lecture—3 hours; discussion—1 hour. Prerequisite: courses 145C and 252 or either course 230 or 231A. Resampling methods and one to three additional topics selected from nonparametric and semi-parametric methods, incomplete data analysis, diagnostic, nonstandard multivariate and time series analysis, applied Bayesian methods, sequential analysis and quality control, categorical data analysis. Offered in alternate years.

290. Seminar in Statistics (1-6) I. II. III. The Staff (Chairperson in charge) Prerequisite: consent of instructor. Seminar on advanced topics in probability and statistics. (S/U grading only)

296. Group Study (1-6) I. II. III. The Staff (Chairperson in charge)
Prerequisite: consent of instructor. (S/U grading only)

299D. Dissertation Research (1-12) I. II. III. The Staff Prerequisite: candidate for Ph.D. degree. Research in statistics under the supervision of major professor. (S/U grading only)

Proffessional Course

401. Methods in Statistical Consulting (3) I. II. III. The Staff Supervised consultation—3 hours Prerequisite: graduate standing in Statistics. Students observe faculty consulting with clients and discuss with faculty members of analyzing their data or of designing their experiments. Students may also perform data analysis. Following this, students do supervised, then unsupervised, but reviewed, statistical consulting. May be repeated once for credit. (S/U grading only)

Statistics

(Graduate Program)

George G. Roussas, Ph.D., Chairperson of the Group
Group Office, 469 Kerr Hall (916-753-2361)
Faculty. The Group has approximately thirty faculty members from all colleges, schools, and divisions, including twelve 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. Facility in com-
puter programming is essential for some of the
course work. The supervised statistical consulting
required of all M.S. students has proven to be a valu-
able educational experience. The Ph.D. program
combines advanced course work in statistics and
probability with the opportunity for in-depth concur-
rent study in an applied field. For detailed informa-
tion, see the Graduate Announcement, or contact the
Chairperson of the Group.
Preparation. For admission to the Ph.D. program,
course work requirements for the master's degree,
and at least one semester's work in advanced cal-
culus must be completed.
Graduate Adviser, F. J. Samaniego.

Subject A
See under University Requirements;
and English A.

Surgery
See Surgery (Medicine, School of); and Surgery (Veterinary Medicine), below.

Surgery
(School of Veterinary Medicine)
Eugene P. Steffey, V.M.D., Ph.D., Chairperson of the Department
Department Office, 2112 Medical Science 1A
(916-752-3599)

Faculty
Claudia A. Bailey, D.V.M., Ph.D., Associate Professor
Roy W. Baxlom, D.V.M., M.S., Professor
Eugene M. Breznock, D.V.M., Ph.D., Professor
Nedra M. Buyukmihal, V.M.D., Associate Professor
Robert M. Cello, D.V.M., Professor Emeritus
Isaac C. G. E. DeCampion, V.M.D., Ph.D., Professor Emeritus
C. L. Brian, V.M.D., Ph.D., Associate Professor Emeritus
Steve H. Hawkins, V.M.D., M.S., Professor
Susan V. Hildebrand, D.V.M., Associate Professor
Terrell A. Holiday, D.V.M., Ph.D., Assistant Professor Emeritus
Janet E. Iliou, B.V.Sc., Ph.D., Assistant Professor
David N. Krag, M.D., Assistant Professor in Residence
Robert L. Leighton, V.M.D., Professor Emeritus
Robert L. Linford, D.V.M., Ph.D., Assistant Professor Emeritus
Bruce R. Madewell, V.M.D., M.S., Professor
Dennis M. Meagher, D.V.M., Ph.D., Professor Emeritus
Harold R. Parker, D.V.M., Ph.D., Professor Emeritus
John R. Pascoe, B.V.Sc., Ph.D., Associate Professor Emeritus
Peter J. Pascoe, B.V.Sc., Assistant Professor Emeritus
Jack R. Snyder, D.V.M., Ph.D., Assistant Professor in Residence
Eugene P. Steffey, V.M.D., Ph.D., Professor Emeritus
Gordon H. Thellien, D.V.M., Professor Emeritus
Philip B. Vasseur, D.V.M., Associate Professor
John D. Watson, D.V.M., Professor Emeritus
Alfie P. Wind, M.D., Senior Lecturer
Part-Time Clinical Faculty
Gregory L. Ferraro, D.V.M., Associate Clinical Professor
Dennis V. Hacker, D.V.M., Assistant Clinical Professor
Randall H. Scaglione, D.V.M., Assistant Clinical Professor

Leigh West-Hyde, D.V.M., Assistant Clinical Professor
Pauline L. Wong, D.V.M., Lecturer

Courses in Surgery

Upper Division Course
199. Special Study for Advanced Undergraduates (1-5) I, II, III. The Staff (Steffey in charge)
(PNP grading only)

Graduate Courses
230. Principles of Anesthesia and Surgery for Investigators (2) II, Stoffey
Lecture—2 course. Prerequisite: graduate or profes-
sional student or consent of Instructor. Presentation and
introduction to principles and techniques of anes-
thesia and surgery for laboratory animals. Course is
not restricted to student numbers.
230L Principles of Anesthesia and Surgery for Investigators (2) II, Stoffey
Course—4 hours. Prerequisite: course 230 concurrently. Laboratory to complement course 230. Limited enrollement. (SU grading only)

291. Anesthesia/Critical Care Basic Science Conference (1) I, II, III. The Staff (P. Pascoe in charge)
Discussion—1 hour. Prerequisite: postdoctoral, medi-
cal, or graduate student; consent of instructor.
Advanced course in scientific foundations of animal
anesthesia and critical care. Format is directed by
discussion following reading of assigned material
emphasizing foundations in pharmacology and
physiology. (SU grading only)

293. Anesthesia/Critical Care Basic Science Conference (2) I, II, III. The Staff (P. Pascoe in charge)
Discussion—1 hour. Prerequisite: postdoctoral, medi-
cal, or graduate student; consent of instructor.
Advanced course in scientific foundations of animal
anesthesia and critical care. Format is directed by
discussion following reading of assigned material
emphasizing foundations in pharmacology and
physiology. (SU grading only)

295. Pathology and Laboratory Medicine (1-5) I, II, III. The Staff (Steffey in charge)
Research (1-12) I, II, III. The Staff (Steffey in charge)

Professional Courses
411. Small Animal Surgery (1 1/2 per week) I, II, III. The Staff (Vasseur in charge)
Laboratory—50 hours. Prerequisite: professional
standing, House Officer in Veterinary Medical Teaching
Hospital, or consent of Instructor. House Officers
responsible for care of small animal patients in the hos-
pital including physical examinations, presurgical
work-up, surgery, postoperative care, and follow-up
under the supervision of the senior surgical staff.
May be repeated for credit. (SU grading only)

412. Large Animal Surgery (1 1/2 per week) I, II, III. The Staff (Vasseur in charge)
Laboratory—50 hours. Prerequisite: professional
standing, House Officer in Veterinary Medical Teaching
Hospital, or consent of Instructor. House Officers
responsible for care of farm animal surgical patients
in the hospital and outpatient clinic including physi-
cal examinations, presurgical work-up, assistance at
operations, surgery, post-surgical care and follow-up
under the supervision of the senior surgical staff.
May be repeated for credit. (SU grading only)

414. Veterinary Anesthesiology (1 1/2 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 anesthesia care of patients in the
operating room under the supervision of the senior
staff. May be repeated for credit. (SU grading only)

420. Veterinary Neurology (1 1/2 per week) I, II, III. Holladay
Laboratory—50 hours. Prerequisite: professional
standing, House Officer in Veterinary Medical Teaching
Hospital, or consent of instructor. House Officers
responsible for care of farm hospital and outpatients
including history taking, neurologic examinations
and special diagnostic and therapeutic procedures
under the direction of the staff neurologist. (SU grading only)

422. Veterinary Ophthalmology (3/4-1 1/2 per week) I, II, III. Buyukmihal
Laboratory—50 hours. Prerequisite: professional
standing, House Officer in Veterinary Medical Teaching
Hospital, or consent of instructor. House Officers
responsible for care of animals in the hospital and
outpatient clinic including history taking, oph-
thalmologic examinations, special diagnostic tech-
niques, assistance at ophthalmologic surgery and
medical and post surgical care under the direction of
the staff ophthalmologist. May be repeated for credit.
(SU grading only)

429. Large Animal Grand Rounds (1-2) I, II, III. The Staff (Meagher in charge)
Discussion—1 hour. Prerequisite: professional standing;
House Officer in Veterinary Medical Teaching Hospital
or consent of instructor. House Officers take an
active part in the presentation and discussion of
selected cases from the large animal and ambulatory
clinics. (SU grading only)

Swedish
See Scandinavian

Textile Science
See Fiber and Polymer Science

Textiles
(A Graduate Group)
S. Heig Zenorlan, Ph.D., D.Sc., Chairperson of the Group
Group Office, 129 Everson Hall (916-752-6850)
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: structure, modification, and properties of textiles; and psychological and sociological factors relating to consumption and use of apparel. Extensive specialized textiles research facilities are available. For detailed information regarding the pro-
gram, address the Chairperson of the Group.
Graduate Adviser, S. H. Zenorlan (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 (916-752-6850)
Faculty
You-Lu Heisel, Ph.D., Associate Professor
Susan B. Kaiser, Ph.D., Associate Professor
Emery Menefee, Ph.D., Adjunct Professor

*Course not offered this academic year.*
Textiles and Clothing

The Major Program

The textiles and clothing major emphasizes the connections among (a) the physical characteristics of textile products, (b) human perceptions of and behavior toward these products, and (c) global economic trends affecting the textile/apparel marketplace. An integrative knowledge base links textile products with people and processes, to focus on the production and distribution, and consumer use of textiles and apparel.

The Program. The textiles and clothing major offers two options: multidisciplinary and marketing. 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.

Marketing Option emphasizes social science and business coursework, 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 certification, and textiles journalism. The majority of texts 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 design.

Electives. Students may also pursue graduate studies in textiles, business, and other areas depending on their specific selections 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**

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Marketing Option Depth Subject Requirement

- Agricultural Economics 100A-100B, 106, 136
- Social research methods (Sociology 48A or Psychology 41)
- 4
- Statistics (Statistics 121, 123)
- 4
- Psychology (Psychology 145 or 183)
- 4
- Textiles and clothing (Fiber and Polymer Science 110, 115, 122-124, 165, 167, 174, 177)
- 27

Multidisciplinary Option Depth Subject Requirement

- Agricultural Economics 112, 113
- 6
- Design (Design 111, 113, 114)
- 6
- Psychology (Psychology 145 or 183)
- 4
- Textiles and clothing (Fiber and Polymer Science 100, 161, 161L, Textiles and Clothing 107, 162, 162L, 163, 163L, 164, 174, 177)
- 27

Marketing Option Restricted Electives

- Courses selected from the following:

Multidisciplinary Option Restricted Electives

- Courses selected from the following:

Total Units for the Degree: 180

Major Adviser: S.H. Zeronian

Advising Center: Major is located in 129 Eames Hall (916-752-4417)

The Minor Program

The Division of Textiles and Clothing offers a minor program for non-majors interested in satisfying secondary career needs or preparation into the program see the advisor in 129 Eames Hall.

Textiles and Clothing

- 18 courses from Textiles and Clothing 6, 8, 107, 110, 161-161L, 162-162L, 163-163L, 164, 170, 173, 174, 177

Minor Adviser: S.H. Zeronian

Graduate Study. A program of study is offered leading to the M.S. degree in Textiles. Information can be obtained from the graduate adviser, S.H. Zeronian. Also see the Graduate Division section in this catalog related courses.

Courses in Textiles and Clothing

Questions pertaining to the following courses should be directed to the instructor or to the Division of Textiles and Clothing.

Lower Division Courses

1. Introduction to Textiles (4) Ill. The Staff Lecture—3 hours; laboratory—3 hours. Introduction to the structure and properties of textiles. Consumer use and fabric characteristics are emphasized. (CAN-H.6, 6)

2. The Textile and Apparel Industries (4), Rucker Lecture—4 hours. Study of the textile and apparel industries including fashion theory, production, distribution, and consumption of textile goods.

3. Internship in Textiles and Clothing (1-12), Ill. The Staff Lecture—3 hours; laboratory—3 hours. Internship—3-38 hours. Prerequisite: consent of instructor. Work experience off campus in a textile or clothing-related area. Supervision by a member of the Textiles and Clothing faculty. (P/N grading only)

4. Directed Group Study (1-5), Ill. The Staff Rucker in charge. Prerequisite: consent of instructor. (P/N grading only)

5. Special Study for Lower Division Students (1-5), Ill. The Staff Rucker in charge. (P/N grading only)

Upper Division Courses


2. Textiles and Clothing (3) Ill. The Staff Lecture—3 hours. Prerequisite: course 6. Properties of fabrics as related to serviceability, comfort, and appearance.

3. Textiles and Clothing (4) Ill. The Staff Lecture—3 hours. Prerequisite: course 16 (may be taken concurrently). Laboratory methods and processes employed in studying properties of textile fabrics as related to serviceability, comfort, and appearance.

4. Textiles and Clothing (4) Ill. The Staff Lecture—3 hours. Prerequisite: course 16 (may be taken concurrently). Laboratory methods and processes employed in studying properties of textile fabrics as related to serviceability, comfort, and appearance.

5. Textiles and Clothing (4) Ill. The Staff Lecture—3 hours. Prerequisite: course 16 (may be taken concurrently). Laboratory methods and processes employed in studying properties of textile fabrics as related to serviceability, comfort, and appearance.

6. Textiles and Clothing (4) Ill. The Staff Lecture—3 hours. Prerequisite: course 16 (may be taken concurrently). Laboratory methods and processes employed in studying properties of textile fabrics as related to serviceability, comfort, and appearance.

7. Textiles and Clothing (4) Ill. The Staff Lecture—3 hours. Prerequisite: course 16 (may be taken concurrently). Laboratory methods and processes employed in studying properties of textile fabrics as related to serviceability, comfort, and appearance.

8. Textiles and Clothing (4) Ill. The Staff Lecture—3 hours. Prerequisite: course 16 (may be taken concurrently). Laboratory methods and processes employed in studying properties of textile fabrics as related to serviceability, comfort, and appearance.

9. Textiles and Clothing (4) Ill. The Staff Lecture—3 hours. Prerequisite: course 16 (may be taken concurrently). Laboratory methods and processes employed in studying properties of textile fabrics as related to serviceability, comfort, and appearance.
Courses in Vegetable Crops
Questions pertaining to the following courses should be directed to the instructor or to the Vegetable Crops Office, 148 Asmundson Hall.

Lower Division Course
92. Internship in Vegetable Crops (1-6 E) I, II, III. The Staff (Department Chairperson in charge) Internship—I—36 hours. Work experience off or on campus in all subject areas pertaining to vegetable crops. Internships supervised by a member of the faculty. Maximum of 12 units permitted in the Vegetable Crops 92-192 series. (PQP grading only.)

Upper Division Courses
101. Principles of Vegetable Crops Production (4) I, II. Jones Lecture—2 hours; laboratory—6 hours; field trip(s) and written and oral reports. Prerequisite: Biological Sciences 1C and/or Plant Science 2. Fundamentals of vegetable crop production, handling, processing, utilization and distribution.

105. Vegetable Biology, Evolution, and Systematics (4) I, II. Yoder Lecture—2 hours; laboratory—6 hours; field trip(s) and written and oral reports. Prerequisite: Biological Sciences 1C and Botany 108 recommended. Taxonomic and horticultural classification of the more important vegetable cultivated species, their origin, morphology, nomenclature, and description; wild vegetable species, minor and exotic vegetables, and trends in development of new cultivars. Offered in alternate years.

119. Seed Production, Technology, and Physiology (4) I, II. Bradford Lecture—2 hours; laboratory—3 hours. Prerequisite: Botany 112: Genetics 100 or Plant Science 131 recommended. Principles of crop seed production, storage, and utilization. Physiological, developmental, genetic, and environmental factors influencing seed quality. Biologic and technological aspects of crop establishment from seed. Laboratory sessions include field trips to seed industry facilities.

150. Vegetables in World Food Production Systems (4) I, II. Shennan Lecture—2 hours; discussion—1 hour. Prerequisite: Plant Science 2 or Biological Sciences 1C; course 101 recommended. World food production, evaluation of cropping systems and priorities for agricultural research. Examination of selected systems in tropical, subtropical, and temperate regions. Emphasis on genetic improvement of crops with emphasis on the importance of and current research goals for significant vegetable crops.

190. Topics in Plant Science Research (1-6) I, II. The Staff Discussion—1 hour. Prerequisite: undergraduate standing in the plant or biological sciences. Discussion and critique of current research by faculty, graduate students, and undergraduate students. May be repeated for credit. (PQP grading only.)

191. Undergraduate Research: Proposal (3) I. The Staff Lecture—1 hour; discussion—1 hour; independent study—3 hours. Prerequisite: upper division standing and consent of instructor. Faculty sponsor will individually assist each student to define a problem, conduct a literature survey, identify objectives, generate testable hypotheses, design experiments, plan data analysis, prepare a written outline, and write and revise a draft proposal. (PQP grading only.)

191L. Undergraduate Research: Experiment (1-5) I, II, III. The Staff Laboratory—3 to 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. (PQP grading only.)

192. Internship in Vegetable Crops (1-12) I, II, III. The Staff (Chairperson in charge) Internship—2-36 hours. Prerequisite: consent of instructor. Work experience off or on campus in all subject areas pertaining to vegetable crops. Internships supervised by a member of the faculty. Maximum of 12 units permitted in Vegetable Crops 192-192 series. (PQP grading only.)
num of 12 units permitted in the Vegetable Crops 92-192 series. (P/NP grading only)

194H. Senior Honors Thesis (1) I, II, III. The Staff
Independent study—3 hours. Prerequisite: course 191L and consent of chairperson. Preparation and submission of honors thesis and presentation of the results in a seminar. (P/NP grading only)

195. Field Study of Vegetable Industry (1) I. Jackson
Field Study. Prerequisite: consent of instructor; field study illustrating different aspects of California agriculture including research institutions, farm operations, field stations, Extension Service, marketing, processors, equipment, etc. To be given between winter and spring quarters. Considered a spring course for preenrollment. (P/NP grading only)

197T. Tutoring in Vegetable Crops (1-3) I, II, III. The Staff (Chairperson in charge)
Laboratory—3 to 9 hours. Prerequisite: consent of instructor. Voluntary tutoring for upper division students who desire teaching experience. Under supervision students may prepare laboratory materials, experiments, and autotutorial modules, conduct discussions and demonstrations, and be involved in testing. May be repeated up to a total of 6 units. (P/NP grading only)

198. Directed Group Study (1-5) I, II, III. The Staff
(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

212. Postharvest Physiology of Vegetables (4) III. Salvetat and Yang
Lecture—4 hours; laboratory—6 hours. Prerequisite: Botany 112 or Plant Science 112. Comparative physiology of harvested vegetables; emphasis on maturation, senescence, compositional changes, physiological disorders and effects of environmental factors. Laboratories stress concepts and research procedures. Offered in alternate years.

220. Biotechnology and Genetics of Crop Improvement (3). M. Michalmore
Lecture—3 hours. Prerequisite: Genetics 100, Plant Science 113; Genetics 102A, 102B recommended. Emphasizes the integration of modern biotechnology and classical plant breeding including: transposable elements, recombination mapping, gene identification, transformation, tissue culture, compatibility mechanisms, male sterility, gametophyte selection, disease and stress resistance.

220L. Biotechnology and Genetics of Crop Improvement Laboratory (1). M. Michalmore
Laboratory—3 hours. Prerequisite: course 220 concurrently. Several class projects in plant genetics and biotechnology: tomato genetics, isozyme segregation, Agrobacterium mediated plant transformation, self-incompatibility in Brassica species, mapping disease resistant genes.

221. Genetics and Cytogenetics of Vegetable Crops (3) III. Cruickshank
Lecture—3 hours. Prerequisite: Plant Science 113 or the equivalent. Genetics and cytogenetics of the principal vegetables on a crop by crop basis. Current advances on the cytogenetic technology, sources of genetic variation and applications to practical breeding problems.

221L. Genetics and Cytogenetics of Vegetable Crops Laboratory (2) III. Cruickshank
Laboratory—6 hours. Prerequisite: course 221 (may be taken concurrently). Genetic and cytogenetic techniques applicable to vegetables. Includes chromosomal squash preparations for pachytene analysis, segregation and linkage analysis of quantitative traits in hybrid cultivars, hybrid genecentromere mapping, and aneuploid segregations.

225. Transposable Elements in Higher Plants (3) III. Yoder
Lecture—1 1/2 hours; discussion—1 1/2 hours. Prerequisite: graduate standing or consent of instructor. Examines both the classical and molecular genetic information about plant transposable elements. Topics include the discovery, molecular structure, evolutionary significance and practical uses of these fascinating genetic entities. Offered in alternate years.

228. Plant Molecular Biology Laboratory (4) II. Bennett, Harker (Botany)
Lecture—1 hour; laboratory—10 hours. Prerequisite: Biochemistry 101L, a course in molecular genetics, and consent of instructors; Botany 227 recommend- ed. Research methods in plant molecular biology. Topics include analysis of gene expression, characterization of gene structure, and gene transfer technology. Emphasis will be placed on analysis of developmentally regulated gene expression. (Same course as Botany 226.)

230. Selected Methods in Vegetable Research (3) II. Bennett
Lecture—1 hour; laboratory—6 hours. Prerequisite: one course from Plant Science 102, Botany 111, 112, Biochemistry 101A-101B or 101L. Survey of the theory and practice of certain laboratory methods and techniques used in vegetable/plant research, with emphasis on determination of plant constituents, physiological functions, and cell/tissue culture. Offered in alternate years.

290. Seminar (1) I, II, III. The Staff
Discussion—1 hour. (SU grading only)

291. Special Topics in Vegetable Crops (2) I. The Staff (Chairperson in charge)
Lecture—1 hour; discussion—1 hour. Prerequisite: graduate standing. In-depth coverage of selected topics in vegetable crops and related disciplines. Topics and speakers determined by instructor in charge. Assignments include brief evaluation of a lecture, and pertinent narrative or grant proposal. May be repeated for credit. (SU grading only)

295. Group Study (1-5) I, II, III. The Staff (Chairperson in charge)
Prerequisite: consent of instructor.

299. Research (1-12) I, II, III. The Staff (Chairperson in charge) (SU grading only)

Professional Courses

300. Tutoring in Vegetable Crops (1-3) I, II, III. The Staff (Chairperson in charge)
Tutoring—3 to 9 hours. Prerequisite: consent of instructor. Voluntary tutoring for graduate students who desire teaching experience, but who are not teaching assistants. Students under supervision may give lectures, prepare laboratory materials, experiments, and autotutorial modules, conduct discussions and demonstrations, and be involved in testing. May be repeated for a total of 6 units. (SU grading only)

Professional Course

300T. Tutoring in Vegetable Crops (1-3) I, II, III. The Staff (Chairperson in charge)
Tutoring—3 to 9 hours. Prerequisite: consent of instructor. Voluntary tutoring for graduate students who desire teaching experience, but who are not teaching assistants. Students under supervision may give lectures, prepare laboratory materials, experiments, and autotutorial modules, conduct discussions and demonstrations, and be involved in testing. May be repeated for a total of 6 units. (SU grading only)

Veterinary Medicine, School of

Edward A. Rhodes, D.V.M., Dean of the School
George H. Cardinet III, D.V.M., Ph.D., Associate Dean—Instruction
Bennie L. Osburn, D.V.M., Ph.D., Associate Dean—Research
Donald G. Low, D.V.M., Ph.D., Associate Dean—Public Programs
Robert J. Hansen, Ph.D., Associate Dean—Student Services
William J. Winchester, D.V.M., Assistant Dean
School Office, 1018 Haring Hall (916-752-1360)

Courses in Veterinary Medicine

Lower Division Course

92. Internship in Veterinary Science (1-12) I, II, III, summer. Cardinet
Discussion-laboratory—1 1/4 hours; clinical experience—3 to 6 hours. Prerequisite: approval of project by faculty sponsor prior to period of internship. Students in this program will be under the supervision of faculty in the School of Veterinary Medicine whose expertise is appropriate for the proposed project. (P/NP grading only)

Upper Division Course

170. Ethics of Animal Use (3) III. Brooks, D.D.D., Practice
Lecture—3 hours. Prerequisite: one basic course in composition or speech. Applied ethical methodology, respectful of divergent views, for forming personal and professional ethics toward animals. Examination of current ethical codes, case histories and problem areas and pursuit of consensus policy to protect animal and related human values. General Education credit: Civilization and Culture/Non-Introductory, or Contemporary Societies/Non-Introductory, or Social Science/Non-Introductory.

192. Internship in Veterinary Science (1-12) I, II, III, IV. Cardinet
Discussion-laboratory and clinic—3 to 6 hours; final report. Prerequisite: upper division standing; approval of project prior to period of internship by preceptor. Supervised work experience in Veterinary Medicine. (P/NP grading only)

Professional Courses

400. Informatics (1-0) I. Cardinet
Discussion—2 hours; laboratory—3 to 6 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 microcomputers will be achieved through the "real time" use of microcomputers within the science laboratories of instruction. (SU grading only)

401. Microscopic and Gross Veterinary Anatomy (10.4) I, II, Hyde
Lecture—5 hours; laboratory—50 three-hour sessions. Prerequisite: first year standing in the School of Veterinary Medicine. Approved for graduate degree credit. Normal interrelationships of structure and function through an introduction to the fine structure of molecular, cellular, tissue, organ, and whole animal structure; principles of developmental biology and organogenesis, and comparative structures of animals and their organ systems. (Deferred grading only; pending completion of two-quarter sequence.)

402A. Systemic Physiology: Gastrointestinal and Cardiovascular Systems (2.9) I. Curry, Heusner
Lecture—22 hours; laboratory—7 three-hour sessions. Prerequisite: first year standing in the School of Veterinary Medicine. Approved for graduate degree credit. Basic principles of normal physiologic function in the vertebrate gastrointestinal and cardiovascular systems. These principles are essential for understanding of disorders of the gastrointestinal and cardiovascular systems.

402B. Systemic Physiology: Urinary System and Body Fluids (1.7) II. Bruss
Lecture—12 hours; laboratory—6 three-hour sessions. Prerequisite: first year standing in the School of Veterinary Medicine. Approved for graduate degree credit. Provides an understanding of the various functions of the kidney and the urinary system; body fluids and acid-base physiology and mammalian physiology.

402C. Systemic Physiology: Respiratory System (1.8) I. Jones
Lecture—12 hours; laboratory—6 three-hour sessions. Prerequisite: first year standing in the School of Veterinary Medicine. Approved for graduate degree credit. Provides a basic understanding of normal physiologic function of the vertebrate respiratory system.

403. Physiological Chemistry (6.6) I. Black
Lecture—57 hours; laboratory—9 three-hour 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.

404. Fundamentals of Radiography (2.7) II. Morgan
Lecture—23 hours; laboratory—4 three-hour sessions. Prerequisite: second-year standing in School
of Veterinary Medicine, ionizing radiation and its interaction with matter and biological systems; instrumentation and principles of diagnostic radiology, radionuclide and molecular imaging, and ultrasound. Provided toward the understanding of the biological and clinical applications of ionizing radiation, and the use of these in the diagnosis and treatment of disease. The student will be responsible for the safe and ethical practice of radiation therapy.

405. Veterinary Parasitology (3.6) III. Conrad. Boyce Lecture—26 hours; laboratory—10 three-hour sessions. Prerequisite: first year standing in the School of Veterinary Medicine. Approved for graduate degree credit. Provides an understanding of the important biological and clinical aspects of parasitic diseases and the disease they cause in animals.

405B. Clinical Veterinary Parasitology (2.3) III. Boyce and Conrad Lecture—20 one-hour sessions. Prerequisite: third year standing in the School of Veterinary Medicine. Provides an 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.

407B. Principles and Techniques of Surgery (2.1) I. Goggin Lecture—9 hours; laboratory—8 three-hour sessions; discussion—3 three-hour sessions. Prerequisite: third year standing in School of Veterinary Medicine. Conceptual framework, introduction to the veterinary student to technical aspects of surgical science. Specific operative procedures performed by the student provide an opportunity to learn fundamental skills of asepsis, instrument identification and manipulation, knot tying, hemostasis and tissue dissection.

407C. Surgical Anatomy (1.1) I. Stover Laboratory—10 three-hour sessions. Prerequisite: third year standing in School of Veterinary Medicine or consent of instructor. Survey of anatomy of anatomical systems as applied to selected surgical operations. Topographical features useful to approaching organs and structures are described. Tissues and structures basic to surgery emphasized.

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 or consent of instructor. Approved for graduate degree credit. Principles of nutrition and their application to the solution of nutritional disorders of animals.

409. Epidemiology (1.7) II. Gardner Lecture—11 hours; discussion—6 hours. Prerequisite: first year standing in the School of Veterinary Medicine. Approved for graduate degree credit. Introduction to epidemiology and its applications in veterinary medicine.

410. Veterinary Toxicology (2.6) III. Mount Lecture—26 hours. Prerequisite: third year standing in School of Veterinary Medicine. Approved for graduate degree credit. Diseases of animals produced by chemical poisons, organic and inorganic. The principles and techniques of monitoring and exposure of animals to them; the incidence, pathogenesis, diagnosis and treatment of diseases produced by poisons will be discussed.

411A. Laboratory Animal Medicine (2.1) 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, mice and rats. Selected laboratory rodents will be presented to serve the needs of clinical and research veterinarians. Lecture demonstrations with subject species will be provided.

411B. Laboratory Animal Medicine (2.1) II. Brooks Lecture—20 hours. Prerequisite: third year standing in School of Veterinary Medicine or consent of instructor. Prevention, diagnosis and therapy of medical problems in rabbits, guinea pigs, hamsters, mice, rats and other laboratory species. Emphasis will be placed on animal colony health management techniques, and concepts of preventive health care in various species.

413. Medical Primatology (2.3) II. Roberts Lecture—20 hours. Prerequisite: third year standing in School of Veterinary Medicine or consent of instructor. Major diseases, medical management and husbandry of captive nonhuman primates. (SU grading only)

414A. Principles of Veterinary Pharmacology and Toxicology (2.4) I. Joy Lecture—22 hours; laboratory—two 3-three-hour sessions. Prerequisite: second year standing in the School of Veterinary Medicine. Provides a broad survey of the pharmacology of drugs and drugs of veterinary importance. Focus on the principles of pharmacology and begins a consideration of drugs by pharmacological classes.

414B. Veterinary Pharmacology (1.8) II. Gill Lecture—17 hours; laboratory—one 3-hour session. Prerequisite: second year standing in the School of Veterinary Medicine. Presents discussion of the pharmacology of several classes of drugs which are of major importance in veterinary medicine.

414C. Veterinary Toxicology (2.1) III. Mount Lecture—21 hours. Prerequisite: second year standing in the School of Veterinary Medicine. General principles of poisons and xenobiotics, toxic agents, and genetic immunotoxicants. Course also discusses the biological effects of toxic substances of biological and industrial origins in animals.

415. Management and Disease of Captive Wildlife (2.3) III. Fowler Lecture—20 hours. Prerequisite: third year standing in School of Veterinary Medicine or consent of instructor. Lectures, demonstrations, and discussions used to illustrate selected medical problems of captive wild animals.

416. Aquatic Animal Medicine (2.3) II. Heyrick Lecture—20 hours. Prerequisite: third year standing in School of Veterinary Medicine or consent of instructor. Ecology, pathology, diagnosis, management and prevention of diseases of fish and some aquatic arthropods and mammals. Preventive management of diseases in aquaculture.

417. Cage Bird Medicine (2) II. Ramsay Lecture—20 hours. Prerequisite: third year veterinary medical student or consent of instructor. Approved for graduate degree credit. Medical and surgical problems of caged birds; handling and restraint, feeding, nutritional and infectious diseases, anesthesia and surgery, plus problems of organ systems.

418. Diseases of Free Living Wildlife (2.2) II. Fowler Discussion—20 hours. Prerequisite: third year standing in School of Veterinary Medicine or consent of instructor. Lectures and discussion of epidemiology of disease in free-living wild animals including medical management of free-living populations.

419. Virology (2.7) III. Zee, Yilma Lecture—19 hours; laboratory—3 three-hour sessions. Prerequisite: first year standing in the School of Veterinary Medicine. Approved for graduate degree credit. Introduction to the classification, morphology, and the strategy of replication and types of animal viruses, coverage on molecular pathogenesis of animal viruses at the cellular level with emphasis on agents of infectious diseases of animals.

420. Immunology (3.0) III. Gershwin Lecture—20 hours; laboratory—10 three-hour sessions. Prerequisite: first year standing in the School of Veterinary Medicine. Approved for graduate degree credit. Concepts of immunology. Emphasis is on the principles of immunization, responses to pathogens and host and the development of hypersensitivity and autoimmune reactions.

421. Principles of Neurosciences (2.7) II. Cummings Lecture—22 hours; laboratory—5 three-hour sessions. Prerequisite: first year standing in the School of Veterinary Medicine or consent of instructor. Approved for graduate degree credit. An integrated study of normal neurobiology, neuroanatomy, and neurophysiology, to enable students to engage in studies of neurologic disorders and clinical neurology.

422. Veterinary Ophthalmology (2.5) II. Bellhorn Lecture—21 hours; laboratory—4 three-hour sessions. Prerequisite: second year standing in School of Veterinary Medicine. Approved for graduate degree credit. Normal and pathological function of the eye and the response of the eye to disease. All species of domestic animals will be included. Discussion of selected ocular diseases of various species.

423. Small Animal Ophthalmology (2.3) II. Buyukciftci Lecture—20 hours. Prerequisite: third year standing in School of Veterinary Medicine or consent of instructor. Fundamentals of ocular pathology and management of commonly encountered eye diseases of small animals and non-domestic animals.

424. Current Topics in Veterinary Oncology (1.3) II. Maciariello Lecture—10 hours. Prerequisite: third year standing in School of Veterinary Medicine or consent of instructor. Approved for graduate degree credit. Fundamentals of oncology for veterinary students with objectives of clinical practice, research or academic careers. Topics will include epidemiology, diagnosis, and treatment of cancer in domestic animals.

425. Introduction to the Abnormal Musculoskeletal System (3.0) III. Poole 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, pathology and pathogenesis, basic responses of musculoskeletal tissues to major types of injuries and diseases.

426. Pulmonary Medicine (2.9) I. George Lecture—23 hours; laboratory—8 three-hour sessions. Prerequisite: third year standing in School of Veterinary Medicine or consent of instructor. Basic understanding of nature, causes, clinical expression, diagnosis and treatment of the important respiratory diseases of dogs, cats, horses, and food animals.

425C. Cardiovascular Medicine (2.6) I. Thomas Lecture—21 hours; laboratory—5 three-hour sessions. Prerequisite: third year standing in School of Veterinary Medicine or consent of instructor. Principles of cardiovascular medicine (pathophysiology, diagnosis, and treatment) in animals.

425D. Urinary System, Abnormal (2.5) II. Cowgill Lecture—20 hours; laboratory—5 three-hour sessions. Prerequisite: third year standing in School of Veterinary Medicine or consent of instructor. Abnormal function of urinary system and diseases affecting this system in animals. Manifestations, pathogenesis, pathophysiology, diagnosis and medical and surgical treatment of urinary system discussed.

426. Principles of Veterinary Anesthesiology and Critical Patient Care (1.7) II. Stetey Lecture—15 hours; laboratory—2 three-hour sessions. Prerequisite: second year standing in the School of Veterinary Medicine. Offers basic principles of veterinary anesthesia including technical monitoring and management of animals under anesthesia.

427. Equine Internal Medicine (3.2) III. Madigan Lecture—30 hours. Prerequisite: third year standing in School of Veterinary Medicine or consent of instructor. Advanced equine medical diseases including sections on general medicine, respiratory and gastrointestinal diseases, cardiology, dermatology, neurology, oncology, and ophthalmology.

428. Food Animal Surgery (1.6) II. Smith Lecture—16 hours; laboratory—5 three-hour sessions. Prerequisite: third year standing in School of Veterinary Medicine. Selected topics in surgical diseases of food animals covered in detail. (SU grading only)

428L. Food Animal Surgery Laboratory (0.7) III. Smith Laboratory—7 three-hour sessions. Prerequisite: third year standing in School of Veterinary Medicine; course 428E (concurrently). Representative surgeries
of food animals performed by groups of students. Limited enrollment. (SU grading only.)

429A. Herd Health Management of Beef, Cattle, Swine, Sheep, and Goats (3) I. Kirby Lecture—40 hours. Prerequisite: third-year standing in School of Veterinary Medicine or consent of instructor. Practical systems for delivering veterinary service to feedlots, swine, and goat production units are considered, with emphasis on prevention and control of disease.

429B. Dairy Herd Health Management (4) III. Weaver Lecture—40 hours. Prerequisite: third-year standing in School of Veterinary Medicine or consent of instructor. Approved for graduate degree credit. Practical systems for delivering veterinary services to dairy farms with disease prevention and production control. Lectures supplemented with visits to dairy farms to evaluate feeding programs and health management.

430. Principles of Radiology and Radiographic Anatomy (3.0) I-LIII. Koblik Lecture—26 hours; laboratory—4 three-hour sessions. Prerequisite: first-year standing in the School of Veterinary Medicine. Approved for graduate degree credit. Radiographic views of major bone and soft tissue structures are presented. The interrelationships of bone, muscle, cartilage, and other tissue types are emphasized. Development of the musculoskeletal system is covered with emphasis on fetal development.

431. Endocrinology and Metabolism (2.0) II. Cury Lecture—20 hours. Prerequisite: first-year standing in the School of Veterinary Medicine. Approved for graduate degree credit. Provides a basic understanding of the functions of the endocrine glands and their hormones. Emphasis is placed on the regulation of metabolic processes.

433. Veterinary Oncology (1) III. Thallan, Madewell Lecture—10 hours. Prerequisite: second-year standing in the School of Veterinary Medicine. Approved for graduate degree credit. Provides a basic understanding of principles of the normal physiological function of the oncology glands, their hormones, and other factors that affect the regulation of metabolic processes.

439. Infectious Diseases (4.5) I. Pederen Lecture—40 hours. Prerequisite: third-year standing in School of Veterinary Medicine. Overview of select infectious diseases of companion and food animals.

445. Clinical Hematology and Biochemistry (6.5) I. Zhang Lecture—40 hours; discussion—8 hours; laboratory—18 three-hour sessions. Prerequisite: second-year standing in the School of Veterinary Medicine. Approved for graduate degree credit. Knowledge and understanding of normal form and function of the hemolymphatic, excretory, and endocrine systems and their control and regulation is emphasized.

446. Public Health and Food Safety (2) III. Genegaoh Lecture—20 hours. Prerequisite: third-year standing in School of Veterinary Medicine or consent of instructor. Approved for graduate degree credit. Introduction to preventive aspects of veterinary medicine as they relate to zoonoses, environmental hygiene and the safety of foods of animal origin.

447A. Issues in Veterinary Medicine: Ethics, Animal Use, Professional Standards, and Communication (0.8) I. Brooks Discussion—8 hours. Prerequisite: first-year standing in the School of Veterinary Medicine. Approved for graduate degree credit. Introduction to the important responsibilities of veterinarians to society through their role as health care providers.

448. Introduction to Methods of Animal Handling, Restraint, Examination, and Therapy (1) 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 breed characteristics and purpose in animal species of veterinary importance. (SU grading only.)

449. Beef Cattle Nutrition (2) I. Hjelte Lecture—7 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 providing nutritional and ration-associated diseases of beef cattle.

450. Veterinary Neurology (2.7) III. Holley Lecture—21 hours; laboratory—6 three-hour sessions. Prerequisite: second-year standing in the School of Veterinary Medicine. Approved for graduate degree credit. Integrated study of the relationship between neuroanatomy, neurophysiology, neuropathology, and the clinical manifestations of the diagnosis of neurological diseases and the use of the various neurodiagnostic aids.

453. Behavior Clinic (2) I-II, III, IV. Hart Laboratory—9 hours; discussion—2 hours. Prerequisite: second-year standing in School of Veterinary Medicine and consent of 452B. Clinical training in behavioral therapy. Students work with clients and animal patients through the Behavioral Services Outpatient Clinic. Case record work-ups with selected presentation of cases during discussion sessions.

455. Small Animal Theriogenology (2.2) III. Feldman Lecture—12 hours. Prerequisite: third-year standing in School of Veterinary Medicine or consent of instructor. Conditions affecting the reproductive system in the dog and cat, with emphasis on symptomatology, pathology, and treatment. Stressing the development of diagnostic and therapeutic approaches to the clinical patient.

456. Food Animal Theriogenology (3) III. BonDurant Lecture—20 hours; laboratory—10 three-hour sessions. Prerequisite: third-year standing in School of Veterinary Medicine. Conditions affecting the reproductive system in the cow, sow, ewe, and goat, with emphasis on symptomatology, pathophysiology, treatment, control, prevention, and herd health applications.

458. Equine Theriogenology (3) III. Hughes 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.

459. Veterinary Bacteriology and Mycology (4.9) I. Hirsh Lecture—34 hours; laboratory—15 three-hour sessions. Prerequisite: second-year standing in 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 each disease. Emphasis placed on structural and functional aspects including morphology, growth, reproduction, and products of medical interest.

462. General Pathology (2.1) I. Moore Lecture—18 hours; laboratory—13 three-hour sessions. Prerequisite: second-year standing in the School of Veterinary Medicine. Approved for graduate degree credit. Basic principles of disease and in particular the fundamental mechanisms responsible for disease production. Emphasis on how the application of general pathological principles is used to determine disease pathogenesis and prognosis.

464. Clinical Immunology (2) I. Pedersen Lecture—14 hours; laboratory—6 three-hour sessions. Prerequisite: third-year standing in School of Veterinary Medicine or consent of instructor. Approved for graduate degree credit. Immune-mediated diseases of domestic animals with emphasis on mechanism of disease production, diagnosis, and therapy. Relevant diagnostic tests, their interpretation, and sampling techniques.

465. Integumentary System (4.9) I-II. Stannard Lecture—45 hours. Prerequisite: third-year standing in School of Veterinary Medicine or consent of instructor. Approved for graduate degree credit. Course covers structure, function, pathologic and clinical aspects including therapeutics of the integumentary system and diseases of the integumentary system of animals. (Deferred grading only, pending completion of two-semester course.)

466. Jurisprudence and Law for the Veterinarian (2) II. Wilson Lecture—10 two-hour sessions. Prerequisite: third-year standing in School of Veterinary Medicine. Introduction to principles of veterinary medical jurisprudence and legal concepts pertinent to professional activities. (SU grading only.)

467. Veterinary Business Management (2) I. Wilson Lecture—10 two-hour sessions. Prerequisite: third- or fourth-year standing in School of Veterinary Medicine or consent of instructor. Course presents a broad-base of information which is essential to the successful management of a veterinary practice. Topics to be covered include basic accounting, medical recordkeeping, money management, business and personal insurance, client relations and tax law. (SU grading only.)

468. Behavioral Therapy (3) III-IV. Thall Lecture—1 hour. Prerequisite: first-year standing in the School of Veterinary Medicine or consent of instructor. Clinical application of management, conditioning procedures, hormonal manipulation and drug therapy to resolve common behavioral problems of dogs and cats.

469. Systemic Pathology (4.9) II. Dungworth Lecture—32 hours; laboratory—17 three-hour sessions. Prerequisite: second-year standing in the School of Veterinary Medicine. Approved for graduate degree credit. Students will be introduced to the pathobiology of major organ systems relevant to a variety of animal species. Emphasis will be placed on mechanisms of injury, patterns of response to injury and on balance between damage and repair.

470. Emergency and Critical Care (2) III. Haskins Lecture—20 hours. Prerequisite: third-year standing
in School of Veterinary Medicine. Introduction to the essential and practical concepts of care for emergency and critically ill patients.

461. Small Animal Orthopedics (1.7). W. Wind Lecture—14 hours; laboratory—3 three-hour sessions. Prerequisite: third-year standing in School of Veterinary Medicine. Approved for graduate degree credit. Surgical approaches to joints of the shoulder, hip, elbow, cranial aspect of the humerus, stifle, radius, ulna, pelvis, femur, tibia, and meta carpa/tarsals.

462. Radiographic Diagnosis: Small Animal (2.5). N. Nylan Lecture—16 hours; discussion—8 two-hour and 1 one-hour sessions. Prerequisite: third-year standing in School of Veterinary Medicine. Diagnostic radiography of small animals for the student electing small animal and mixed tracks. Non-ionizing radiation and special procedures will be discussed as they relate to the thorax, abdomen, and musculoskeletal system.

463. Soft Tissue Surgical Diseases of Small Animals (1.5). J. Gregor. Lecture—10 hours. Prerequisite: third-year standing in School of Veterinary Medicine. Approved for graduate degree credit. Pathophysiological and surgical treatment of selected soft tissue disease processes in small animals.

466. Mixed-Large Animal Anesthesiology (1.5). H. Hildebrand Lecture—15 hours. Prerequisite: third-year standing in School of Veterinary Medicine or consent of instructor. Approved for graduate degree credit. Applied clinical anesthesiology for young veterinary students. Special techniques and considerations for anesthetizing a variety of species including horses, swine, ruminants, large non-domestic species, cats and dogs. (SU grading only.)

467. Small Animal Anesthesiology (1.5). J. Hildow Lecture—15 hours. Prerequisite: third-year standing in School of Veterinary Medicine or consent of instructor. Approved for graduate degree credit. Presentation of material which is basic to safe clinical administration of anesthetic drugs to small animals. Clinical applications, indications and contraindications, and methods of use of commonly used anesthetic drugs and techniques will be discussed.

468L. Equine Lameness and Radiology (4). M. Meagher, O. O'Brien, P. Pool. Laboratory—40 hours. Prerequisite: third-year standing in School of Veterinary Medicine, Principles in the radiologic diagnosis of conditions that cause lameness. The equine will be used as the model. Clinical applications, indications and contraindications, and methods of use of common anesthetic agents and techniques will be discussed. (SU grading only)

469. Equine Surgery (2). I. Pascoe. Lecture—20 hours. Prerequisite: third-year standing in School of Veterinary Medicine or consent of instructor. Designed to allow third-year veterinary student additional hands-on experience and surgical techniques in the horse.

469L. Equine Surgery Laboratory (1). I. Pascoe. Laboratory—10 three-hour sessions. Prerequisite: course 469 (concurrently). Priority enrollment for students in equine track; others with consent of instructor. Limited enrollment.

470. Food Animal Practice Clinics (2.5-2.5). I—III. The Staff (Director Veterinary Medicine Teaching Hospital) Lecture—40 hours. Veterinary clinical practices—40 hours. Prerequisite: third-year standing in School of Veterinary Medicine. Approved for graduate degree credit. Assignments in medical and surgical services and clinical diagnostic laboratories of the 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—III and I sequence. (SU grading only, pending completion of three-quarter sequence.)

470A. Companion Animal Practice Clinics (2.5-1.5) I—III. The Staff (Director Veterinary Medicine Teaching Hospital) Lecture—40 hours. Veterinary clinical practices—40 hours. Prerequisite: fourth-year standing in School of Veterinary Medicine or consent of instructor. Clinical training in veterinary medicine or consent of instructor. Clinical training in veterinary medicine or consent of instructor. Assignments in medical and surgical services and clinical diagnostic laboratories of the VM Teaching Hospital with emphasis on those services relating to veterinary practice. May be repeated for credit. May be repeated for credit. Students in combined DVM/MPVM program enroll for the Summer Sessions I—III and I sequence. (SU grading only, pending completion of three-quarter sequence.)

478. Small Animal/Food Animal Practice Clinic (2.5-1.5). I—III. Summer. H. Hjerpe Veterinary clinical practices—7.5—5.5 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—III and I sequence. (SU grading only.) (Deferred grading, pending completion of sequence.)

480A-480B. Clinic Rounds for Freshmen (0.4-0.4) I—III. The Staff (Director Veterinary Medicine Teaching Hospital) Discussion—eight 1 1/2 hour sessions per year. Prerequisite: first-year standing in School of Veterinary Medicine. Approved for graduate degree credit. Discussion of selected cases from VM Teaching Hospital. (SU grading only, pending completion of one-fourth sequence.)

481A-481B-481C. Second-year Clinic Rounds (1.2) I—III. The Staff (Director Veterinary Medicine Teaching Hospital) Discussion—twelve 1 1/2 hour sessions. Prerequisite: second-year standing in School of Veterinary Medicine. Discussion of selected cases from the clinic. (SU grading only, pending completion of three-quarter sequence.)

483. Pet Loss Support Rounds (1-2) I, II, III, IV. Lecture—4 hours. Prerequisite: veterinary student status. Training and experience in responding to pet loss hotline callers who are experiencing grief associated with an animal's death. Training in dealing with phone calls and referral to community resources and increased effectiveness in dealing with upset pet owners. (SU grading only.)

485. Introduction to Clinical Veterinary Medicine (1). Low Lecture—1 hour. Prerequisite: first year standing in the School of Veterinary Medicine. An introduction to clinical veterinary medicine, and to an understanding of the relationship between basic sciences and clinical veterinary medicine. (SU grading only.)

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**Veterinary Microbiology and Immunology**

(School of Veterinary Medicine)

Laurel J. Gershwin, Chairperson of the Department
Department Office, 2075 Haring Hall 916-752-1400

Faculty

Alexander A. Ardans, D.V.M., M.S., Professor

(Medicine)

Norman F. Baker, D.V.M., Ph.D., Professor, Emeritus

Eugene C. Donaldson, D.V.M., Ph.D., Professor

Walter M. Boyce, D.V.M., Ph.D., Associate Professor

*Course not offered this academic year.*
Courses in Veterinary Microbiology and Immunology

Upper Division Courses
126. Fundamentals of Immunology (3) I. Ferrick, Gerashin, Scott
Lecture—3 hours alternate weeks with lecture—2 hours and discussion—1 hour. Prerequisite: Biochemistry 101A or the equivalent. Immune response and defense against infection: antibodies, antigens, antibody-antigen interactions, regulation and manipulation of the immune response, hypersensitivity mechanisms and their relationships to disease processes. Clinical applications of immune phenomena emphasized.

126L. Immunology Laboratory (2) I. Ferrick Laboratory—6 hours. Prerequisite: course 126. Laboratory procedures in immunology. The immune response, antigens, antigen-antibody interactions, hypersensitivity mechanisms.

127. Medical Bacteria and Fungi (5) III. LeFebvre Lecture—3 hours; laboratory—6 hours. Prerequisite: general microbiology. Basic Immunology. An introduction to the bacterial and mycotic pathogens of man and animals, with emphasis on pathogenic mechanisms and ecologic aspects of infectious disease. Limited enrollment.


132. Introduction to Parasitology (5) III. Conrad Lecture—3 hours; laboratory—6 hours. Prerequisite: Biological Sciences 1B. The nomenclature of human and animal parasites, their general morphology, life cycles, epidemiology, diagnostic techniques, and host-parasite relationships. Individual laboratory studies supplemented with demonstrations.

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

199. Special Study for Advanced Undergraduates (1-5) I, II, III. The Staff (Gerashin in charge) (P/NP grading only.)

Graduate Courses

228. Molecular Biology of Animal Virus (3) II. The Staff Lecture—3 hours. Prerequisite: course 128 or Microbiology 162 or the equivalent. Current status of molecular biology of the major groups of animal viruses. Topics of major emphasis include: virus genome structure, strategy of genome replication and transcription, and regulation of genome expression.

270. Advanced Immunology (3) II. Scott Lecture—3 hours. Prerequisite: course 126 or Veterinary Medicine 450 or consent of Instructor. Immunoglobin structure and function, antigenic determinants, complement. Biology of lymphocytes, cell-mediated immune reactions, immunogenetics, hypersensitivity. Pathogenetic mechanisms in immunological diseases, immunological unresponsiveness, cancer Immunology. Dynamics of infection and resistance. Methods in immunohemistry and immunobiology. Offered in alternate years.

229. Seminar in Immunology (1) I, II, III. Gerashin Seminar—1 hour. A discussion of the current topics in immunology. (SU grading only.)

229. Seminar in Animal Virology (1) I, II, III. Yama, Zee Seminar—1 hour. A discussion of the current topics in animal virology. (SU grading only.)

229. Seminar in Infectious Diseases (1) I, II, III. Hirsch Seminar—1 hour. Discussion of current topics and cases of infectious diseases. (SU grading only.)

294. Seminar in Parasitology (1) III. Bocock, Conrad Seminar—1 hour. Discussion of current topics in veterinary parasitology and entomology.

296. Microbiological Diagnosis (2-5) I, II, III. Gerashin, Hirsch Discussion—1 hour; laboratory—5-14 hours. Prerequisite: laboratory course in veterinary medical microbiology or the equivalent; course 293 (concurrently); consent of Chief of Microbiology, VM Teaching Hospital. Lab 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 (Gerashin in charge)

299. Research (1-12) I, II, III. The Staff (SU grading only.)
3. Introduction to Wine Making (3) I. Noble; II. Meredith; III. ——
Lecture—3 hours. This broad overview of wines introduces students to the various steps and processes involved in the production of alcoholic beverages. Topics include vine varieties, winemaking techniques, and the influence of geography and climate on wine quality.

99. Special Study for Undergraduates (1-5) I, II, III. The Staff (Chairperson in charge) (P/NP grading only)

Upper Division Courses

101A. Viticultural Practices (2) I. Walker Discussion-laboratory—3 hours. Prerequisite: course 1. This course focuses on the practical aspects of viticulture, including vineyard management, irrigation, and pest control.

101B. Viticultural Practices (2) I. Kiewer Discussion—4 hours. Prerequisite: course 2. Field-oriented experience in the principles and practices of vineyard management, including pruning, planting, and irrigation.

101C. Viticultural Practices (2) III. Walker Discussion-laboratory—3 hours. Prerequisite: course 2. Field-oriented experience in the principles and practices of vineyard management, including pruning, planting, and irrigation.

110. Grapevine Growth and Physiology (3) III. Matthews Lecture—3 hours. Prerequisite: course 3. Botanical aspects of grapevine growth and development, including flowering, fruit set, and yield.

115. Raisin and Table Grape Production (2) I. Williams Lecture—2 hours. Prerequisite: course 2. This course is an overview of the raisin and table grape industries in California and other major producing regions worldwide.

125. Wine Types and Sensory Evaluation (3) II. Noble Lecture—2 hours; laboratory—3 hours. Prerequisite: course 124, Agricultural Science and Management 150, and consent of instructor. Open to upper division students in Conservation Science and Plant Science, and graduate students in Agricultural and Environmental Chemistry, Food Science, Horticulture, and Microbiology. Principles and practices of evaluating different types of wines, with special emphasis on the grape varieties used and the methods of wine production for each.

126. Wine Processing (4) II. Boulton Lecture—2 hours; laboratory—1 hour. Prerequisite: course 124, Agricultural Science and Management 150. A study of the principles of wine processing, including fermentation, clarification, and stabilization.

135. Distilled Beverage Technology (3) III. Lecture—3 hours. Prerequisite: Chemistry 6B; Food Science and Technology 110A. Distillation principles and practices; production technology of brandy, whiskey, rum, vodka, and other distilled beverages; characteristics of raw materials, fermentation, distillation, and aging.

145. Critical Evaluation of Wines of the World (1) III. Noble, Adams, Meredith Laboratory—2 hours. Prerequisite: course 125. An analysis of various wines from different regions, evaluating their quality and characteristics.

Courses in Viticulture and Enology

Lower Division Courses

2. Introduction to Viticulture (2) II. Wills Lecture—2 hours. Fundamentals of viticulture and enology. This course covers the basic principles of grapevine cultivation, including vine variety selection, soil management, and viticultural practices.

7. Winery Operations (3) I. Kiewer Lecture—3 hours. This course provides an overview of the operations of a winery, including winemaking processes, quality control, and business management.

14. Sensory Evaluation of Wines (3) II. Ough Lecture—2 hours. This course focuses on the principles of sensory evaluation, including the use of sensory panels and the development of sensory profiles for different types of wines.

15. Wine Chemistry (3) I. Kiewer Lecture—3 hours. This course covers the chemical aspects of wine, including the composition of wine, the role of chemical compounds in wine quality, and the impact of chemical processes on wine aging.

16. Wine Production (3) I. Boulton Lecture—2 hours; laboratory—4 hours. Prerequisite: course 1. This course provides a comprehensive overview of wine production, including vineyard management, winemaking processes, and wine evaluation.

18. Wine Law and Policy (3) III. Matthews Lecture—3 hours. This course covers the legal and policy aspects of the wine industry, including regulations, taxation, and marketing.

19. Wine Marketing (3) III. Matthews Lecture—3 hours. This course focuses on the principles of wine marketing, including market research, pricing strategies, and sales and distribution strategies.

20. Wine and Society (3) III. Matthews Lecture—3 hours. This course explores the cultural and social significance of wine in different societies, including historical and contemporary perspectives.

21. Wine and Food Pairing (3) III. Matthews Lecture—3 hours. This course covers the principles of wine and food pairing, including the selection of wines to complement different types of food.

22. Wine and the Environment (3) III. Matthews Lecture—3 hours. This course examines the environmental impact of the wine industry, including sustainability practices and the role of environmental policies.

23. Wine and Public Policy (3) III. Matthews Lecture—3 hours. This course explores the role of policy in the wine industry, including environmental regulations, trade policies, and economic incentives.

24. Wine and the Law (3) III. Matthews Lecture—3 hours. This course covers the legal aspects of the wine industry, including regulations, taxation, and marketing.

25. Wine and Society (3) III. Matthews Lecture—3 hours. This course explores the cultural and social significance of wine in different societies, including historical and contemporary perspectives.

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32. Wine and the Law (3) III. Matthews Lecture—3 hours. This course covers the legal aspects of the wine industry, including regulations, taxation, and marketing.

33. Wine and Society (3) III. Matthews Lecture—3 hours. This course explores the cultural and social significance of wine in different societies, including historical and contemporary perspectives.

34. Wine and the Environment (3) III. Matthews Lecture—3 hours. This course examines the environmental impact of the wine industry, including sustainability practices and the role of environmental policies.

35. Wine and Public Policy (3) III. Matthews Lecture—3 hours. This course explores the role of policy in the wine industry, including environmental regulations, trade policies, and economic incentives.

36. Wine and the Law (3) III. Matthews Lecture—3 hours. This course covers the legal aspects of the wine industry, including regulations, taxation, and marketing.
War-Peace Studies

The Undergraduate Academic Internship Program

Undergraduate Academic Internship Program

The UC Davis Washington Center undergraduate program is open to students from all majors in the College of Letters and Science, Agricultural and Environmental Sciences, and Engineering who have completed 84 units toward 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 are evaluated based on a written statement, letters of recommendation and personal interviews.

The undergraduate program runs fall and spring quarters, on a 12-15 week "extended quarter" basis. It has three principal components:

- Internships/Research Projects (6-8 units): Students work three to four days per week as interns in Congress, federal agencies, interest groups, trade associations, research institutions, the media, museums or in other organizations related to policy, politics, science and culture and geared to the interests and objectives of individual students. Drawing on the internship experience, each student will develop a research project, under the supervision of a member of the faculty.

- Policy-Process Seminar (3-4 units): This seminar focuses on a particular area of policy (e.g., foreign policy, economic policy, agricultural policy) and the key issues, the politics, the principal institutions, and the dynamics of the processes within that policy area. In addition to regular instruction, seminars are likely to include guest speakers, observations of congressional committees and federal agencies, and other relevant Washington experiences.

- Topical Interest Seminar (3-4 units): This course is of more general interest, designed to draw on some of the unique historical, scientific, cultural and artistic resources of Washington.

Course 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 also are offered directly by the Washington Center.

Students live in university-arranged housing, convenient to public transportation. Arrangements also are made to cover health services and other aspects of student life. The Washington Center also has two positions for graduate students as Graduate Fellows (combination of a predoctoral research fellowship and a teaching assistantship). More information is available from the Washington Center or the Graduate Division.

UC Davis Washington Center

Prof. Bruce W. Jentleson, Director
UC Davis Washington Center, 1300 19th Street, NW, #300, Washington, D.C. 20038 (202-296-8221)

Information:
UC Davis Washington Center Internship and Career Center
2nd Floor, South Hall, 916-752-2760

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 and a research program for faculty and graduate students.

Water Science

Water Science (College of Agricultural and Environmental Sciences)

Faculty. See under the Departments of Land, Air and Water Resources; Agricultural Engineering; Civil Engineering; Geology; and Geography.

Related Major Program. See the major in Soil and Water Science.

Graduate Study. A program of study is offered leading to the M.S. degree in Water Science. Detailed information can be obtained from the graduate advisor. Also see the Graduate Division section in this catalog.

Graduate Advisor. G.E. Fogg (Land, Air and Water Resources).
Courses in Water Science

122. Biology of Running Waters (3) I. Knight
Lecture—2 hours; discussion—1 hour. Prerequisite: Ecology 101 or Water Science 101. This course focuses on the biology of running waters, including the interaction between aquatic organisms and their physical environment.

124. Hydraulics (3) I. Parlane
Lecture—2 hours; laboratory—3 hours. Prerequisites: Mathematics 101 and Water Science 101. This course covers the principles of hydraulics as they apply to the design and operation of water control structures.

125. Irrigation and Drainage Systems (3) I. Wallender, Grismer, Hill
Lecture—2 hours; laboratory—3 hours. Prerequisite: Mathematics 101. This course introduces the principles of irrigation and drainage systems, including design and operation techniques.

126. Water Quality, Salt Control and Reclamation (4) Biggs
Lecture—3 hours; laboratory—3 hours. Prerequisites: Mathematics 101 and Water Science 101. This course examines the methods and technologies used for water quality improvement and salt reclamation.

129. Groundwater Hydrology (3) I. Fogg
Lecture—2 hours; laboratory—3 hours. Prerequisites: Mathematics 101 and Water Science 101. This course covers the principles of groundwater hydrology, including aquifer characterization and flow processes.

130. Water Law and Water Institutions (3) I. Hall
Lecture—2 hours; discussion—1 hour. Prerequisites: Mathematics 101 and Water Science 101. This course explores the legal and institutional frameworks governing water resources.

131. Advanced Topics in Water and Soil Chemistry (3) II. Biswas
Lecture—2 hours; laboratory—3 hours. Prerequisite: course 101 and Statistics 101. This course covers advanced topics in water chemistry and soil science, including applications to environmental science.

132. Hydrochemical Models (3) I. Taru
Lecture—2 hours; laboratory—3 hours. Prerequisite: physical chemistry and computer programming. This course focuses on the development and application of hydrochemical models for water systems.

172. Farm Irrigation Management (3) III. Hopmans
Lecture—2 hours; one field trip. Prerequisite: course 101 or consent of instructor. This course focuses on the management of water use in agricultural irrigation systems.

180. Chemistry of the Hydrosphere (3) I. Tanj
Lecture—2 hours; laboratory—3 hours. Prerequisite: Chemistry 101. This course covers the chemistry of water and its role in the hydrosphere, including water chemistry and aquatic ecosystems.

192. Special Study for Advanced Undergraduates (1-3) I. III. The Staff
Prerequisite: senior standing. (P/N grading only)

Graduate Courses

200. Modelling of Soil-Water-Plant Continuum (3) III. Hopmans
Lecture—2 hours; discussion—1 hour. Prerequisites: Mathematics 101, Soil Science 101, and Water Science 101. This course covers the theoretical and mathematical modeling of soil-water-plant systems.

201. Advanced Plant-Water Relations (3) I. Hall
Lecture—2 hours; discussion—1 hour. Prerequisite: course 101 or Plant Science 101. This course explores the physiological and molecular mechanisms of plant-water relations.

202. Evapotranspiration (3) III. Parlane
Lecture—2 hours; discussion—1 hour. Prerequisite: Atmospheric Science 101. This course covers the processes of evapotranspiration and their role in the water cycle.

206. Water Resource Systems Analysis (3) I. Mamo
Lecture—2 hours; discussion—1 hour. Prerequisite: course 141 and Statistics 101. This course focuses on the analysis and design of water resource systems.

215. Advanced Topics in Water and Soil Chemistry (3) II. Biswas
Lecture—2 hours; laboratory—3 hours. Prerequisite: course in physical chemistry and soil chemistry or consent of instructor. This course covers advanced topics in water chemistry and soil science, including applications to environmental science.

*Course not offered this academic year.
Graduate Adviser. G. E. Fogg (Land, Air and Water Resources), 225 Veihmeyer Hall (916-752-6810).

Wildlife and Fisheries Biology
(College of Agricultural and Environmental Sciences)
Daniel W. Anderson, Ph.D., Chairperson of the Department
Department Office, 66 Briggs Hall (916-752-8656)

Faculty
Daniel W. Anderson, Ph.D., Professor
Louis W. Bradford, Ph.D., Associate Professor
Timothy M. Caio, Ph.D., Assistant Professor
Joseph J. Coeh, Jr., Ph.D., Professor
Ronald E. Cole, B.S., Lecturer
Chris Drees, Ph.D., Lecturer
Walter E. Howard, Ph.D., Professor Emeritus
Nadine K. Jacobsen, Ph.D., Associate Professor
Dave L. Lott, Ph.D., Professor
Eric E. Marsh, B.S., Lecturer
Peter B. Moyle, Ph.D., Associate Professor
Dennis G. Raveling, Ph.D., Professor
Robert G. Schwab, Ph.D., Professor Emeritus
Dirk Van Vuren, Ph.D., Assistant Professor

The Major Program
The wildlife and fisheries 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 wildlife or fisheries. The major is designed primarily for students interested in eventually becoming professionals in wildlife and fisheries 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, the American Fish Society, or the Ecological Society of America or preparation for specialized resource-related graduate studies may also be achieved by careful planning of electives with a faculty adviser.

Career Alternatives. Positions now held by graduates in this major include wildlife, fisheries, animal control, 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, sportman's clubs, aquaculture operations, and environmental consulting firms. Also, some are veterinarians, medical physicians, and professors/researchers who teach and conduct research in academic institutions.

B.S. Major Requirements:

| English Composition Requirement ................................................. 0.4 |
| See College requirement |

| Preparatory Subject Matter ....................................................... 56-59 |
| Biological sciences (Biological Sciences 1A, 1B, 1C) ......................... 15 |
| Chemistry (Chemical Engineering 1E, 1F) ........................................ 6 |
| Computer science (Computer Science Engineering 1C or Engineering 5) ..... 5 |
| Mathematics (Mathematics 16A, 16B, 16C) .................................... 8 |
| Physics (Physics 5A, 5B, 5C) ...................................................... 12 |

| Statistics (Statistics 13 or Agricultural Science and Management 150) .......... 4 |

Breadth/General Education ......................................................... 6-24
Satisfaction of General Education requirement ................................ 6-24

Depth Subject Matter ...................................................................... 62-72
Chemistry (Physiological Sciences 101A-101B or Biochemistry and Biophysics 101A-101B) ......................................................... 6-7
Ecology (Environmental Studies 100 or Zoology 126) .......................... 3-4
Evolution (Zoology 100 or Genetics 103) ........................................... 3-4
Genetics (Genetics 100) .................................................................... 4
Physiology (Physiology 110) ............................................................... 5
Vertebrate anatomy (Zoology 100 or Anatomy 100) ............................. 4
Wildlife and fisheries (Wildlife and Fisheries Biology 122, 130, 140) ........... 12

Choose one option from the following two:
Option I: Wildlife Biology specialization
Botany (Botany 102 or 108, Botany 117) .............................................. 9
Statistics (Statistics 104, 106, 108, or 110) ......................................... 3-4
Wildlife biology (Wildlife and Fisheries Biology 100, 110, 111, 115L) ........ 13

Option II: Fisheries Biology specialization
Aquatic entomology/invertebrate zoology (Entomology 115 or Zoology 112A with adviser's approval) .................................................. 3-5
Fisheries biology (Wildlife and Fisheries Biology 102, 120, 120L, 121) .... 14
Limnology/oceanography/stream biology (Environmental Studies 116 or 150C or 151 or Water Science 122) ........................................... 3-4
Statistics (Statistics 104, 106, 108 or 110) .......................................... 6-9

Unrestricted Electives ................................................................. 17-48
Total Units for the Degree ............................................................ 180

Major Adviser. Contact Department office (66 Briggs).

Graduate Study. See the Graduate Division section in this catalog.

Related Courses. A selection of courses may depend on each student's special interests. A set of related courses is available from advisers.

Courses in Wildlife and Fisheries Biology

Lower Division Courses
10. Wildlife Ecology and Conservation (4) L The Staff
52. Internship (1-5) L, II, III. The Staff (Department Chairperson in charge)
Internship—3-18 hours. Prerequisite: lower division standing and consent of instructor. Work experience off and on campus in subject area office in the department. Internships supervised by a member of the faculty. (P/NP grading only)

Upper Division Courses
100. Field Methods in Wildlife Biology (3) III. The Staff
Lecture—10 hours total; laboratory—40 hours total (5 days). Prerequisite: course 110 or 111-112; Zoology 125 or the equivalent; consent of instructor. Intensive course on methods of studying and reporting data obtained from free-ranging wildlife. Held between winter and spring quarters; considered a spring course for preenrollment. Limited enrollment. (P/NP grading only)

102. Field Studies in Fisheries Biology (6) Extra-session, summer. Moyle, Cech
Discussion—1 hour; laboratory—40-60 hours. Prerequisite: upper division course in ecology and fish biology; consent of instructor. Special session course emphasizes field investigations in fisheries biology including capture methods and individual research.
projects on ecology, behavior, physiology, or population dynamics of fish in relation to their habitats. Offered in alternate years.

110. Mammalian Biology and Ecology (5) III. The Staff
Lecture—4 hours; discussion—1 hour; laboratory—5 hours. Prerequisites: Biological Sciences 1A, 1B, 1C, or the equivalent; course in ecology recommended. Integrated introduction to the biology and ecology of nondomestic mammals. Emphasis on natural history, taxonomy, general-ecological distribution, anatomical-physiological-behavioral adaptations of mammals to their environment, and research-management methodologies.

111. Biology and Management of Wild Birds (3) I. Anderson, Raveling
Lecture—3 hours. Prerequisites: upper division course in ecology or consent of instructor. Phynology, distribution, migration, reproduction, population dynamics, behavior, and physiology of wild birds. Emphasis on adaptations to environments, species interactions, and management considerations. Students who have had Zoology 187 may receive credit for this course.

111L. Laboratory in Biology and Management of Wild Birds (2) I. Anderson, Raveling
Laboratory—6 hours. Prerequisites: course 111 (may be taken concurrently); consent of instructor. Laboratory exercises in the morphology, systematics, and identification of birds, emphasizing the freshwater and marine fishes of California.

120. Biology of Fish (3) I. Moye
Lecture—3 hours. Prerequisite: Biological Sciences 1B. Introduction to biology, morphology, evolution, and systematics of fishes and their relationship to fisheries management.

120L. Biology of Fish Laboratory (1) I. Moye
Laboratory—3 hours. Prerequisite: course 120 (may be taken concurrently); laboratory exercises in the morphology, systematics, and identification of fishes, emphasizing the freshwater and marine fishes of California.

121. Physiology of Fishes (4) II. Cecc
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. Bolzhorst
Lecture—3 hours; laboratory—3 hours. Prerequisite: Mathematics 18A-18B, Statistics 19 or the equivalent; upper division course in biology, ecology, or evolution. Description of bird, mammal and fish population dynamics, modeling philosophy, techniques for estimation of animal abundance (e.g., mark-recapture, change-in-ratio, etc.), techniques for population models of, e.g., Leslie matrix, logistic, dynamic pool, stock-recruitment; case histories.

130. Physiological Ecology of Wildlife (4) II. Jacobson
Lecture—4 hours. Prerequisite: course 110, 111, or 120; Physiology 110, and Zoology 125. Animal functions, adaptations, and ecological energetics of wildlife. Nutrition, metabolism, and productivity are emphasized. Ecological studies 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. Jacobson
Lecture—2 hours; laboratory—3 hours. Prerequisite: Physiology 110 and Zoology 125, or the equivalent; course 110 recommended. Evolution, biology, and management of cervoids. Topics include differences in nutritive ecology, bioenergetics, reproduction and growth, use of habitats, and research methodologies. Emphasis on North American species of caribou, elk, moose, and reindeer. Offered in alternate years.

136. Ecology of Waterfowl and Game Birds (3) II. Raveling
Lecture—2 hours; laboratory—3 hours; field trip. Prerequisite: courses 111 and 117L, or the equivalent.

Detailed examination of distribution, behavior, population dynamics, and management of waterfowl and land game birds in alternate years.

140. Ecology and Evolution of Vertebrate Social Organization (4) II. Lott
Lecture—4 hours. Prerequisite: Biological Sciences 1B or upper division ecology course (Zoology 125 or the equivalent). Spawning competition, cooperation, and grouping of wild vertebrates are described and analyzed as adaptive products of their evolutionary history. Social organization consideration is given to humans and other primates.

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 Biototoxicology (4) II. Anderson
Lecture—3 hours, discussion—1 hour. Prerequisite: introductory courses in organic chemistry, ecology, and physiology, or consent of instructor; Environmental Toxicology 101 recommended. Various forms of environmental contamination: their influence on fish, wildlife, the effects and mechanisms of pollutants, effects on individuals and systems, laboratory and field ecotoxicology, examples/case histories, philosophical/management considerations. Offered in alternate years.

154. Conservation Biology (3) II. Caro
Lecture—3 hours. Prerequisite: Zoology 125 or Environmental Studies 100 introduction to conservation biology. Background to the biological issues and controversies surrounding loss of species and habitats.

190. Proseminar in Wildlife and Fisheries Biology (1, 2, 3, 4) I, II, III. The Staff
Seminar—1 hour. Prerequisite: upper division standing in biological sciences, 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: consent of instructor. Weekly conference on research problems, progress, and techniques in wildlife and fisheries sciences. May be repeated for credit. (SU grading only)

290. Physiology of Fishes Seminar (1) I. Cecc
Seminar—1 hour. Prerequisite: graduate standing and at least two courses in physiology, consent of instructor. Seminar devoted to current topics concerning the physiological functioning of fishes. May be repeated three times for credit. (SU grading only)

290C. Research Group Conference (1) I, II, III. The Staff (Chairperson in charge)
Discussion—1 hour. Prerequisite: consent of instructor. Weekly conference on research problems, progress, and techniques in wildlife and fisheries sciences. May be repeated for credit. (SU grading only)

297. Supervised Teaching in Wildlife and Fisheries Biology (1, 2, 3, 4) I, II, III. The Staff
Seminar—1 hour. Prerequisite: consent of instructor; Teaching assistant in Wildlife and Fisheries Biology. Weekly conferences with instructor, evaluations of teaching; preparing for and conducting demonstrations, laboratories, and discussions; preparing for and grading examinations. May be repeated for a total of 5 units when different course is tutored. (SU grading only)

299. Group Study (1-8) I, II, III. The Staff (Chairperson in charge)
Lectures and/or discussions—1-5 hours. (SU grading only)

Research projects and oral and written reports. Prerequisites: courses 140, 110, or 111-111L; Zoology 125, Statistics 10, and consent of instructor. Field research in wildlife biology; formulation of testable hypotheses, experimental design, execution of the study, data reduction, and preparation of suitable written and oral reports. Limited enrollment. Preference given to graduate students in wildlife areas of study. (SU grading only.)

222. Advanced Population Dynamics (3) II. Botstain
Lecture—3 hours. Prerequisite: graduate standing: advanced course in ecology (e.g., Zoology 125); population dynamics (e.g., course 122), and one year of calculus; familiarity with matrix algebra and partial differential equations recommended. Model population models, evaluation of simple ecological models, current population models with age, size, and stage structure, theoretical basis of managing wild vertebrates that have become pests.

296. Seminar (1-3) I, II, III. The Staff (Chairperson in charge)
Seminar—1-3 hours. Prerequisite: consent of instructor. Seminar devoted to a highly specific research topic in any area of wildlife or fisheries biology. Special topics selected for a quarter will vary depending on interest of instructor and students. (SU grading only)

290C. Research Group Conference (1) I, II, III. The Staff (Chairperson in charge)
Discussion—1 hour. Prerequisite: consent of instructor. Weekly conference on research problems, progress, and techniques in wildlife and fisheries sciences. May be repeated for credit. (SU grading only)

290. Physiology of Fishes Seminar (1) I. Cecc
Seminar—1 hour. Prerequisite: graduate standing and at least two courses in physiology, consent of instructor. Seminar devoted to current topics concerning the physiological functioning of fishes. May be repeated three times for credit. (SU grading only)

290C. Research Group Conference (1) I, II, III. The Staff (Chairperson in charge)
Discussion—1 hour. Prerequisite: consent of instructor. Weekly conference on research problems, progress, and techniques in wildlife and fisheries sciences. May be repeated for credit. (SU grading only)

297. Supervised Teaching in Wildlife and Fisheries Biology (1, 2, 3, 4) I, II, III. The Staff
Seminar—1 hour. Prerequisite: consent of instructor; Teaching assistant in Wildlife and Fisheries Biology. Weekly conferences with instructor, evaluations of teaching; preparing for and conducting demonstrations, laboratories, and discussions; preparing for and grading examinations. May be repeated for a total of 5 units when different course is tutored. (SU grading only)

299. Group Study (1-8) I, II, III. The Staff (Chairperson in charge)
Lectures and/or discussions—1-5 hours. (SU grading only)

*Course not offered this academic year.
Women's Studies

(College of Letters and Science)

Judith Newton, Ph.D., Program Director
Program Office, 307 Young Hall (918-752-4688)

Committee in Charge

Yvette Flores-Ortiz, Ph.D., (Chicano Studies)
Sandra Gilbert, Ph.D., (English)
Carole Jefferis, Ph.D., (Sociology; Women's Studies)
Sue Joseph, Ph.D. (Anthropology)
Lata Mani, Ph.D. (Women's Studies)
Josannila Miranda (Academic Peer Adviser)
Linda A. Morris, Ph.D., ex officio (English)
Belinda Robnett, Ph.D. (Sociology)
Judith Stacey, Ph.D. (Sociology; Women's Studies)
Beverly Tewell (Administrative Assistant)

Faculty

Emily Apter, Ph.D., Associate Professor (French and Italian)
Clytie K. L. Brandley, Ph.D., Associate Professor (History)
Angie Chabram, Ph.D., Associate Professor (Chicano Studies)
Donna Estes, Ph.D., Lecturer (Comparative Literature)
Karen P. Erickson, Ph.D., Professor (Psychology)
Diane Felmlee, Ph.D., Associate Professor (Sociology)
Paula Frazier, Professor (Anthropology)
Yvette Flores-Ortiz, Ph.D., Assistant Professor (Chicano Studies)
Zunilda Gertel, Ph.D., Professor (Spanish and Classics)
Sandra Gilbert, Ph.D., Professor (English)
Gary Sue Goodman, Ph.D., Lecturer (Campus Writing Center)
Inez J. Groth, Ph.D., Assistant Professor (Native American Studies)
Sarah B. Hrdy, Ph.D., Professor (Anthropology)
Mary Jackman, Ph.D., Professor (Sociology)
Carole Jefferis, Ph.D., Professor (Sociology; Women's Studies)
Sue Joseph, Ph.D., Associate Professor (Anthropology)
Cathy Kudlick, Ph.D., Assistant Professor (History)
Anna Kuczyńska, Assistant Professor (German)
Kari Lokie, Ph.D., Assistant Professor (Comparative Literature)
Diana Saccio Macleod, Ph.D., Associate Professor (Sociology)
Lata Mani, Ph.D., Assistant Professor (Women's Studies)
Susan Merritt, Ph.D., Professor (History)
Sandi McNelis, Ph.D., Professor (Psychology)
Patricia Moran, Ph.D., Assistant Professor (English)
Linda Morris, Ph.D., Senior Lecturer (English)
Judith Newton, Ph.D., Associate Professor (Women's Studies)
Beatriz M. Pesquera, Ph.D., Assistant Professor (Sociology; Chicano Studies)
Michele Pranger, Ph.D., Assistant Professor (French and Italian)
Donna Reed, Ph.D., Lecturer (Comparative Literature)
Ada Riddell, Ph.D., Professor (Chicano Studies)
Belinda Robnett, Assistant Professor (Sociology)
Irl Rogoff, Ph.D., Professor (Art History)
Lynn Roller, Ph.D., Associate Professor (Classics)
Ruth E. Rosen, Ph.D., Associate Professor (History)
Vicki L. Ruiz, Ph.D., Associate Professor (History)
Stephanie A. Shields, Ph.D., Associate Professor (Psychology)
Juliana Schlesier, Ph.D., Associate Professor (French and Italian)
Carol Smith, Ph.D., Professor (Anthropology)
Barbara Sommer, Ph.D., Lecturer (Psychology)
Judith Stacey, Ph.D., Professor (Sociology; Women's Studies)
Margit Stange, Ph.D., Assistant Professor (English)
Lena A. Tirm, Ph.D., Professor (Linguistics)
Patricia Turner, Ph.D., Assistant Professor (Afro-American Studies)

Marrian B. Ury, Ph.D., Professor (Comparative Literature)
Diane Wolf, Ph.D., Assistant Professor (Sociology)

The Major Program

The interdepartmental major in women's studies explores the ways in which, especially for women, but also for men, gender has affected cultural achievements, historical events, and socio-economic structures.

The Program. Students majoring in this field may take courses in African-American studies, American studies, anthropology, art, comparative literature, English, history, linguistics, Chicano studies, political science, psychology, sociology, Asian American studies, Native American studies, textiles and clothing, and other disciplines. Depending on individual career goals, each student will design a program in consultation with an adviser.

Career Alternatives. Professional students who major in women studies will discover that it offers useful undergraduate preparation for schools of medicine and law, particularly in medicine, for specialties in obstetrics/gynecology, family practice, pediatrics, or psychiatry; and in law, for special ties to social or family-related fields. In addition, students who plan to do practical work in counseling, clinical psychology, social services, or political science will find women's studies a helpful undergraduate major, while other students may wish to go on to graduate research in such fields as literature, philosophy, sociology, anthropology, psychology, economics, or political science will benefit from a strong undergraduate background in women's studies and gender theory. Increasingly, too, specialties in this field are being used as consultants in industry, higher education, insurance companies and personnel firms. Later, moreover, state and federal government agencies require people who have special training in understanding the problems that women face in society. Finally, educational institutions need specialists to develop and administer women's studies programs, women's centers, and other institutional structures designed specifically to study and assist women.

A.B. Major Requirements:

<table>
<thead>
<tr>
<th>Requirement</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>Preparatory Subject Matter</td>
<td>20-33</td>
</tr>
<tr>
<td>History 27A</td>
<td>4</td>
</tr>
<tr>
<td>Women's Studies 50</td>
<td>4</td>
</tr>
<tr>
<td>All Preparatory Subject Matter listed for a single discipline in an area of student's interest, may be chosen with consultation with adviser</td>
<td>12-25</td>
</tr>
<tr>
<td>Depth Subject Matter</td>
<td>15</td>
</tr>
<tr>
<td>African-American Studies</td>
<td>8</td>
</tr>
<tr>
<td>At least 36 units of women's studies to be chosen with consent of advisor including at least 8 units from Area A, at least 12 units from Area B, and up to 16 units of special topics courses</td>
<td>36</td>
</tr>
<tr>
<td>Area A: Women and the Humanities (minimum 8 units)</td>
<td></td>
</tr>
<tr>
<td>Comparative Literature 135, 195C</td>
<td>135, 195C</td>
</tr>
<tr>
<td>English 155B, 185, Linguistics 113</td>
<td>113</td>
</tr>
<tr>
<td>Area B: Gender and Society (minimum 12 units)</td>
<td></td>
</tr>
<tr>
<td>Afro-American Studies 123, 133, American Studies 101B, Anthropology 130, 131, 134, Asian American Studies 122, Chicano Studies 102, Human Development 110, Native American Studies 130, Political Science 166, Psychology 114, 119, Sociology 131, 132, 133</td>
<td></td>
</tr>
<tr>
<td>Special topic courses (maximum 16 units)</td>
<td></td>
</tr>
<tr>
<td>List of acceptable courses offered throughout the University, will be available from major advisers.</td>
<td></td>
</tr>
<tr>
<td>Total Units for the Major</td>
<td>84-77</td>
</tr>
</tbody>
</table>

Recommended

The following courses are recommended: American Studies 17, 30, Biological Sciences 10, Economics 151B, Genetics 10, History 728, Psychology 10, Statistics 13.

Minor Program Requirements:

<table>
<thead>
<tr>
<th>Requirement</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>Women's Studies 50</td>
<td>4</td>
</tr>
<tr>
<td>Upper division units in women's studies area with courses to be chosen in consultation with adviser</td>
<td>20</td>
</tr>
<tr>
<td>At least 4 units must be from Area A</td>
<td></td>
</tr>
<tr>
<td>At least 8 units must be from Area B</td>
<td></td>
</tr>
</tbody>
</table>

Major Adviser: See Class Schedule and Room Directory.

Courses in Women's Studies

Lower Division Course

50. Introduction to Women's Studies (4) I, II, III.

The Staff

Lecture—4 hours, in-depth examination of a woman's studies topic related to the research interest of the instructor. May be repeated for credit when topic differs. Limited enrollment.

100. Feminist Approaches to Inquiry (4) I. Newton

Lecture-discussion—4 hours, Prerequisite: one course specified for Women's Studies major. Feminist applications and transformations of traditional, disciplinary practices; current issues and methodologies in feminist interdisciplinary work.

102. Colonialism, Nationalism, and Women (4) II.

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.

Upper Division Courses

190A. Senior Research Seminar (1-4) II, III.

Seminar—4 hours. Prerequisite: twenty units in Women's Studies and consent of instructor. Guided reading, discussion, and writing, culminating in the preparation of a research proposal.

190B. Senior Research Seminar (1-4) II, III.

Seminar—4 hours. Prerequisite: course 190A. Completion of individual research project formulated in course 190A; seminar discussion of topics and problems related to individual projects.

192. Internship in Women's Studies (1-12) I, II, III.

Internship—3-36 hours. Written report. Prerequisite: completion of a minimum of 64 units and consent of instructor; enrollment dependent on availability of intern positions with priority to Women's Studies majors. Supervised Internship and study in positional/institutional settings dealing with gender-related problems or issues, as for example, a women's center, affirmative action office, advertising agency, or social welfare agency. First written report on internship experience (P/NP grading only).
Zoology

The Major Programs

Zoology is the biology of animals from the molecular level up to the ecosystem. It is a field that offers almost limitless ways to explore animal life by combining different approaches to animal biology in the field and in the laboratory.

The Program. Zoology majors may earn either a Bachelor of Science or a Bachelor of Arts degree. The requirements for the B.S. include more science courses, such as biochemistry, whereas those for the B.A. degree allow room for more electives within the humanities and social sciences. The B.A. degree is especially appropriate for those students who wish to combine arts with languages for career preparation in such areas as scientific writing and translating or illustration. The major is structured to ensure breadth of preparation while still allowing individualization of each student's program in accordance with his or her interests. Beyond the basic upper division requirements for biochemistry, genetics, evolution, cell biology, and statistics, elective course work is selected in consultation with the undergraduate adviser.

Choice of College. The Bachelor of Arts and the Bachelor of Arts and Science degrees are offered only in the College of Letters and Science. The Bachelor of Science degree is offered in 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 course requirements and policies. See the appropriate college sections in the front of this catalog for more information.

Students majoring in Zoology in the College of Letters and Science may petition the Dean of the College to receive credit for work toward the 64 upper division units required for the degree for certain courses in organic chemistry that have been taken at other institutions prior to first enrollment at UC Davis and that are judged by the Chemistry department to cover substantially the same material as upper division courses in the subject at UC Davis. Students in the College of Agricultural and Environmental Sciences must accumulate 54 units of upper division courses to graduate.

Internships and Career Alternatives. Many students gain experience in the field through internships in research laboratories in academe or industry, in practices of doctors or veterinarians, or in government agencies. Many zoology majors go on to graduate work in the life sciences as preparation for academic careers. A considerable proportion of the zoology majors on the Davis campus are pre-dental, pre-medical, and pre-vet students. Zoology graduates may also go on to careers in wildlife biology and management, in environmental assessment, and in range of similar fields. Davis graduates are currently serving in research, teaching, management, and policy-making positions in both public and private institutions and agencies in California and throughout the world, including many of the nation's foremost universities and research laboratories.

A.B. Major Requirements:

Preparatory Subject Matter

Chemistry 1A, 1B, 2A, 2B..........................14
Biological Sciences 1A, 1B, 1C..........................15
Mathematics 16A-16B or Statistics 102. ..............4-8
Physics 1A-1B or 5A-5C..........................6-8

Depth Subject Matter

Genetics 100................................................3
Zoology 130 or 121A-121B.............................4-6
One course from Zoology 148, Genetics 103, Geology 107, 111A, Anthropology 151..........................3-4

Additional upper division course work in biological science to achieve a total of 36 units or more..........................20-25
Include at least (a) 15 units in zoology, and (b) one course from two of the four Areas of Study shown below.

Total Units for the Major..............................77-81

Recom men ded

Geology 3, Physics 5B; Biochemistry 101A-101B or Physiological Sciences 101A-101B.

B.S. Major Requirements:

Preparatory Subject Matter

Chemistry 1A, 1B, 1C..........................15
Chemistry 2A-2B or 118A-118B-118C or 125A-125B-125C..........................6-12
Biological Sciences 1A, 1B, 1C..........................15
Mathematics 16A-16B or 21A-21B..........................6-8
Physics 5A, 5B, 5C..........................12

Depth Subject Matter

Biochemistry 101A-101B or Physiological Sciences 101A-101B..........................6-7
Genetics 100..........................4
Statistics 102..........................4
Zoology 130 or 121A-121B..........................6
One course from Zoology 148, Genetics 103, Geology 107, 111A, Anthropology 151..........................3-4

Additional upper division coursework in biological science to achieve a total of 49 or more units..........................22-28
Include at least
(a) 15 units in zoology,
(b) 6 units (or 18 hours) of laboratory, and
(c) one course from three of the four Areas of Study shown below.

Breadth Subject Matter

College of Agricultural and Environmental Sciences students..........................29
English and/or rhetoric..........................7
Social sciences and/or humanities..........................16
See also the College section for additional requirements.

College of Letters and Science students:

Refer to the College section for a description of requirements to be completed in addition to the major.

Total Units for the Major..............................103-111

Recom men ded

Chemistry 5, Mathematics 16C or 21C, Geology 3.

Areas of Study

1. Ecology and behavior: Zoology 125, 147, 149, 155; Environmental Studies 100.
4. Physiology: Zoology 121C, 142, 142L, 143; Physiology 110, 110L.

Note: A maximum of 5 units of variable-unit courses (numbered 192, 198, and 199) may be applied to upper division elective unit requirements. Zoology majors may not substitute course 192 for the upper division laboratory requirement. Courses numbered 197T are not applicable to the upper division elective unit requirement.

Biological Sciences Electives. The following courses are acceptable toward the fulfillment of the upper-division biological sciences requirement in the major program and may be selected without adviser approval. Other elective courses are approved on an individual basis by petition through an adviser.

Anatomy 100
Anthropology 151, 152, 153, 154A, 154B, 155, 156
Biochemistry and Biophysics, all upper division courses
Biological Sciences, all upper division courses
Botany, all upper division courses
Chemistry 107A, 107B
Clinical Pathology 101, 101L, 102
Entomology, all upper division courses except 110, 115
Environmental Studies 110, 116, 121, 123, 150C, 151, 151L.
Courses in Zoology

Lower Division Courses

2. General Zoology
This course has been cancelled and replaced by Biological Sciences 1B.

2L. Laboratory in General Zoology
This course has been cancelled and replaced by Biological Sciences 19.

10. Conception and Early Development (3) I. Watt
Lecture—3 hours. Principal issues of modern zoology for non-science majors. Diversity, its causes and consequences, self-stabilization, evolution, levels of organization. Implications of zoology for the human situation.

19. 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 Department of Zoology. Internships supervised by a member of the faculty. (P/NP grading only.)

99. Special Study for Lower Division Students (1-5) I, II, III. The Staff (Chairperson in charge)
(P/NP grading only.)

Upper Division Courses

100. Embryology (4) I. Armstrong; II. The Staff; III. Erickson
Lecture—4 hours. Prerequisite: Biological Sciences 1A, 1B; concurrent enrollment in course 100K. Events and mechanisms of embryonic development, including fertilization, morphogenesis, cell differentiation and organogenesis, with emphasis on vertebrates.

100L. Laboratory in Vertebrate Embryology (1)
Lecture—2 hours; laboratory—6 hours. Prerequisite: course 100, 100K; Biochemistry 101A, 101B; consent of instructor. Lectures in modern topologies in developmental biology will be followed by supplementary laboratory exercises that demonstrate lecture topics. Students conduct their own independent studies during last four weeks of quarter. A written report due at end of quarter.

102. Senior Colloquium in Developmental Biology (3) II. Griggs
Lecture—1 hour; seminar—2 hours. Prerequisite: course 100 with a grade of B or better; consent of instructor. Analysis of major topics in developmental biology, including fertilization, embryonic development, morphogenesis, cell differentiation, and pattern formation. Limited enrollment.

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.

112. Invertebrate Zoology (4) II. Ellers
Lecture—4 hours. Prerequisite: Biological Sciences 1A, 1B; course 112—(concurrently); courses in systematics, ecology, and evolution recommended. Survey of the invertebrate phyla emphasizing aquatic forms and focusing on invertebrate zoology, natural history, and phylogenetic relationships.

112L. Laboratory for Invertebrate Zoology (3) II. Ellers
Discussion—1 hour; laboratory—6 hours. Prerequisite: Biological Sciences 1A, 1B; course 112 concurrently. Field and laboratory experience with representative members of the invertebrate phyla described in course 112. Emphasis on comparative morphology, natural history, ecology, and behavior of living invertebrates.

121A. Cell Biology (4) I. Nucciello
Lecture—3 hours; discussion—1 hour. Prerequisite: introductory course in biochemistry (may be taken concurrently). An introduction to modern cell biology with emphasis on cell structure, membranes and organelles, the cytoskeleton, and bioenergetics.

121B. Cell Biology (4) II. Natzle
Lecture—3 hours; discussion—1 hour. Prerequisite: introductory course in biochemistry (may be taken concurrently). Discussion of modern cell biology with emphasis on structure of the nucleus, cell cycle, information transfer, the immune system, and cancer cell biology. Students who have had Zoology 130 may receive only 2 units for course 121B.

121C. Advanced Cell Biology (4) III. Baskin, Scholey
Lecture—3 hours; extensive reading and research report. Prerequisite: Biochemistry 101B; Mathematics 16B or equivalent. Molecular and biological properties of contractile and motile systems.

121L. Cell Biology Laboratory (3) II. L. Crowe
Lecture—1 hour; laboratory—6 hours. Prerequisite: Biochemistry 101A-101B; courses 121A-121B recommended, or consent of instructor. Exercises illustrating the principles of cell biology; emphasis on individual research employing one or more advanced techniques.

122. Histology (4) II. Eaton
Lecture—3 hours; laboratory—2 hours. Prerequisite: course 121A; working knowledge of elementary physiology is essential. Functional morphology of animal tissues and organs. Emphasis is placed on the use of structural evidence in elucidating mechanisms underlying physiological and metabolic processes.

125. Animal Ecology (3) I. Toft; II. Mangell and staff
Lecture—3 hours; laboratory—6 hours. Prerequisite: Biological Sciences 1A, 1B, 1C. General survey of the concepts of animal ecology.

130. Survey of Cell Biology (4) I. Leslie, Thag (Botany)
Lecture—3 hours; discussion—1 hour. Prerequisite: Chemistry 85 or 128C; introductory course in biochemistry strongly recommended. A survey of cell biology presenting the structure and function of the major cell organelles. Topics discussed include general cell structure, membranes, bioenergetics, motility, cell synthesis, and cell division. Not open to students who have received credit for course 121A/121B. (Same course as Botany 130.)

133. Patterns in Vertebrate Biology (3) II.
Lecture—3 hours. Prerequisite: Biological Sciences 1A, 1B. Vertebrate thermoregulation and water balance, circulation and osmotic control, communication, breathing, movements and feeding patterns.

134. Herpetology (3) III. Shaffer
Lecture—2 hours; term paper. Prerequisite: Biological Sciences 1A, 1B; course 148 recommended. The world-wide diversity of amphibians and reptiles with emphasis on behavior, ecology, functional morphology, and evolutionary history. Offered in alternate years.

134L. Herpetology Laboratory (3) III. Shaffer
Lecture—5 hours; two weekend field trips. Prerequisite: Biological Sciences 1A, 1B; course 134 concurrently. Diagnostic characteristics and functional attributes of amphibians and reptiles, emphasizing ecological, biogeographic and phylogenetic patterns. Field trips will acquaint students with techniques for identifying and studying amphibians and reptiles under natural conditions. Offered in alternate years.

138. Mammalogy (2). The Staff
Lecture—2 hours. Prerequisite: course 125 or equivalent general course in ecology. Systematics, life history, reproduction, distribution, and physiology of wild mammals.

138L. Mammalogy Laboratory (2). The Staff
Lecture—6 hours; extensive weekend field trips. Prerequisite: course 125 or 139, and consent of instructor. Systematics of California mammals; techniques of study in professional mammalogy. May be taken concurrently with course 139.

137. Ornithology (2) III. Marler
Lecture—2 hours. Prerequisite: course 125 or the equivalent course in ecology. Systematics, distribution, physiology and population dynamics of birds. Students who have taken Wildlife and Fisheries Biology 111 may not receive credit for this course.

137L. Ornithology Laboratory (3) III. Marler
Lecture—6 hours. Prerequisite: course 125 or 137 (may be taken concurrently) and consent of instructor. Individual study and field trips strongly emphasized. Systematics, behavior, population dynamics, and reproduction of California birds.

138. Ecology of Tropical Latitudes (3) III. Shapiro

141. Principles of Systematic Zoology (3) III.
Shapiro
Lecture—2 hours; biweekly research projects. Prerequisite: Biological Sciences 1B or 1C; course 148 or Genetics 103 recommended. Historical background, philosophical rationale, contemporary approaches, and working rules of biological systematics, including International Code of Zoological Nomenclature. Offered in alternate years.

142. Invertebrate Physiology (4) I. Crowe
Lecture—3 hours; term paper; individual conferences. Prerequisite: course 112, Chemistry 1A, 1B, Physics 5C; Biochemistry 101A, 101B recommended. Comparative physiology of invertebrate organ systems.

142L. Invertebrate Physiology Laboratory (3) III. Crowe
Lecture—6 hours (includes research project). Prerequisite: course 142 (may be taken concurrently). Experiments on the physiological mechanisms of invertebrate organ systems. Design and execution of a research project.
143. Neurobiology (4) I. Muloney, Wilson Lecture—3 hours; tutorial (3)I. Prerequisite: Biological Sciences 1A, 1B, 1C; Biochemistry 101A-101B or the equivalent. Neuron function; impulse transmission; synapses; transmitters and transmitter pharmacology; receptors; growth and differentiation of neurons and nervous systems; genetics of behavior.

143L. Neurobiology Laboratory (4) I. Muloney Lecture—1 hour; discussion—1 hour; laboratory—12 hours. Prerequisite: course 143 and consent of instructor. Recommended. Students will learn to record action potentials and synaptic circuits, to interpret quantitatively their recordings, and to use vital dyes and intracellular electrodes. Limited enrollment.

147. Zoogeography (4) I. Shapiro Lecture—3 hours; term paper. Prerequisite: Biological Sciences 1A, 1B. Movements of terrestrial animals. The role of geologic, climatic, and biologic changes in the geographic distribution of animals. Offered in alternate years.

148. Animal Phylogeny and Evolution (4) II. The Staff Lecture—4 hours. Prerequisite: Biological Sciences 1A, 1B; Genetics 100, cell biology and biochemistry recommended. Introduction to current evolutionary theory. The place of evolution as the central unifying theory to biology will be emphasized.

*149. Evolution of Ecological Systems (4) III. Shapiro Lecture—3 hours; term paper. Prerequisite: course 125 or Environmental Studies 100 (or the equivalent) and course 148 or Genetics 103 (or the equivalent). Evolution as an organizing force in natural communities. Coadaptation in trophic and competitive relationships. Ecology of polymycophytes, climes, and speciation. Offered in alternate years.

150. Behavior of Animals (5) II. Merler, Stamps Lecture—4 hours; discussion—1 hour. Prerequisite: Biological Sciences 1A, 1B. Basic principles, mechanisms and evolution of behavior with special reference to the significance of behavior under natural conditions. Students who have had Animal Sciences 104 may receive only 4 units of credit for this course.

189. Introduction to Biological Research (1) I, II, III. The Staff (Chairperson in charge) Discussion—1 hour. Prerequisite: upper division standing in Zoology or related biological sciences or consent of instructor. Introduction to research methods in biology. Presentation and discussion of research by faculty, graduates, and undergraduate students. May be repeated for credit up to a total of 3 units. (P/NP grading only)

190. Undergraduate Seminar in Zoology (2) I. Deamer, III. Mangel Seminar—2 hours. Prerequisite: upper-division standing in biological sciences or related discipline. Student reports or current topics in zoology broadly construed, with emphasis on integration of concepts, synthesis, and state-of-the-art research approaches. Reviews of literature and reports of undergraduate research may be included. May be repeated for credit. (P/NP grading only)

192. Internship (1-12) I, II, III. The Staff (Chairperson in charge) Internship—3-36 hours. Prerequisite: completion of 64 units and consent of instructor. Work experience of and on campus in all subject areas offered in the Department of Biological Sciences supervised by a member of the faculty. (P/NP grading only)

194HA, 194HB, 194HC. Research Honors in Zoology (2) I, II, III. The Staff (Chairperson in charge) Laboratory—6 hours. Prerequisite: students majoring in zoology who have completed 125 units and qualification for the honors program (as defined in the current catalog). Zoology majors pursue intensive research under guidance of a faculty advisor. Students are expected to complete the full three-quarter sequence culminating in the writing of an honors thesis. (Degree granting only, pending completion of sequence.)

1977. Tutoring in Zoology (1-3) I, II, III. The Staff (Chairperson in charge) Discussion—1-2 hours. Prerequisite: upper division standing. Experience in teaching zoology under guidance of staff. (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. Current Techniques in Cell Biology (2) I. Nuccitelli Lecture—2 hours. Current techniques used in cell biology research including microscopy, spectroscopy, electrophysiology, immunocytochemistry, histology, organelle isolation, calorimetry, tissue culture and gel electrophoresis. Lectures presented by experts on each technique, with emphasis on pitfalls to avoid when using the technique. (SU grading only.) (Same course as Cell and Developmental Biology 200)

200LA. Cell and Developmental Biology Laboratory (3) I, II, III. The Staff (Chairperson in charge) Laboratory—18 hours (five-week only). Prerequisite: course 200 (may be taken concurrently). One five-week assignment in research laboratory of a Cell and Developmental Biology Graduate Group member. Individual research problems with emphasis on methodological/technical experience and experimental approach. (Same course as Cell and Developmental Biology 200LA.)

200LB. Cell and Developmental Biology Laboratory (6) I, II, III. The Staff (Chairperson in charge) Laboratory—18 hours (two-five-week assignments). Prerequisite: course 200 (may be taken concurrently). Two five-week assignments in research laboratories of Cell and Developmental Biology Graduate Group members. Individual research problems with emphasis on methodological and technical experience and experimental design. (Same course as Cell and Developmental Biology 200LB)

*202. Bionomics (6) III. Watt Lecture—4 hours; laboratory—6 hours. Prerequisite: two courses in calculus; three courses in statistics. Mathematical aspects of physiology, ecology, and epidemiology: development and testing of models, mathematical description of biological systems, measurement, analysis, synthesis and simulation in biology.

*203. Global and Regional Modelling (6) II. Watt Lecture—1 hour; discussion—1 hour; seminars—3 hours; laboratory—3 hours. Prerequisite: Mathematics 16A, 16B and 105 or 131A-131B; 131C; FORTRAN. Use of statistical analysis of data, mathematical modeling, and computer simulation of the world or regions to provide basis for policy recommendations and experimental design.

*204. Cellular Basis of Morphogenesis (4) III. Armstrong Lecture—3 hours; term paper. Prerequisite: course 100. Development of form and structure; morphogenetic movement, mechanisms of cellular mobility, cell adhesion, intercellular invasion, interaction of cells and tissues in development. Offered in alternate years.

*205. Pattern Formation (4) I. Nuccitelli Lecture—3 hours; term paper. Prerequisite: course 100 or 121A or the equivalent, and consent of instructor. Morphology and mechanism of pattern formation beginning with epiblastic segregation, continuing through organogenesis. Prerequisite: only but some multicellular systems will also be covered. Offered in alternate years.

*206. Mechanisms of Organogenesis (4) I. Ekholm Lecture—3 hours; term paper. Prerequisite: course 100. Course will demonstrate the various means by which several cell types become organized and differentiated to form a normal unit, using five selected organ systems. Offered in alternate years.

208. Molecular Mechanisms in Animal Development (4) I. Nuccitelli Lecture—1.5 hours; seminar—1.5 hours. Prerequisite: graduate standing or consent of instructor. Introduction to development in evolutionary biology and developmental genetics research. Analysis of the molecular mechanisms that control animal development, with a special focus on multiple levels of gene regulation. Experimental systems including Drosophila, amphibians, C. elegans, and mice will be discussed. Readings will be taken from the current literature.

*212. Topics in Invertebrate Evolution (2) III. Grosber Lecture—2 hours. Prerequisite: graduate standing or consent of instructor and course 112-112L; courses in evolutionary biology, systematics, and ecology highly recommended. Advanced seminar that critically examines problems relevant to evolutionary patterns among the invertebrates. May be repeated for credit when topic differs. (SU grading only.)

*223. Modeling in Behavioral and Evolutionary Ecology (3) III. Mangel Lecture—2 hours. Prerequisite: graduate standing or consent of instructor; course 125 or 155, or the equivalent; Mathematics 131A or Statistics 130A, or the equivalent. Advanced course in theoretical behavioral and evolutionary biology to introduce students to methods that can be used to characterize the fitness associated with different behavioral and developmental adaptations. Will enable students to develop and apply models. Offered in alternate years.

225. Biology of Fertilization (3) I. Clark, Hedrick, Metzel, Nuccitelli Lecture—2 hours; term paper. Prerequisite: course 121A or the equivalent and consent of instructor. The morphology, physiology and biochemistry of gametes and the mechanisms and consequences of their union. Offered in alternate years.

226. Cell and Molecular Biology of Cancer (1) I. Armstrong Lecture—2 hours (first five weeks of quarter). Prerequisite: course 100 or one course from courses 121A, 121B, or 130; or Biochemistry 101A-101B or Physiological Sciences 101A-101B. Analysis of the cellular and molecular levels of the regulation of normal and neoplastic growth, tumor dissemination, identification and characterization of oncogenic agents, characterization of oncoproteins and anti-oncogenes.

236. Muscle Physiology (4) I. Baxin Lecture—2 hours; discussion—1 hour; term paper. Prerequisite: Biochemistry 101A-101B and Mathematics 16B or 218; or consent of instructor. The physical and chemical aspects of muscle function.

*240. Topics in Cell Biology (3) I. Deamer Lecture—2 hours; discussion—1 hour. Prerequisite: graduate standing and consent of instructor. Discussion and review of current topics in the area of cellular biology. May be repeated for credit.

241. Membrane Biology (3) I. Deamer Lecture—3 hours; discussion—1 hour. Prerequisite: courses 121A-121B or Biochemistry 101A-101B recommended, or consent of instructor. Course emphasizes biological aspects of membrane function and structure. The general approach will be to discuss cell biology from the viewpoint of the components of cell. Offered in alternate years.

242. Research Conference in Cell Biology (1) I. Scholey, II. Leslie, III. Natzle Seminar—1 hour. Prerequisite: consent of instructor. Presentation and critique of faculty and graduate student research in cell biology. May be repeated for credit. (SU grading only)

243. Topics in Cellular and Behavioral Neurobiology (2) I. Muloney Discussion—1 hour; seminar—1 hour. Prerequisite: consent of instructor. An advanced examination of the cellular and behavioral neuroscience. Topics that vary in different years; may be repeated for credit. (SU grading only) (Same course as Neurobiology 243).
Professional Course

390. Methods of Teaching Zoology (2) I, II, III. The Staff (Chairperson in charge)
Lecture—1 hour; discussion—1 hour. Prerequisite: graduate standing and consent of instructor. Practical experience in the methods and problems of teaching zoology and related biological sciences. Includes analysis of texts and supporting material, discussion of teaching techniques and preparing and conducting of laboratory and discussion sections. May be repeated for credit a maximum of 8 units. (SU grading only.)

*Course not offered this academic year.
STATEMENT ON LEGAL RESIDENCE AT THE UNIVERSITY OF CALIFORNIA

Each new student entering the University of California (and each former student returning after an absence of one or more quarters) is required to submit a Statement of Legal Residence to the Office of the Registrar. This Statement is used by the Residence Deputy in determining the residence of each student for fee assessment purposes.

Students who have not been residents of California for more than one year immediately prior to the residence determination date for each quarter in which they propose to attend the University are charged, along with other fees, a nonresident tuition fee.

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.

Establishing Legal Residence for Tuition Purposes

In order to be classified as a resident for tuition purposes upon admission to the University of California, an adult student, other than an adult alien present in the United States under the terms of a nonimmigrant status which precludes the alien from establishing domicile in the U.S., must be able to provide evidence of having established his or her residence in California at least one year immediately preceding the residence determination date for the term during which he or she proposes to attend the University and must have relinquished any prior residence. An adult student must couple his or her physical presence within this State for one year with objective evidence that such presence is consistent with his or her intent in making California his or her permanent home. If these steps are delayed, the one-year durational period will be extended until BOTH presence and intent have been demonstrated for one full year. Physical presence within the state solely for educational purposes does not constitute the establishment of California residence under State law regardless of the length of the student's stay in California.

Relevant indicia which can be relied upon to demonstrate one's intent to make California the permanent residence include, but are not limited to, the following: registering and voting in California elections; designating California as the permanent address on all school and employment records, including military records if one is in the military service; obtaining a California driver's license or California identification card, if a non-driver; obtaining California vehicle registration; paying California income taxes as a resident, including taxes on income earned outside this state from the date residence is established; establishing an abode where one's permanent belongings are kept within California; licensing for professional practice in California; residing in California during summers and holidays; maintaining active checking or savings accounts in California banks; and the absence of these indicia in other places during any period for which residence in California is asserted. Documentary evidence may be required. No single factor is controlling or decisive. All relevant indicia will be considered in the classification determination.

The residence of the parent with whom an unmarried minor (under age 18) child lives is the residence of the unmarried minor child. When the minor lives with neither parent his or her residence is that of the parent with whom he or she last lived. A minor, except a minor alien who is precluded by the Immigration and Naturalization Act from establishing domicile in the U.S., may establish his or her residence when both parents are deceased and a legal guardian has not been appointed. The residence of an unmarried minor who has a parent living cannot be changed by his or her own act, by the appointment of a legal guardian, or by relinquishment of a parent's right of control (see Exceptions below). Where the residence of the minor is derived, the California residence of the parent from whom it is derived must satisfy the one-year durational requirement.

An adult establishes his or her own residence. Residence of an adult is not derived from a spouse or parents.

Reclassification

A student seeking resident reclassification for tuition purposes must petition at the Office of the Registrar. Documentation of residence (driver's license, voter registration receipt, etc.) will be required at that time. Financial independence will be included among the factors considered for students classified nonresident seeking reclassification to resident for tuition purposes. Financial independence will not be considered for graduate students who are teaching assistants, research assistants or teaching associates employed on a 0.49 percent or more time basis for the term for which reclassification is sought. All changes of status must be initiated two weeks prior to the in-person registration period for the quarter or semester for which the student intends to be reclassified. No petitions will be accepted after instruction begins.

Detailed information concerning reclassification can be obtained by contacting the Residence Deputy at the Registrar's Office.

Incorrect Classification

Those classified incorrectly as residents are subject to reclassification and to payment of all nonresident fees not paid. If incorrect classification results from false or concealed facts (by the student), the student also is subject to University discipline. Resident students who become nonresidents must immediately notify the Residence Deputy at the Registrar's Office.

Inquiries and Appeals

Inquiries from prospective students regarding residence requirements for tuition purposes should be directed to the Residence Deputy at the Office of the Registrar. No other University personnel are authorized to supply information relative to residence requirements for tuition purposes. Any student, following a final decision on residence classification by the Residence Deputy, may make written appeal to the Legal Analyst—Residence Matters, 300 Lakeside Dr., 7th Floor, Oakland, CA 94612-9565, within 90 days after notification of the final decision by the Residence Deputy.

The student is cautioned that this summation is not a complete explanation of the law regarding residence. The student should also note that the rate of nonresident tuition and the residence requirements are subject to change. Regulations have been adopted by The Regents, a copy of which is available for inspection in the Registrar's Office of the campus.

Exceptions

1. If the California resident parent(s) of an eligible minor moves from California leaving the minor in the state, the minor will be entitled to resident classification as long as he or she enrolls in an institution within one year of the date the parent(s) established a residence outside of California. This classification will continue until the student has attained the age of majority and has resided in the state the minimum time necessary to become a resident so long as, once enrolled, he or she maintains continuous attendance at an institution.

2. A student who is a U.S. citizen or eligible alien and who is a minor or 18 years of age may be eligible for resident status if he or she can show, (a) that he or she has been totally self-supporting through employment and actually present within California for the entire year immediately prior to the residence determination date and (3) that he or she has demonstrated the intent to make California his or her permanent home.
3. A student who is a U.S. citizen or eligible alien shall be entitled to resident classification if immediately prior to the residence determination date he or she has lived with and been under the continuous direct care and control of any adult or adults other than a parent for not less than two years. The adult or adults having such control must have been a California resident during the year immediately prior to the residence determination date. This exception continues until the student has attained the age of majority and has resided in the state the minimum time necessary to become a resident student, so long as continuous attendance is maintained at an institution.

4. A student who has not been an adult resident of California for more than one year may be entitled to resident classification until he or she has resided in California for the minimum time necessary to become a resident if, (a) he or she is the dependent child of a California parent who has established residence in the state for more than one year immediately prior to the residence determination date, and (b) he or she maintains continuous attendance at an institution.

5. Exemption from payment of the nonresident tuition fee is available to the natural or adopted child, stepchild or spouse who is a dependent of a member of the United States military stationed in California on active duty. Such exemption may be maintained until the student has resided in California the minimum time necessary to become a resident. If a student is enrolled in an institution and the member of the military (1) is transferred on military orders to a place outside this state where he continues to serve in the armed forces or (2) is retired as an active member of the armed forces immediately after having been on active duty in California, the student is entitled to retain resident classification under conditions set forth above.

6. A student who is a member of the United States military stationed in California on active duty, except a member of the military assigned for educational purposes to a state-supported institution of higher education, shall be entitled to resident classification until he or she has resided in the state the minimum time necessary to become a resident.

7. Children of deceased public law enforcement or fire suppression employees, who were California residents and who were killed in the course of law enforcement or fire suppression duties, may be entitled to resident status.

8. The dependent children and spouses of full-time University of California employees whose permanent assignment is outside California may be entitled to resident classification.

Waivers Of Nonresident Tuition

To the extent funds are available, nonresident tuition waivers may be granted to a spouse and unmarried dependent children under 21 of a University faculty member who is a member of the Academic Senate. Inquiries regarding this waiver should be directed to the Residence Deputy.

In addition, certain student Teaching Assistants and Teaching Fellows, and certain graduate students designated as University Fellows and Distinguished Scholars may be eligible for nonresident tuition waivers or fellowships. Such students should contact the Graduate Division at their campus for further information.

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, Association of American Medical Colleges, Council on Education of the American Veterinary Medical Association, Engineering Accreditation Commission of the Accreditation Board of Engineering and Technology, American Chemical Society, American Society of Landscape Architects, the Commission for Teaching Preparation and Licensing, 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 Vice Chancellor—Academic Affairs, Mrak Hall.

GOVERNANCE OF THE UNIVERSITY

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. David Pierpont Gardner is president and head of the Universitywide administration. Authority for the administration of each campus has been delegated to a chancellor.

UNIVERSITY POLICY ON NONDISCRIMINATION, SEXUAL HARASSMENT, STUDENT RECORDS, AND PRIVACY

Nondiscrimination. The University of California, in compliance with Titles VI and VII of the Civil Rights Act of 1964, Title IX of the Education Amendments of 1972, and Sections 503 and 504 of the Rehabilitation Act of 1973, the Age Discrimination in Employment Act of 1967, and the Age Discrimination Act of 1975, does not discriminate on the basis of race, color, national origin, sex, handicap, or age in any of its policies, procedures, or practices; nor does the University, in compliance with Section 402 of the Vietnam Era Veterans Readjustment Act of 1974, and Section 12940 of the State of California Government Code, discriminate against any employees or applicants for employment because they are disabled veterans or veterans of the Vietnam era, or because of their medical condition (cancer-related) as defined in Section 12926 of the California Government Code, their ancestry, or their marital status; nor does the University discriminate on the basis of citizenship, within the limits imposed by law or University policy; nor does the University discriminate on the basis of sexual orientation. This nondiscrimination policy covers admission, access, and treatment in University programs and activities, and application for and treatment in University employment.

In conformance with University policy and pursuant to Executive Orders 11246 and 11375, Section 503 of the Rehabilitation Act of 1973, and Section 402 of the Vietnam Era Veterans Readjustment Act of 1974, the University of California is an affirmative action/equal opportunity employer.

Inquiries regarding the University's equal opportunity policies may be directed to the Vice Chancellor of Academic Affairs.
Students may request in writing by the last day of registration 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. Students who desire to withhold all information from the category of public information must file a form in the Registrar's Office.

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 Registrar's Office.

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.

Categories of personally identifiable information designated by the campus as public information are: name, address (campus and/or permanent), telephone numbers, date and place of birth, major field of study, dates of attendance, 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.
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 Science</th>
<th>Applied Economics</th>
<th>Behavioral Science</th>
<th>Food Science</th>
<th>Plant Science</th>
<th>Bio-Science</th>
<th>Resource Science</th>
<th>Engineering</th>
<th>Humanities</th>
<th>Physical Science</th>
<th>Social Science</th>
<th>Total Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>61</td>
<td>77</td>
<td>88</td>
<td>90</td>
<td>100</td>
<td>74</td>
<td>69</td>
<td>97</td>
<td>61</td>
<td>80</td>
<td>70</td>
<td>78</td>
</tr>
</tbody>
</table>

1Source: A 1966 survey of June 1967 graduates conducted by Student Affairs Research and Information, UC Davis.
2Fields of Study are groups of related undergraduate majors; for example, "Animal Science" would include such majors at UC Davis as Animal Science, Avian Sciences, and Wildlife and Fisheries Biology.

RETENTION DATA AND GRADUATION RATES AT UC DAVIS

Freshmen
(Retention and graduation rates through Spring 1990 for regularly admissible undergraduates entering UC Davis as freshmen.)

<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>1980</td>
<td>2,664</td>
<td>89%</td>
<td>36%</td>
<td>67%</td>
</tr>
<tr>
<td>1981</td>
<td>2,609</td>
<td>90%</td>
<td>34%</td>
<td>69%</td>
</tr>
<tr>
<td>1982</td>
<td>2,350</td>
<td>91%</td>
<td>38%</td>
<td>73%</td>
</tr>
<tr>
<td>1983</td>
<td>2,280</td>
<td>92%</td>
<td>32%</td>
<td>72%</td>
</tr>
<tr>
<td>1984</td>
<td>2,780</td>
<td>93%</td>
<td>30%</td>
<td>72%</td>
</tr>
<tr>
<td>1985</td>
<td>2,515</td>
<td>92%</td>
<td>30%</td>
<td>63%</td>
</tr>
</tbody>
</table>

Transfer Students
(Retention and graduation rates through Spring 1990 for 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>1982</td>
<td>633</td>
<td>86%</td>
<td>39%</td>
<td>71%</td>
</tr>
<tr>
<td>1983</td>
<td>516</td>
<td>89%</td>
<td>36%</td>
<td>75%</td>
</tr>
<tr>
<td>1984</td>
<td>704</td>
<td>89%</td>
<td>35%</td>
<td>72%</td>
</tr>
<tr>
<td>1985</td>
<td>629</td>
<td>90%</td>
<td>36%</td>
<td>72%</td>
</tr>
<tr>
<td>1986</td>
<td>599</td>
<td>91%</td>
<td>33%</td>
<td>74%</td>
</tr>
<tr>
<td>1987</td>
<td>683</td>
<td>91%</td>
<td>27%</td>
<td>65%</td>
</tr>
</tbody>
</table>

1These 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.)
2Source: Student Affairs Research and Information, UC Davis (January 1991).

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>$2596</td>
<td>$3040</td>
<td>$4128</td>
</tr>
<tr>
<td>Humanities/ Social Sciences</td>
<td>1821</td>
<td>1981</td>
<td>2619</td>
</tr>
<tr>
<td>Health Sciences/Life Sciences</td>
<td>2032</td>
<td>2334</td>
<td>—</td>
</tr>
<tr>
<td>Physical Sciences</td>
<td>2046</td>
<td>2443</td>
<td>3289</td>
</tr>
</tbody>
</table>

1Source: College Placement Council Salary Survey (September 1990).
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Douglas L. Mennis, Ed.D., Associate Dean

University Extension
Dean
Charles A. Lacy, Ph.D., Assistant Dean
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About the Cover

Thoreau Hall, completed in 1969, is UC Davis's newest residence hall. It's part of the Cuarto area, one block from the north boundary of the campus. Over a third of all resident living space is in the four halls located here. Designed in furnished suites and apartments, buildings are arranged in either a courtyard setting with open exterior walkways and interior courtyards or with swimming pools and spas. Thoreau Hall has 197 residential spaces arranged in eight-person suites. The three-story structure is designed so all rooms surround a central courtyard. Two dining commons, Castilian and Oxford Circle (color inset on the front cover) are in the area. The black and white cover photo, from about 1915, is of students in the East Hall dining room. This building, part dining hall, part infirmary, was located behind South Hall and was torn down in the 1970s.

Although at first glance the contrast between old and new residence hall rooms seems enormous, the 1915 South Hall room (opposite top) shows the same types of furniture, walls hung with pictures and posters, and a carpet on the floor. Even with uncurtained windows and hanging light fixtures, the comfort to students of that era was probably similar to that of the woman in the middle picture. Not all students had the luxury of a room, however. The photo of the quad (bottom) shows tents erected for participants in an Agricultural Extension summer conference in the 1920s. South Hall, one of the original campus dormitories (now offices for student services), is shown in the background.

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