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CALIFORNIA STATE POLYTECHNIC UNIVERSITY, POMONA

1975-76 Catalog

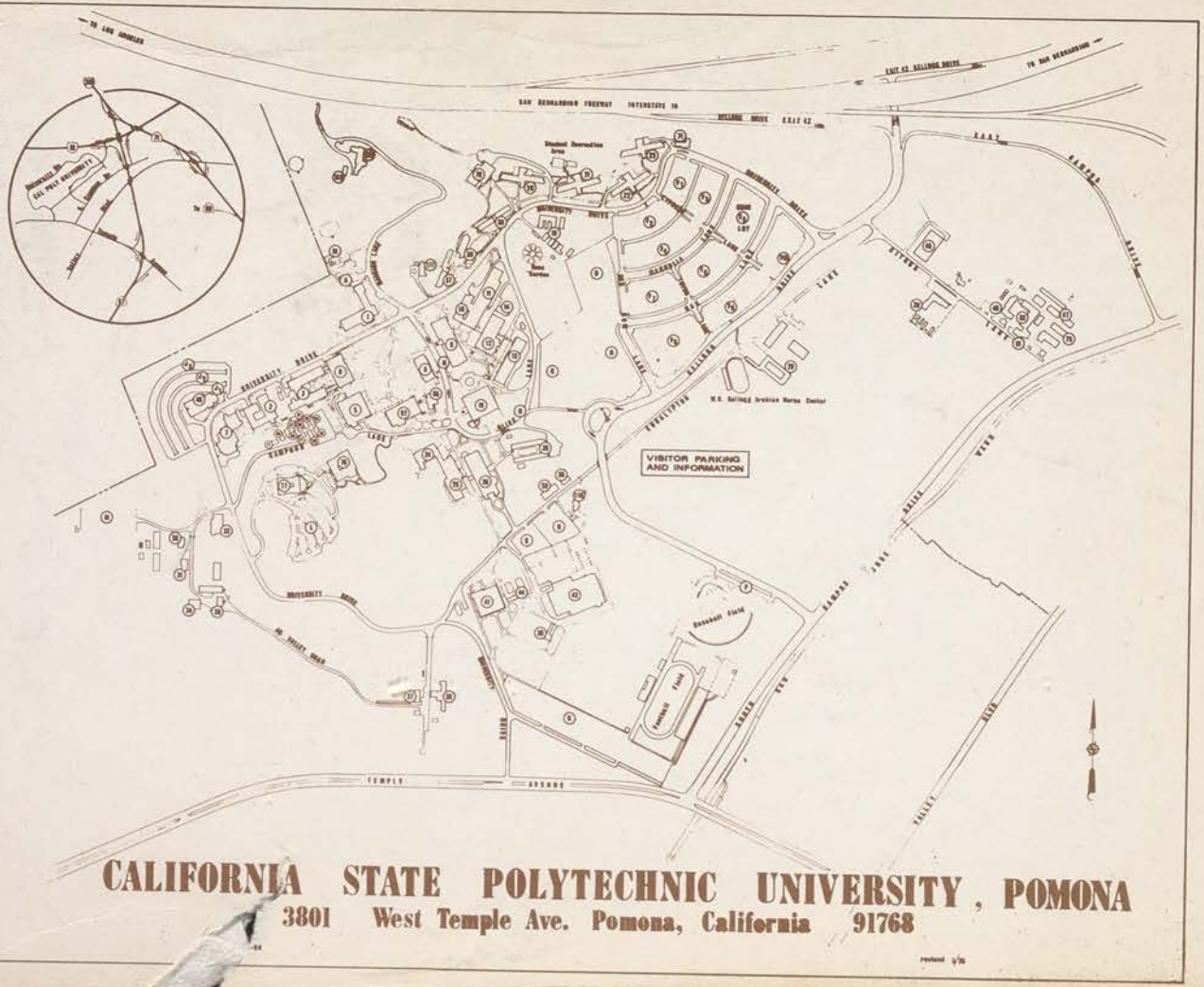
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A	ADMINISTRATION
C	FACULTY- STAFF
D	STUDENT
F-1	PARKING METERS
F-2	DUNN LOT
F 7-10	STUDENT
G	FACULTY- STAFF
H	VISITOR
J 1-2	FACULTY- STAFF- STUDENT
K	FACULTY- STAFF- STUDENT
L	PARKING METERS
L	W.K. KELLOGG PARKING
M	STUDENT
N	STUDENT
P	STUDENT



CALIFORNIA STATE POLYTECHNIC UNIVERSITY, POMONA

3801 West Temple Ave. Pomona, California 91768

revised 1/76

POLYTECHNIC UNIVERSITY, POMONA
3801 West Temple Ave. Pomona, California 91768

CALIFORNIA STATE

POLYTECHNIC UNIVERSITY, POMONA

1975-76 CATALOG

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GENERAL ADMINISTRATION

THE CALIFORNIA STATE UNIVERSITY AND COLLEGES

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ACADEMIC CALENDAR 1975-76

APPLICATIONS & ADMISSIONS	*Summer Quarter 1975*	*Fall Quarter 1975*	*Winter Quarter 1976*	*Spring Quarter 1976*
System-wide initial application periods:	Aug. 1-30 for Spring 1976	Nov. 1-29 for Fall 1976	Feb. 2-27 for Summer 1976	June 2-30 for Winter 1977
Deadline to apply for admission to following quarter	Sept. 2 for Fall 1975	Nov. 14 for Winter 1976	Feb. 13 for Spring 1976	May 7 for Summer 1976
ACADEMIC INSTRUCTION				
Beginning of university year	June 23			
Beginning of quarter for faculty		Sept. 15		
Classes begin for all students	June 23	Sept. 18	Jan.-5	March 29
Final examinations	Aug. 27-29	Dec. 1-5	Mar. 15-19	June 7-11
Commencement				June 12
SCHEDULING AND REGISTRATION				
Orientation of new students	June 19	Sept. 17	Dec. 30	Mar. 25
Last day to drop classes without courses being recorded	June 27	Sept. 24	Jan. 9	Apr. 2
Last day to add classes or register late	July 2	Sept. 29	Jan. 14	April 7
Last day to withdraw & receive refund of M & S fees	July 7	Oct. 2	Jan. 19	April 12
Withdrawal after this date permitted only by petition and for serious and compelling reasons	July 14	Oct. 8	Jan. 23	Apr. 16
Last day to apply for current quarter graduation	July 25	Oct. 17	Jan. 30	April 16
Withdrawal from classes after this date permitted only by petition and only in emergency clearly beyond students control	Aug. 5	Nov. 6	Feb. 20	May 13
Current student deadline for next quarter scheduling	Aug. 8	Nov. 6	Feb. 11	Apr. 29 (Su) May 13 (F)
Academic Holidays				
Independence Day	July 4			
Veterans' Day		November 11		
Thanksgiving		November	27-28	
Christmas		Dec. 8-Jan. 2		
Washington's Birthday			February 16	
Memorial Day				May 31

CALENDAR 1975

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CALENDAR 1976

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THE CALIFORNIA STATE UNIVERSITY AND COLLEGES

The individual California State Colleges were brought together as a system by the Donahoe Higher Education Act of 1960. In 1972 the system became The California State University and Colleges and fourteen of the nineteen campuses received the title *University*.

The oldest campus — San Jose State University — was founded in 1857 and became the first institution of public higher education in California. The newest campus — California State College Bakersfield — began instruction in 1970.

Responsibility for The California State University and Colleges is vested in the Board of Trustees, whose members are appointed by the Governor. The Trustees appoint the Chancellor, who is the chief executive officer of the system, and the Presidents, who are the chief executive officers on the respective campuses.

The Trustees, the Chancellor and the Presidents develop systemwide policy, with actual implementation at the campus level taking place through broadly based consultative procedures. The Academic Senate of The California State University and Colleges, made up of elected representatives of the faculty from each campus, recommends academic policy to the Board of Trustees through the Chancellor.

Academic excellence has been achieved by The California State University and Colleges through a distinguished faculty, whose primary responsibility is superior teaching. While each campus in the system has its own unique geographic and curricular character, all campuses, as multipurpose institutions offer undergraduate and graduate instruction for professional and occupational goals as well as broad liberal education. All of the campuses require for graduation a basic program of "General Education-Breadth Requirements" regardless of the type of bachelor's degree or major field selected by the student. A limited number of doctoral degrees are offered jointly with the University of California.

Presently, under the system's "New Approaches to Higher Education," the campuses are implementing a wide variety of innovative programs to meet the changing needs of students and society. Among pilot programs under way are instructional television projects, self-paced learning plans, minicourses, and credit-by-examination alternatives. *The Consortium of The California State University and Colleges* fosters and sponsors local, regional, and statewide external degree and certificate programs to meet the needs of individuals who find it difficult or impossible to attend classes on a campus.

Enrollments in fall 1974 totaled nearly 292,000 students, who were taught by a faculty of 16,000. Last year the system awarded over 57 percent of the bachelor's degrees and 36 percent of the master's degrees granted in California. Over 465,000 persons have been graduated from the nineteen campuses since 1960.

TRUSTEES OF THE CALIFORNIA STATE UNIVERSITY AND COLLEGES

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The Honorable Mervyn Dymally *Lieutenant Governor of California*	State Capitol Sacramento 95814
The Honorable Leo McCarthy *Speaker of the Assembly*	State Capitol Sacramento 95814
The Honorable Wilson C. Riles *State Superintendent of Public Instruction*	721 Capitol Mall Sacramento 95814
Dr. Glenn S. Dumke *Chancellor of The California State University and Colleges*	5670 Wilshire Blvd. Los Angeles 90036

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Appointments are for a term of eight years expiring March 1 of the years in parentheses. Names are listed in order of appointment to the Board.

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William O. Weissich (1977)
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NOTICE

The Board of Trustees of The California State University and Colleges, in Section 43800 of Title 5 of the *California Administrative Code*, has reserved the right to add, amend, or repeal any of its regulations, rules, resolutions, standing orders, and rules of procedures, in whole or in part, at such time as it may choose. None shall be construed, operate as, or have the effect of an abridgement or limitation of any rights, powers, or privileges of the Trustees. The Chancellor reserves the right to add, amend or repeal any of his Executive Orders, at such time as he may choose, and the President of California State Polytechnic University, Pomona reserves the right to add, amend, or repeal provisions of this catalog and rules of the University, including handbooks, at such time as he may choose. No Executive Order shall be construed, operate as, or have the effect of an abridgement or limitation of any rights, powers, or privileges of the Chancellor nor shall any catalog provision or rule of the University be construed, operate as, or have the effect of an abridgement or limitation of any rights, powers, or privileges of the President.

THE CALIFORNIA STATE UNIVERSITY AND COLLEGES

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Dominguez Hills, California 90747
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Pomona, California 91768
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(714) 598-4592

California State University, Sacramento
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Sacramento, California 95819
James Bond, President
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San Bernardino, California 92407
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(714) 887-6311

San Diego State University
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San Diego, California 92115
Brage Golding, President
(714) 286-5000

Imperial Valley Campus
720 Heber Avenue
Calexico, California 92231
(714) 357-3721

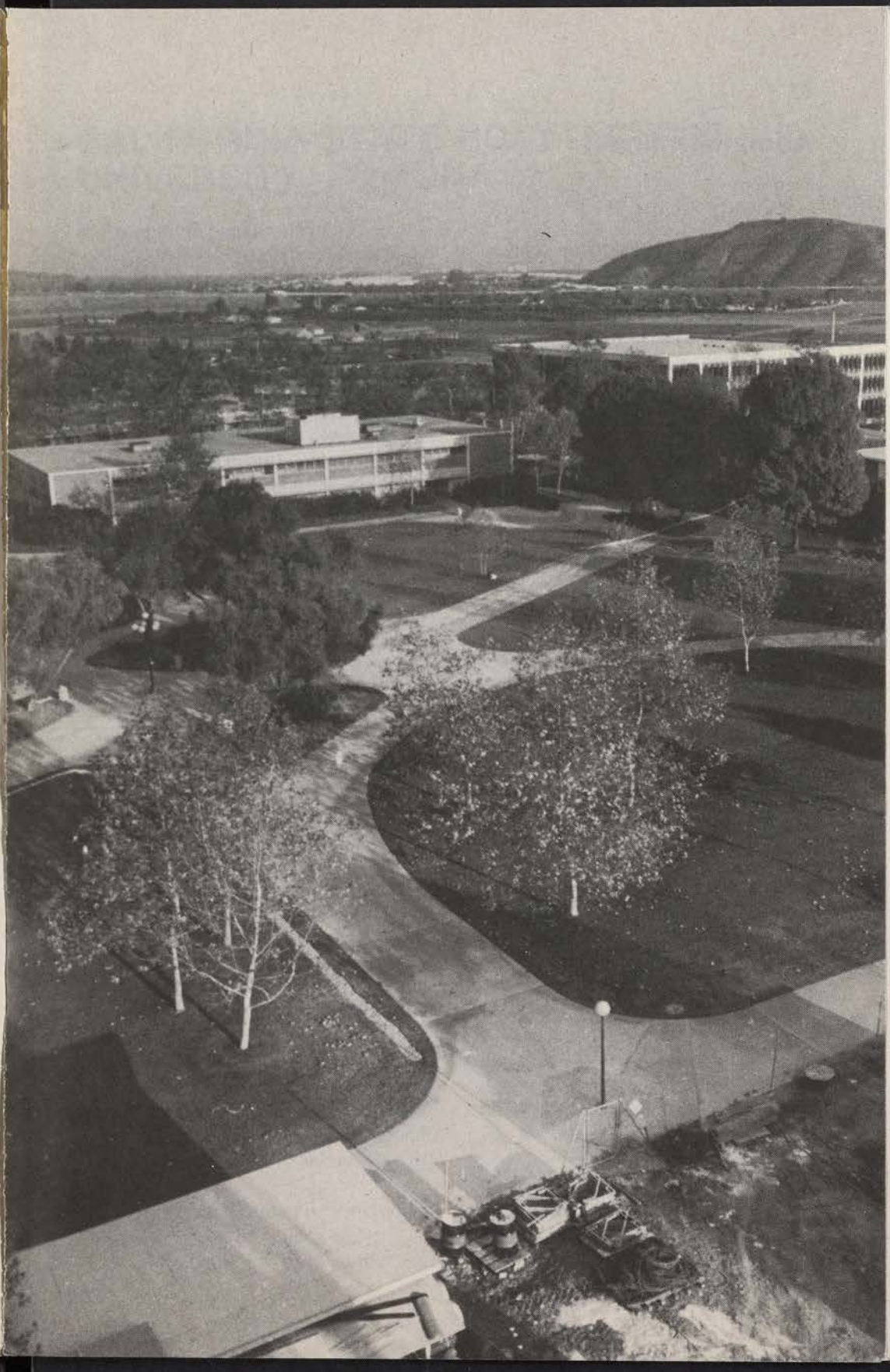
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1600 Holloway Avenue
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San Jose State University
125 South Seventh Street
San Jose, California 95192
John H. Bunzel, President
(408) 277-2000

California Polytechnic State University, San Luis Obispo
San Luis Obispo, California 93407
Robert E. Kennedy, President
(805) 546-0111

California State College, Sonoma
1801 East Cotati Avenue
Rohnert Park, California 94928
Marjorie Downing Wagner, President
(707) 795-2880

California State College, Stanislaus
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Turlock, California 95380
Carl Gatlin, President
(209) 634-9101



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Vice President for Academic Affairs
Hugh O. LaBounty, Jr.

Vice President for Administration and Student Affairs
James Bell

Director of Business Affairs
William E. Fox

Associate Vice President for Academic Affairs
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Associate Vice President for Administration
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Dean of School of Arts
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Reed M. Powell

Dean of School of Engineering
Beaumont Davison

Dean of School of Environmental Design
H. Frederick Koeper

Dean of School of Science
Vincent E. Parker

Director of Teacher Preparation Center
Alvin H. Thompson

Director of the University Library
Harold F. Wells

CALIFORNIA STATE POLYTECHNIC UNIVERSITY, POMONA

Robert C. Kramer, *President*

California State Polytechnic University, Pomona offers higher education in an atmosphere of free inquiry and social awareness. It offers its students the education and the opportunity to acquire skills, intellectual habits, critical attitudes, and broad perspectives which will help them function in, and contribute to a changing society.

Since its founding, the university has specialized in practical, occupationally centered learning. Today, it continues this role and also offers a liberal education to its students and prepares them for professional roles in a variety of fields. Its main purpose is to teach, but it also recognizes that research is important to good teaching and to the search for truth. Freedom of thought and expression are expected and encouraged in the classroom, the laboratory, and the co-curricular programs of the university.

Fundamentally, a university serves many communities through the success of its graduates, but it directs neither its curricula nor its students to the immediate needs of any community. Nonetheless, it recognizes the importance of continuing education for all who desire to increase their knowledge in order to meet society's changing requirements. The value of higher education lies in students prepared to take part in broadly construed social activities and to change and grow with them.

The goals of this university include a number of specific objectives:

1. To provide for all, regardless of origin, educational opportunities of excellent quality and to foster continued professional development.

2. To develop programs which strengthen the student's powers of inquiry, creativity, and adaptability for study and experimentation; to develop a capacity for disciplined thought, for breadth of sympathy, for discernment of values.

3. To find new and creative ways to foster the interaction among the technologies, the arts, and the sciences which lead to technological and social change.

4. To foster the individuality of each academic area in the university while assuring mutual support for the common goals.

5. To encourage the aesthetic and cultural development of the students and of the many communities the university serves.

6. To strengthen a tradition of the university for joint enterprise among students, faculty, and staff in the development of excellence.

7. To include all segments of the university community in developing university programs and policies.

The quality of a center of learning depends upon the people who are drawn to it as an institution with defined objectives and vision. In reaching for excellence in the pursuit of learning and education, something of worth happens to those who reach, and as a consequence the human community is enriched.

HISTORICAL DEVELOPMENT

In 1966, the California Legislature established California State Polytechnic College, Kellogg-Voorhis as an independent state college. Thus ended almost three decades of direct legal and administrative relationship between this institution and Cal Poly, San Luis Obispo. This rapidly growing, changing institution is proudly aware that it has its roots in an unusual two-campus specialized institution with a polytechnic emphasis.

In 1938, the 157-acre Voorhis Campus near San Dimas, formerly the Voorhis School for Boys, became the Southern California branch of California State Polytechnic School of San Luis Obispo. In 1945, the parent institution was renamed California State Polytechnic College.

The 813-acre W. K. Kellogg Arabian Horse Ranch near Pomona was deeded to the State in 1949, and in 1956 it became the second campus of the college's southern facility. Six programs in agriculture leading to four bachelor of science degrees were offered that year. By 1959, the curriculum of the college also included six degree programs in the arts and sciences and four in engineering. In 1962, the Voorhis campus became a continuing education center and a laboratory for students in agriculture and natural sciences.

Many changes that were to have a profound influence on the college were made in 1961. The implementation of the Master Plan for Higher Education saw the establishment of the California State University and College System with its own Board of Trustees. In that year, the Legislature enacted *Education Code* Section 22606 which identifies the primary function of the State Colleges as " . . . the provision of instruction for undergradute students and graduate students, through the master's degree, in the liberal arts and sciences, in applied fields and in the professions, including the teaching profession." The Legislature recognized the special responsibility of this college as a "polytechnic college" by adding Education Code Section 24751 which authorizes the college to emphasize " . . . the applied fields of agriculture, engineering, business, home economics, and other occupational and professional fields."

The 1966 establishment of California State Polytechnic College, Kellogg-Voorhis, Pomona, was accompanied by the appointment of Dr. Robert C. Kramer as president.

Since 1956, the educational programs have grown from 6 undergraduate programs enrolling 550 men to 53 undergraduate and 13 graduate programs enrolling over 10,000 men and women. The number of degrees granted increased from 54 in June 1957 to over 1900 in June 1974.

On November 29, 1971, the governor signed into law Assembly Bill 123, the enabling legislation to change the name of the California State Colleges to the California State University and Colleges and also authorizing changes in name of those colleges which would fill the description of university. This institution was one of those which met these criteria and on June 1, 1972, the name was changed to California State Polytechnic University, Pomona.

ACCREDITATION

The university is accredited as a

degree-granting institution by the Western Association of Schools and Colleges and is authorized by the California State Board of Education to recommend candidates for California Standard Teaching Credentials, both elementary and secondary specializations, in a number of subject areas.

The School of Engineering is accredited by the Engineering Council for Professional Development for its baccalaureate programs in aerospace engineering, civil engineering, electrical and electronics engineering, mechanical engineering, and chemical engineering.

The School of Environmental Design is accredited by the American Society of Landscape Architects for its program in landscape architecture and recognized by the American Institute of Planners for its program in urban planning.

The School of Science is accredited by the American Chemical Society for its program in chemistry.

UNIVERSITY SYMBOL

The Mace is the symbol of the university. The crest of the mace consists of five main branches, which combine in the trunk to symbolize strength. The branches symbolize the five disciplines of learning basic to the curricula of the university: the sciences, technology, the arts, the humanities, and commerce.

At the crown of the tree, the branches converge to support a sphere, symbolic of beauty and perfection arising from a study of the sciences, man and his works, learning, and the search for truth. The staff of the mace represents the strength of the university. On the upper section of the staff is inscribed "W. K. Kellogg Foundation" to honor the university's benefactor and the philanthropic agency created by him. On the knurl is inscribed the university's motto: INSTRUMENTUM DISCIPLINAE — Application of Knowledge. On the lower section of the staff is inscribed "Charles B. Voorhis" to memoralize the donor of the Voorhis School for Boys in San Dimas, an integral part of the university, which was its first site in Southern California. At the base of the staff is a stylized California poppy representing the State of California, denoting that from the state and its people comes the authority and support of the university.

The seal is the symbol of the official acts of the university. It appears on official documents and represents a verification of the university's approval of actions and events. It bears the symbolic elements of the mace. Surrounding the seal are two concentric circles bearing between them the designation "California State Polytechnic University, Pomona" the founding date, 1938, and above the tree the motto: INSTRUMENTUM DISCIPLINAE.

The emblem is a stylized tree with five main branches having smaller branches to symbolize department and other entities that arise from the parent structure. It is used on documents, publications, and other public forms.

The President's Medal symbolizes the office of the president. It is conferred upon the president by the chancellor, granting him his presidential authority. It reproduces the seal of the university in medallion form, supported by a chain of silver links.

On the reverse side is inscribed *"Auctoritas ex Administratoris et Collegio"*: "authority from the Trustees and the College". This denotes the delegation of authority to the president by the Trustees of the California State University and Colleges with the advice and consent of the convocation of the university.

The Campus

LOCATION

Located south of the San Bernardino Freeway on the eastern slope of Kellogg Hill, the campus is one of the largest in the state college system. The buildings represent a careful blending of the tile-roofed Spanish ranch structures built by W. K. Kellogg and the modern laboratory and classroom buildings of concrete and red brick. Campus development has preserved the beauty of the ranch and its original plantings. The combination of agricultural crops and livestock areas with science, engineering, and liberal arts facilities provides for the full range of instruction in the Cal Poly program. (see campus map on inside front cover)

A multi-level interchange, which is a link for the San Bernardino, Corona, Orange, Foothill, Pomona and Riverside Freeways, is located near the northeast corner of the campus. Now only forty minutes from the downtown areas of Los Angeles and San Bernardino, the university is also within easy freeway access from a multitude of other communities in Los Angeles, Orange, San Bernardino and Riverside counties. (see freeway map on inside back cover)

ADMINISTRATION BUILDING

A large three-story structure facing the central Mall, the administration building *(1) houses the university executive and business offices, various support services, and instructional units. The latter include a computer center, equipped with a digital computer and data processing equipment; faculty offices for language arts, and communication arts, journalism and student publications laboratories; and classrooms and conference rooms.

*Numbers in parentheses indicate building locations on map on inside front cover.

LIBRARY

The modern four-story library (15) which can accommodate more than a quarter of a million volumes was opened in 1969. The library is organized into subject divisional reading rooms providing specialized collections, indexes, and reference service. Direct access to the collections is permitted all students. Indoor and outdoor study areas are also provided.

AGRICULTURAL FACILITIES

The chief agricultural facility is the agriculture building (2) which contains laboratories, classrooms, faculty offices, and the school offices. Additional laboratories and offices are located in the new environmental design building (7).

The agricultural engineering building (45) houses shops, laboratories and classrooms for instruction in farm power and machinery, agricultural mechanics, carpentry, irrigation, and surveying.

Agricultural programs are also conducted at the fruit industries-agronomy unit (28) which includes a complete citrus packing house, and at the ornamental horticulture unit (19) which includes 15 plant production facilities.

Directly related to animal science and other agricultural programs are the production units: a beef unit, meats processing building, poultry plant and feed mill (30-34) and swine and sheep units (37-38).

The Arabian horse unit (26) and horse show arena are operated as an instructional facility and also used for the Sunday Arabian horse shows.

Campus acreage utilized by the School of Agriculture for instruction includes areas for field, vegetable, and forage crops, irrigated and natural pastures, citrus fruit and avocados and ornamental plantings.

ARTS FACILITIES

Facilities for the School of Arts are found in many areas of the campus. The school offices along with the departments of Behavioral Science, History, and Social Sciences are located in the School of Arts building (5). Besides general classrooms and faculty offices, the building also houses the Audio-Visual Center, the broadcast laboratories of the Communication Arts Department and the Teacher Preparation Center.

Journalism, student publication offices, and related faculty offices are located on the third floor of the Administration building (1). Facilities for teaching art classes are located in building 12.

The performing arts center is a two-building complex for instruction in music and speech and drama. The speech-drama building (25) contains a 500-seat theater, a large rehearsal room adaptable as a small central-staging theater, make-up and costume rooms, scenery shops, classrooms, and offices. The music building (24) includes choral and orchestra rooms, offices, individual practice rooms, and a music library.

The physical education facility (41-44) includes multi-purpose buildings for instruction in physical education, athletics, recreation, and specialized health and physical therapy programs. These facilities include gymnasiums, swimming pools, handball and tennis courts, fields for team sports, a track, a baseball field and a football field.

BUSINESS ADMINISTRATION FACILITIES

School of Business Administration operations are centered in the two-story business building (6) on the central mall. This structure contains classrooms, accounting and business machine laboratories, facilities for merchandising displays, faculty offices, and the school offices. Some instructional facilities for the school are also located in the engineering center.

ENGINEERING FACILITIES

The engineering facilities consist of seven buildings dominated by a five-story engineering center (9), containing classrooms, electronics lab-

oratories, faculty offices, and a snack bar. Other structures contain equipment and facilities for instruction in aerospace, civil, chemical, electrical, electronics, industrial, and mechanical engineering, and engineering technology (10-14).

ENVIRONMENTAL DESIGN FACILITIES

The new 50,000 square foot environmental design building (7) was occupied in early 1971. It houses laboratories and classrooms for architecture, landscape architecture and urban planning, as well as faculty offices and the school offices.

SCIENCE FACILITIES

The science building (3), which was the first academic building on campus, contains two large lecture rooms, and classrooms, laboratories, and faculty offices for the Departments of Biological Sciences, Chemistry, and Physics and Earth Sciences. Specialized laboratories for biochemistry, botany, earth sciences, entomology, microbiology, radiation biology, radio chemistry, and zoology are located in the building. Mathematics classrooms and faculty offices are located in the engineering center (9).

Presently under construction is a science building addition about twice the size of the present science building. When completed, in 1975, the addition will house advanced science laboratories, the university computing center and the Department of Mathematics.

UNIVERSITY UNION

The University Union is designed for social, cultural, and recreational activities. It is a warm, casual building, with lounges, rooms in which to rest and read, a music listening room, exhibit areas, program areas, a little theatre, and several different types of food service. In addition, a working area for clubs and organizations and meeting rooms has been included. It is a short distance from the University Union to the duplex, which houses the offices of the student development department, the Associated Students, Inc. This building is directly across from the El Patio Bookstore and the student cafeteria. The business office of the ASI is located in the university union.

STUDENT RESIDENCE AREA

Six residence halls (20, 21, 22, 23, 57, 58) accommodating 1184 students line North Campus Road. Behind the halls is a 600-seat residence student dining commons (70). Overlooking the pond is the residence reception center (59) which includes lounges and facilities for social events, and the residence hall activities office.

HEALTH CENTER

The health center (46) includes facilities for X-ray, physical therapy, laboratory tests, and emergency care and treatment and beds for day care, as well as physicians' consultation, treatment, and examination rooms. Although there are no infirmary rooms, rest facilities are available.

OFFICIAL RESIDENCES

The Manor House (111) is the official residence of the university president and his family; Kellogg Hall (112) and its accompanying guest house are now used for meetings, social events, and housing of college guests. The adjoining grounds and ponds, and the collections of specimen plants in Sycamore and Palm Canyons, provide interesting natural settings for the campus.

KELLOGG WEST

On the hill overlooking the central mall is Kellogg West (76-77), the university's new center for continuing education. The main building contains an auditorium, meeting rooms, exhibit areas, and dining facilities for 700 people. The second building contains residence facilities for 102 people.

Continuing Education

Institutions of higher education have recognized a growing demand for providing educational opportunities for those seeking education other than the full-time student. The university has recognized that obligation, and through its facilities and resources has provided opportunities to help the teacher upgrade and keep current on the knowledge in his or her field, to provide school workers with additional training so that they may perform their duties more efficiently, to allow the homemaker to continue her education, which otherwise might be stopped because of her daytime obligations, to offer the scientist or engineer the opportunity to sharpen his talents by working on current subjects in his field, to assist businesses and organizations in training and upgrading their members, and to help other interested people obtain specialized knowledge in areas of their interest.

Cal Poly has one of the most comprehensive continuing education programs of any of the California State University and Colleges.

In August, 1972, the office of educational services within which the extension programs operate relocated to Kellogg West, the multi-million dollar center for continuing education. With this consolidation under one roof, Cal Poly services which provide surrounding communities with continuing education opportunities began operating together.

Continuing education opportunities at Cal Poly can generally be organized into two main areas: conferences and institutes, which serve businesses and organizations, and extension which serves the individual.

Through a staff of professional conference coordinators, Kellogg West provides businesses and organizations with modern facilities, assistance in program planning, professional evaluation, securing effective resources and teacher personnel for conferences and institutes. Its location on a university campus enables Kellogg West to make use of the resources and teaching staff on campus.

Kellogg West's modern facilities have provided lodging for conferees from all over the United States and the world. Adajacent to the conference center, is an air-conditioned lodge with 51 double-occupancy rooms. Meeting rooms, a large auditorium accommodating 250 individuals, dining facilities and a public coffee shop are located in the conference center.

Since its opening in April, 1971, more than 1750 banks, retail businesses, government organizations, associations, churches, corporations, clubs and educational institutions have used the facilities at Kellogg West. The complex was made possible by a $3 million grant from the W. K. Kellogg Foundation in Battle Creek, Michigan, and is the 10th continuing education facility funded by the foundation. It is the first established within a statewide system of higher education, the California State University and Colleges.

For the individual adult learner, Cal Poly has provided extension classes since 1969. Extension classes are offered throughout the year at various locations throughout the Pomona and San Gabriel valleys. Subjects range from agriculture to zoology, and from scuba diving to teacher preparation.

Extension courses offer adults who cannot attend daytime classes, a chance to earn upper division university credit during evenings. At the same time, formal admission to the uiversity is not required.

Extension classes are offered for students who do not want to go through the university's formal matriculation process, or who wish to complete their course of study in a short time. Courses vary in length, from a few days to several weeks. Especially featured during the summer are a number of equitation workshops, horseshoeing workshops, mission trails which visit Southern California missions, camping trips and teacher prep courses.

For further information on extension or to regularly receive a catalogue, contact the extension offices at Kellogg West, California State Polytechnic University, Pomona, California 91768, or call (714) 595-7511.

If your business, organization or club is interested in developing or holding a conference, institute or seminar at Kellogg West, contact the bookings and reservations office, at the same address and telephone number.

Cal Poly Foundation

The Cal Poly Foundation, Inc. was organized and is operated to provide essential services and facilities which are an integral part of the educational programs of the university but which would be difficult to conduct directly through state operation.

The foundation is a self-supporting organization whose resources are used exclusively to complement the university's programs.

Foundation activities include the operation of all food service facilities, including vending, the bookstore, and the fiscal administration for student instructional projects, supplementary health services, instructional research programs, international programs, workshops, conferences, institutes, and the Arabian horse show. Contracts and grants from public and private agencies that are awarded to the university are administered by the foundation.

The foundation was created on February 28, 1966 as a non-profit educational organization under the provisions of the *California Revenue and Taxation Code,* Section 23701 (d) and the *United States Internal Revenue Code,* Section 501 (c) (3). It operates in conformity with regulations established by the Trustees of the California State University and Colleges and approved by the California State Director of Finance as required by the *California Education Code,* Section 24054. It is administered and supervised by the university administrative organization as required by Title 5, *California Administrative Code,* Section 42601 (c).

Alumni Association

The California State Polytechnic University, Pomona Alumni Association, Inc. is an association of graduates, former students and friends of the university. The operations of the organization are carried out by a board of directors comprised of a president, a secretary, a treasurer, six vice presi-

dents representing the instructional schools of the university, a vice president in charge of special interest groups, fourteen directors, a student representative from the Associated Students, Inc., a university representative appointed by the president of the university, and the past president of the association.

In addition to regional and local meetings of alumni, the association welcomes members to receptions during Poly Vue, organizes class reunions, maintains the records of all graduates, is responsible for all alumni publications, including the official alumni newsletter, the *Challenge*, and annually honors a distinguished alumnus. Other service activities include representing the alumni on several university-wide committees, to include the University Union Board, the Friends of the Library, and the school advisory committees, and sponsoring the Cal Poly Alumni Association Student Loan Fund and the Voorhis Alumni Association Scholarship.

Information about the association may be obtained by contacting the university's alumni office.

Arabian Horse Program

The oldest campus tradition is the Arabian horse show, first started by W. K. Kellogg in 1926, and continued after his ranch became a university campus. Public performances are given every Sunday January through July at 2 and 3:30 p.m. The program, featuring the Arabian as an English, western, stock, trick and jumping horse, is planned and produced by students working with horses they have trained.

The shows are designed to promote interest in the Arabian breed and point up the horse's versatility, beauty, and intelligence, as well as to offer valuable experience for students in handling horses. The Arabians are utilized in the animal science courses related to the ever expanding field of light horse production and training. The Kellogg Ranch has been one of the world's outstanding Arabian horse breeding farms, and the university continues the breeding program today, perpetuating the Arabian and making valuable blood lines available to the public. The Kellogg Arabians are a noted attraction for thousands of Southern Californians and tourists who view the show each year.

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ADMISSIONS

Application Procedures

ADMISSION TO THE CAMPUS

Requirements for admission to California State Polytechnic University, Pomona are in accordance with Title 5, Chapter I, Subchapter 3, of the *California Administrative Code*. A prospective applicant who is unsure of his status under these requirements is encouraged to consult a high school or college counselor or the admissions office. Applications may be obtained from the admissions office at any of the campuses of The California State University and Colleges or at any California high school or community college.

UNDERGRADUATE APPLICATION PROCEDURES

Prospective undergraduates, whether applying for part-time or full-time programs of study in day or evening classes, must file a complete application including all the required forms and fees as described in the application booklet. The $20.00 nonrefundable application fee should be in the form of check or money order payable to The California State University and Colleges. Undergraduate applicants may file only at their first choice campus. Alternate choice campuses and majors may be indicated on the application, but an *applicant should list as alternate campuses only those campuses of The California State University and Colleges that he will attend if his first choice campus cannot accommodate him*. Generally, alternate degree majors will be considered at the first choice campus before an application is redirected to an alternate choice campus. Applicants will be considered automatically at the alternate choice campus if the first choice campus cannot accommodate them. *Transcripts and other supporting documents should not be submitted until requested by the campus.*

CATEGORY QUOTAS AND SYSTEM-WIDE IMPACTED PROGRAMS

Application category quotas have been established by some campuses, in some majors, where the number of applicants is expected to exceed campus resources. All applications received in the initial filing period will receive equal consideration for such categories. Certain undergraduate programs (architecture, natural resources, nursing, and physical therapy) are impacted throughout the 19-campus system, and applicants to such programs are expected to meet supplementary admission criteria for admission to these programs. Applicants to these major programs will be sent further information by the campuses about the supplementary criteria to be used, and how and when applicants must meet them.

POST-BACCALAUREATE APPLICATION PROCEDURES

Applicants for any type of post-baccalaureate status (master's degree applicants, those seeking credentials, and those interested in taking courses for professional growth, etc.) must file a complete application within the appropriate filing period. *Second baccalaureate degree aspirants should apply as undergraduates.* A complete application for post-baccalaureate

status includes all of the materials required for undergraduats applicants plus the supplementary graduate admission application. Post-baccalaureate applicants who completed undergraduate degree requirements and graduated the preceding term are also required to submit an abbreviated application and the $20.00 nonrefundable application fee. In the event that a post-baccalaureate applicant wishes to be assured of initial consideration by more than one campus, it will be necessary to submit a separate application (including fee) to each. Applications may be obtained from the graduate studies office of any California State University or College campus in addition to the sources noted for undergraduate applicants.

For additional information see the graduate section of this catalog.

SPACE RESERVATIONS

Applicants who apply during the initial filing period and who can be accommodated will receive a space reservation. A space reservation is not a statement of admission but is a commitment by California State Polytechnic University, Pomona to admit the student once eligibility has been verified. The space reservation directs the applicant to arrange to have appropriate records forwarded promptly to the office of admissions. Applicants should not request that any records be forwarded until they have received a space reservation notice.

UNDECLARED MAJOR

A first-time freshman student is allowed the option of declaring a major upon entrance to the university, or of entering the university without declaring a major. Individuals who enter as freshmen and who do not choose to declare a major at the time of entrance, must make the decision and declare a regular academic major by the end of the third quarter in attendance at the university. Individuals who transfer to the university at a level other than freshman will declare a major upon application to the university.

APPLICATION FILING PERIODS

Term	*Initial Filing Period*	*Extended Filing Period*
Summer	the previous February	March until filled
Fall	the previous November	December until filled
Winter	the previous June	July until filled
Spring	the previous August	September until filled

HARDSHIP PETITIONS

There are established procedures for consideration of qualified applicants who would be faced with extreme hardship if not admitted. Prospective hardship petitioners should contact the admissions office regarding specific policies governing hardship admission.

Undergraduate Admission Requirements

First-time freshman eligibility is governed by an eligibility index. The index is computed using the high school grade point average on all course work completed in the last three years of high school, exclusive of physical education and military science; and the ACT composite, or the SAT total score. The full table of grade point averages, with corresponding test scores and the equation by which the index is computed, is reproduced on p. 27. Test results of either the CEEB Scholastic Aptitude Test (SAT) or the American College Testing program examination X(ACT) are acceptable in establishing eligibility.

Registration forms and test dates for either test may be obtained from school or college counselors, from the addresses below, or from the admissions office. For either test, submit the registration form and fee at least one month prior to the test date.

ACT Address

American College Testing Program
Registration Unit
P.O. Box 168
Iowa City, Iowa 52240

SAT Address

College Entrance Examination Board
P.O. Box 1025
Berkeley, California 94770

FIRST-TIME FRESHMEN (CALIFORNIA HIGH SCHOOL GRADUATES AND RESIDENTS)

An applicant who is a graduate of a California high school or a legal resident for tuition purposes must have an eligibility index which places him among the upper *one-third* of California high school graduates. The minimum acceptable index for applicants using the SAT score is 3072; using the ACT score, 741.

FIRST-TIME FRESHMEN (HIGH SCHOOL GRADUATES FROM OTHER STATES AND U.S. POSSESSIONS)

The admissions requirements for non-resident applicants are more restrictive than those for California residents. An applicant who is a non-resident for tuition purposes and is a graduate of a high school outside California must have an eligibility index which places him among the upper *one-sixth* of California high

school graduates. The minimum acceptable index for non-resident applicants using the SAT score is 3402; using the ACT score, 826.

FIRST-TIME FRESHMEN (HIGH SCHOOL NON-GRADUATES)

An applicant who is over 18 years of age, but who has not graduated from high school will be considered for admission only when preparation in all other ways is such that the campus believes promise of academic success is equivalent to that of eligible California high school graduates.

UNDERGRADUATE TRANSFERS (RESIDENT AND NON-RESIDENT)

Beginning fall term 1974, transfer eligibility is based on *transferable* college units attempted, rather than on *all* college units attempted. The California community college transfer should consult his college counselor for information on transferability of courses. An applicant in good standing at the last college attended may be admitted as an undergraduate transfer if he meets either of the following requirements:

1. was eligible for admission in freshmen standing (see First-Time Freshman requirements) and has earned an average grade of "C" (2.0 on a scale where A = 4.0) or better in all transferable college units attempted.
2. has completed at least 56 transferable semester units or 84 transferable quarter units with an average grade of "C" (2.0 on a scale where A = 4.0) or better if a California resident. Non-residents must have a G.P.A. of 2.4 or better.

ELIGIBILITY INDEX

The following chart is used in determining the eligibility of graduates of California high schools (or California legal residents) for freshman admission to a CSUC campus. Grade point averages are based on work completed in the last three years of high school, exclusive of physical education and military science. Scores shown are the SAT total and the ACT composite. Students with a given G.P.A. must demonstrate the attainment of the necessary test score as shown in the table. Conversely, students with a given ACT or SAT score must demonstrate the attainment of the necessary G.P.A. as shown in the table in order to be eligible.

The minimum eligibility index is: SAT = 3072 and ACT—741. The index is computed either by multiplying the grade point average by 800 and adding it to the total SAT score, or multiplying the grade point average by 200 and adding it to 10 times the composite ACT score.

G.P.A.	A.C.T. Score	S.A.T. Score	G.P.A.	A.C.T. Score	S.A.T. Score	G.P.A.	A.C.T. Score	S.A.T. Score	G.P.A.	A.C.T. Score	S.A.T. Score	G.P.A.	A.C.T. Score	S.A.T. Score
(-)[1]			2.96	15	704	2.71	20	904	2.47	25	1096	2.22	30	1296
3.20	11	512	2.95	16	712	2.70	21	912	2.46	25	1104	2.21	30	1304
3.19	11	520	2.94	16	720	2.69	21	920	2.45	26	1112	2.20	31	1312
3.18	11	528	2.93	16	728	2.68	21	928	2.44	26	1120	2.19	31	1320
3.17	11	536	2.92	16	736	2.67	21	936	2.43	26	1128	2.18	31	1328
3.16	11	544	2.91	16	744	2.66	21	944	2.42	26	1136	2.17	31	1336
3.15	12	552	2.90	17	752	2.65	22	952	2.41	26	1144	2.16	31	1344
3.14	12	560	2.89	17	760	2.64	22	960	2.40	27	1152	2.15	32	1352
3.13	12	568	2.88	17	768	2.63	22	968	2.39	27	1160	2.14	32	1360
3.12	12	576	2.87	17	776	2.62	22	976	2.38	27	1168	2.13	32	1368
3.11	12	584	2.86	17	784	2.61	22	984	2.37	27	1176	2.12	32	1376
3.10	13	592	2.85	18	792	2.60	23	992	2.36	27	1184	2.11	32	1384
3.09	13	600	2.84	18	800	2.59	23	1000	2.35	28	1192	2.10	33	1392
3.08	13	608	2.83	18	808	2.58	23	1008	2.34	28	1200	2.09	33	1400
3.07	13	616	2.82	18	816	2.57	23	1016	2.33	28	1208	2.08	33	1408
3.06	13	624	2.81	18	824	2.56	23	1024	2.32	28	1216	2.07	33	1416
3.05	14	632	2.80	19	832	2.55	24	1032	2.31	28	1224	2.06	33	1424
3.04	14	640	2.79	19	840	2.54	24	1040	2.30	29	1232	2.05	34	1432
3.03	14	648	2.78	19	848	2.53	24	1048	2.29	29	1240	2.04	34	1440
3.02	14	656	2.77	19	856	2.52	24	1056	2.28	29	1248	2.03	34	1448
3.01	14	664	2.76	19	864	2.51	24	1064	2.27	29	1256	2.02	34	1456
3.00	15	672	2.75	20	872	2.50	25	1072	2.26	29	1264	2.01	34	1464
2.99	15	680	2.74	20	880	2.49	25	1080	2.25	30	1272	2.00	35	1472
2.98	15	688	2.73	20	888	2.48	25	1088	2.24	30	1280	(-)[2]		
2.97	15	696	2.72	20	896				2.23	30	1288			

[1]Students earning grade point averages above 3.20 are eligible for admission.
[2]Students earning grade point averages below 2.0 are not eligible for admission.

ENTRANCE PREPARATION

Overall excellence of performance in high school subjects and evidence of academic potential provide the basis for success in college. While no specific high school course pattern is required, the applicant, to prepare himself to undertake a full program of studies and to pursue the required program in general education, is encouraged to include in his high school program subjects which provide a background for college work.

The following courses are recommended:

1. College preparatory English.
2. Foreign language.
3. College preparatory mathematics.
4. College preparatory laboratory science.
5. College preparatory history and/or social science.
6. Study in speech, music, art, and other subjects contributing to general academic background.

Admission as an Undergraduate Transfer

Any individual who has attempted college work will be considered for admission under one of the following provisions.

APPLICANTS WITH 56 OR MORE SEMESTER UNITS

An applicant who has completed 56 or more transferable semester units (84 quarter units) or the equivalent at an accredited college or university is eligible for admission if he has achieved a grade point average of 2.0 (C) on all acceptable college work attempted and was in good standing at the last college he attended.

Non-resident applicants must have attained a grade point average of at least 2.4 (C+).

APPLICANTS WITH FEWER THAN 56 SEMESTER UNITS

An applicant who has completed fewer than 56 transferable semester units (90 quarter units) or the equivalent at an accredited college or university may be admitted if he meets the above scholarship and good standing requirements and if he meets requirements currently in effect for first-time freshmen or, if he has been in full-time continuous enrollment at a college since his graduation from high school and he meets the requirements that were in effect for first time freshmen at the time of his high school graduation.

Either ACT or SAT test results are required of transfer applicants with fewer than 60 semester units (90 quarter units).

APPLICANTS WITH PARTICULAR MAJORS

An applicant who does not meet either of the above provisions may be admitted to the university if his desired major is such that 60 units (90 quarter units) of work appropriate to that major are not offered by the institution from which he seeks to transfer, and if he:

1. has completed all appropriate course work offered at the college from which he will transfer.
2. has attained a grade point average of 2.0 (C) in all college work attempted.

3. was in good standing at the last college attended.
4. can, in the judgment of the university, succeed in his degree objective.

OTHER APPLICANTS

Applicants not admissible under one of the above provisions should enroll in a junior college or other appropriate institution. Only under the most unusual circumstances will such applicants be permitted to enroll in the university. Permission is granted only by special action.

PROVISIONAL ADMISSION

A student transferring from a non-accredited institution may be granted provisional admission if he meets the above requirements.

A student who was on probation at the time of leaving the most recent college or university attended may be granted only provisional admission.

Admission from Schools and Colleges in Foreign Countries

The admission of international (foreign) students is governed by separate requirements.

The official transcript of record and other credentials of an applicant for admission from a foreign country should be submitted in a certified English language translation. They will be evaluated under the regulations governing foreign student admissions. All papers required for completion of the application for admission should be submitted to the admissions office at least three months before the opening of the quarter for which the applicant hopes to gain admittance. This early application allows sufficient time for the necessary correspondence relative to entrance and, if the applicant is admitted, will aid him in obtaining the necessary travel documents.

An applicant from a foreign country may be admitted only after demonstrating that his command of the English language will permit him to profit from instruction in this university. An applicant will be asked to take an English language test in his own country or one administered by the university.

All foreign students and students with permanent resident status who cannot demonstrate the necessary level of fluency in the English language (to be determined by the Department of English) must take ENG 102 and ENG 103 (English as a Second Language) in addition to the degree requirements of their major department. All other students must fulfill the basic English requirement.

An applicant who is a graduate of a foreign high school must have preparation deemed by the university to show promise of academic success. All applicants are not required to take the ACT or SAT, however some may be required to do so.

For information on admission of foreign students to graduate study, see the section of this catalog on admission as a graduate or post-baccalaureate student.

GRADUATES OF HIGH SCHOOLS IN A FOREIGN COUNTRY

Applicants who are graduates of foreign high schools must have preparation at least equivalent to that re-

quired of eligible California high school graduates. The university will carefully review the previous record of all such applicants and only those with promise of academic success equivalent to that of eligible California high school graduates will be admitted. Such applicants are not required to take the SAT and/or ACT except when specifically requested to do so.

Redirection

It is not always possible for the university to accommodate all qualified applicants. If an application is accepted and it later becomes evident that space will not be available, it and any supporting documents will, at the request of the applicant, be forwarded to any state college or university where space is available. No additional application fee is required.

Graduate and Post-Baccalaureate Admission

University admission criteria for graduate and post-baccalaureate applicants will be found in the section of this catalog dealing with graduate announcements, beginning on p. 335.

Determination of Residence for Non-Resident Tuition Purposes

New and returning students of The California State University and Colleges are classified for the purpose of determining the residence of each student for nonresident tuition purposes. The residence questionnaire and, if necessary, other evidence furnished by the student is used in making these determinations. A student may not register and enroll in classes until his residence questionnaire has been received by the admissions office.

The following statement of the rules regarding residency determination for non-resident tuition purposes is not a complete discussion of the law, but a summary of the principal rules and their exceptions. The law governing residence determination for tuition purposes by the California State University and Colleges are found in *Education Code Sections* 22800-22865, 23753.1, 23754-23754.4, 23-758.2, and 23752, in Title 5 of the *California Administrative Code,* Article 4 (commencing with Section 41-901) of Sub-chapter 5 of Chapter 1, Part V. A copy of the statutes and regulations is available for inspection at the campus admissions office.

Legal residence may be established by an adult who is physically present in the state while, at the same time, intending to make California his permanent home. Steps must be taken at least one year prior to residence determination date to evidence the intent to make California the permanent home with concurrent relinquishment

of the prior legal residence. Some of the relevant indicators of an intention to establish and maintain California residence may be established by registering to vote and voting in elections in California; satisfying resident California state income tax obligations on total income; ownership of residential property or continuous occupancy or letting of an apartment on a lease basis where one's permanent belongings are kept; maintaining active resident memberships in California professional or social organizations; maintaining California vehicle plates and operator's license; maintaining active savings and checking accounts in California banks; maintaining permanent military address and home of record in California if one is in the military service.

The student who is within the state for educational purposes only does not gain the status of resident regardless of the length of his stay in California.

In general, the unmarried minor (a person under 18 years of age) derives legal residence from his father (or from his mother if the father is deceased), or in ths case of permanent separation of the parents, from the parent with whom the minor maintains his place of abode. The residence of a minor cannot be changed by act of the minor or that of the minor's guardian, so long as the minor's parents are living.

A man or a woman may establish his or her residence; marriage is not a governing factor.

The general rule is that a student must have been a California resident for at least one year immediately preceding the residence determination date in order to qualify as a "resident student" for tuition purposes. A residence determination date is set for each academic term and is the date from which residence is determined for that term. The residence determination dates for the 1975-1976 academic year.

QUARTER TERM CAMPUSES

Fall — September 20, 1975
Winter — January 5, 1976
Spring — April 1, 1976
Summer — July 1, 1976

SEMESTER TERM CAMPUSES

Fall — September 20, 1975
*Winter — January 5, 1976
Spring — January 25, 1976

*Applies only to Winter term in Stanislaus experimental calendar.

If you have any questions respecting the applicable date, the campus admissions office can give you the residence determination date for the term for which you are registering.

There are several exceptions for nonresident tuition. Some of the exceptions provide for:

1. Persons below the age of 19 whose parents were residents of California but who left the state while the student was still a minor. When the minor reaches age 18, an exception is granted for one year to enable the student to qualify as a resident student.
2. Persons below the age of 19 who have been present in California for more than a year before the residence determination date, and entirely self-supporting for that period of time.
3. Persons below the age of 19 who have lived with and been under the continuous direct care and control of an adult, not a parent, for the two years immediately preceding the

residence determination date. Such an adult must have been a California resident for the most recent year.

4. Dependent children and spouses of persons in active military service stationed in California on the residence determination date. This exception applies only for the minimum time required for the student to obtain California residence and maintain that residence for a year. The exception is not affected by transfer of the military person directly to a post outside the 50 states and the District of Columbia.
5. Military personnel in active service stationed in California on the residence determination date for purposes other than education at state-supported institutions of higher education. This exception applies only for the minimum time required for the student to obtain California residence and maintain that residence for a year.
6. A student who is an adult alien is entitled to residence classification if the student has been lawfully admitted to the United States for permanent residence in accordance with all applicable provisions of the laws of the United States; provided, however, that the student has had residence in California for more than one year after such admission prior to the residence determination date. A student who is a minor alien shall be entitled to residence classification if both the student and the parent from whom residence is derived have been lawfully admitted to the United States for permanent residence in accordance with all applicable laws of the United States, provided that the parent has had residence in California for more than one year after acquiring such permanent residence prior to the residence determination date of the term for which the student proposes to attend the university.
7. Certain credentialed, full-time employees of school districts.
8. Full-time State University and Colleges employees and their children and spouses. This exception applies only for the minimum time required for the student to obtain California residence and maintain that residence for a year.
9. Certain exchange students.
10. 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.
11. A person in continuous full-time attendance at an institution who had resident classification on May 1, 1973, shall not lose such classification as a result of adoption of the uniform student residency law on which this statement is based, until the attainment of the degree for which currently enrolled.

Any student, following a negative decision on campus on his residence classification, may make written appeal to:

Office of General Counsel
5670 Wilshire Boulevard
Suite 1260
Los Angeles, California 90036

within 120 calendar days of notification of the final decision on campus. The office of the general counsel may

make a decision on the issue, or it may send the matter back to the institution with instructions for a further review on campus. Students classified incorrectly as residents or incorrectly granted an exception from nonresident tuition are subject to reclassification as nonresidents and payment of nonresident tuition in arrears. If incorrect classification results from false or concealed facts, the student is subject to discipline pursuant to Section 41301 of Title 5 of the *California Administrative Code*. Resident students who become nonresidents, and nonresident students qualifying for exceptions whose basis for so-qualifying changes, must immediately notify the admissions office. Applications for a change in classification with respect to a previous term are not accepted.

The student is cautioned that this summation of rules regarding residency determination is by no means a complete explanation of their meaning. The student should also note that changes may have been made in the rate of nonresident tuition, in the statutes, and in the regulations between the time this catalog is published and the relevant residence determination date.

REGISTRATION

General Procedures

A new student will receive a registration fee statement with his notice of admission. Registration fees must be received in the accounting office not later than the deadline date indicated on the fee statement. Classes will not be scheduled nor an evaluation of transfer credit prepared until these fees are paid. A person applying or admitted late is not assured of classes or that an evaluation of transfer credit will be prepared before classes begin.

Instructions for registration of a continuing student are included in the class schedule issued prior to the opening of each quarter.

Credit for a course is given only when a student is properly registered in the university and successfully completes the course. An individual is not properly registered until all registration forms required by the registrar have been filed and fees paid. A student may not be admitted to a course unless he is properly registered in the university.

CONCURRENT ENROLLMENT

A student who wishes to register at another accredited institution while in attendance at this university must file a petition for concurrent enrollment. No credit will be granted for work taken at a college concurrent with work at this university unless this petition has been approved in advance. Petitions are available at the records office.

GRADUATE ENROLLMENT PRIORITIES

Departments with high gradute enrollments may assign priorities to students wishing to enroll in graduate-level courses. Applicants for a master's degree who are in the last quarter of residence have first priority; other classified graduate and post-baccalaureate students, degree or credential, have second priority; conditional and unclassified graduate and post-baccalaureate students have third priority. Nonobjective unclassified graduate students are admitted on a space-available basis.

HOLDING OF RECORDS

Student records may be placed on a hold status because of financial or other obligations to the university. While the student's records are on hold he will not be allowed to register, nor will transcripts of credits be released. Records will be held until the obligation is cleared to the satisfaction of the office or department instituting the hold. Legal authority for these actions is cited in Sections 42380 and 42381 of *Title 5* of the *California Administrative Code*.

HONORABLE DISMISSAL

Honorable dismissal automatically will be noted on the transcript of each student who graduates or withdraws from the university, unless he has been disqualified because of misconduct.

MAXIMUM UNIT LOAD

The maximum number of units an undergraduate student may take in any one quarter is 20, including audited courses and approved concurrent work at other colleges or universities. The normal maximum for graduate students is 16 units. Exceptions may be made upon the advance approval of a "Petition to Carry an Excess Load" by the dean of the school in which the student is registered. Maximum program limits will be waived only upon presentation of evidence of the student's ability to successfully complete such a group of courses.

ADDING OR DROPPING COURSES

Each student is responsible for *every* course listed on his official program card. Any change,-which is an addition or deletion of a course or change in section, must be made on the proper form and filed with the registrar's office on or before the dates published in the academic calendar. Forms for changes in program may be obtained from the student's adviser.

Courses may be added or sections changed through the 8th day of classes. Courses may be dropped without penalty (no grade assigned) through the 5th day of classes. After this date and through the seventh week of classes, a student may withdraw from a course in which he is enrolled only for serious and compelling reasons. Permission to withdraw during this time period will be granted only with the approval of the professor, the department chairman, and the school dean. All requests for permission to withdraw under these circumstances and all approvals shall be made in writing on a withdrawal petition which states the reasons for the withdrawal. For course withdrawals during this period the instructor will assign a grade of W.

Withdrawals shall not be permitted during the final three weeks of instruction except in cases where the cause of withdrawal is due to circumstances clearly beyond the student's control. The appropriate grade will be assigned at the discretion of the instructor. Ordinarily, withdrawals in this category will involve total withdrawal from the university.

WITHDRAWAL FROM THE UNIVERSITY

Students who desire to withdraw from the university because of personal, academic or other problems should consult with, and obtain forms from, the Counseling Center. After official clearances are received by the student, the withdrawal application is submitted to the records office. Students leaving the university who do not officially withdraw are subject to failing grades in their classes. The grading policy for students who withdraw from the university after the 5th day of classes is the same as for students who drop courses after this date (see Adding or Dropping Courses).

LEAVE OF ABSENCE

When a student finds it necessary to interrupt his progress toward a degree for a reason related to the student's educational objective and acceptable to the appropriate university authorities, he may be granted a leave of absence. A student on leave of absence may, upon return from the

leave, continue in the same program he had prior to the leave, and he retains the right to elect requirements in effect at the time he entered or reentered the curriculum.

A leave of absence will be granted when the student has filed an approved petition with the Registrar. The leave petition, which must be approved by the applicant's adviser, department chairman, and school dean, shall specify the reasons for the leave and the duration of the leave. A student granted a leave of absence has a commitment from the university to be readmitted. This commitment must be validated by a written notice of return from leave for the quarter of return specified in the leave application submitted to the Registrar no later than 90 days after the opening date of the application filing period for that quarter.

The reason for requesting a leave must be stated completely and clearly. Approval will depend upon the significance of the leave in furthering the student's educational objective. It is the student's responsibility to demonstrate the significant relationship between his leave of absence and his progress toward his educational objective. Leaves may be granted for a maximum of two years or eight consecutive quarters. A request for leave of absence must be filed prior to the period of absence. Retroactive leave requests will not be approved.

Failure to return from leave as specified in the approved petition will be considered withdrawal from the university. Under such circumstances, reenrollment will require a full application for readmission under the same circumstances as any new or returning applicant including enrollment in the curriculum in effect at the time of reenrollment.

REFUNDS

Any student who withdraws from the university before the end of the second week is entitled to a refund of a portion of registration fees paid. A nonresident or foreign student who withdraws from the university or who drops units during the first four weeks of a quarter is entitled to a refund of a portion of tuition paid. A student must file an application for a refund with the records office at the time of withdrawal or dropping of units to be eligible for a refund. Applications for refund cannot be accepted at a later date. (see p. 42)

AUDITING COURSES

Auditing a course is attending classes for no credit. **A student must be registered and must have paid fees in order to audit a course.** Audited courses must be included on the student's official program card, and they are designated by AU beside the course unit listing. No exceptions to this policy are permitted.

Enrollment in any course as an auditor shall be permitted only after students otherwise eligible to enroll in the course on a credit basis have had an opportunity to do so. Auditors are subject to the same fee structure as credit students and regular class attendance is expected. Once enrolled as an auditor, a student may not change to credit status unless such a change is requested on or before the last day to add classes. The deadline for changing

from credit to audit is the same as for dropping a course. The materials and service fee is determined on the basis of the total units of both credit and audit courses in which the student is enrolled.

TRANSFER TO OTHER INSTITUTIONS

A student who plans to transfer from this university to another college or university, should, at the earliest possible date, request that his transcript of record be forwarded by the registrar's office (see Fees and Expenses Schedule for charges) to the new institution. Evaluation of transcripts will be made by the new institution.

Changes in Curriculum

CHANGE OF MAJOR

A student has the opportunity, upon determining that he is pursuing a course of study for which he has no aptitude or in which he is not interested, to change to another major. In such cases, a student should consult his adviser and the Counseling Center for assistance in making the change. Students enrolled under certain laws must obtain approval by the Veterans Administration before a change can be made.

Transfer from one major to another does not in any way change the student's scholastic standing.

CURRICULUM DEVIATION

Although the university has specified a program of courses for each major, under certain conditions, a student may be permitted to deviate from the established curriculum. Information regarding requests to deviate from the curriculum may be obtained from the student's adviser and the registrar's office.

REVISION OF REQUIREMENTS

A student in continuous attendance and continuing in the same curriculum may elect to meet the graduation requirements in effect either at the time of entering the curriculum or at any subsequent time prior to his graduation. Substitutions for discontinued courses not taken by the student may be authorized or required by the student's major department.

In the case of those transferring from a community college in California, the student may elect to continue in the curriculum in effect at the time of his first enrollment in the community college if he has been in continuous full-time enrollment.

A student granted a leave of absence may continue on the same degree program he had before leaving, so long as he complies with leave of absence regulations.

FULL-TIME EQUIVALENT AND FULL-TIME STUDENT

Enrollment in the California State University and Colleges system is measured in full-time equivalent (FTE) students. One FTE is the equivalent of fifteen units of student course credits taken by one or more students. One FTE could represent one student carrying 15 course-units, three students each carrying five course-units, five students each carrying three course-units, or any other student/course-unit combinations the product of which equals 15 course-units. The university's FTE enrollment is the total course-units taken by all students divided by fifteen.

FTE is not related to full-time student status. An undergraduate student is considered full time for such purposes as payment of fees, veterans' benefits, and other financial aids when he is enrolled for twelve units of credit. A full-time student is not necessarily a full-time equivalent (FTE) student. Graduate and post-baccalaureate students are considered as full time for most purposes, such as veterans' benefits, when they are enrolled for eight units.

THE STUDENT SERVICES FEE

The Student Services Fee for 1975-76 was recently established by the Trustees of The California State University and Colleges *in lieu* of the Material and Services Fee; however, the fee level was maintained at $144 (for 12 or more units for the Academic Year). It is intended that this new fee will provide financing for the following student services programs not covered by state funding:

1) Social and Cultural Development Activities: provides for the coordination of various student activities, student organizations, student government and cultural programs.
2) Counseling: includes the cost of counselor's salaries and clerical support plus operating expenses and equipment.
3) Testing: covers the cost of test officers, psychometrists, clerical support, operating expenses and equipment.
4) Placement: provides career information to students and faculty for academic program planning and employment information to graduates and students.
5) Financial Aids Administration: includes the cost of the counseling and business services provided in connection with the financial aid programs.
6) Health Services: provides health services to students and covers the cost of salaries of Medical Officers and Nurses plus related clerical and technical personnel as well as operating expenses and equipment.
7) Housing: includes the cost of personnel providing housing information and monitoring housing services provided to students.
8) Student Services Administration: covers 50% of the cost of the Dean of Students Office which has responsibility for the overall administration of student services.

Prior to 1975-76 the Student Services fee was known as the Materials and Service fee and not only covered the above expenditures but covered the cost of Instructional and Audio Visual supplies and contractual services. A Task Force recommended that responsibility for financing these expenditures be transferred to the State and that the basis for this fee be more adequately communicated to students and campus staff. It should be noted that the 1975-76 Student Services fee is subject to change by future Board of Trustees action made necessary by budget actions of the Executive and Legislative branches of government.

EXPENSES AND HOUSING

FEE SCHEDULE, 1975-76

Tuition is not charged to legal residents of California. The following reflects the fees and expenses for both the quarter and semester systems.

All Students

Application fee (non-refundable) payable by check or money order at time of applying..... $20

	Sem.	Qtr.
Student Services Fee for all campuses except California State College, Stanislaus		
(1-3.9 units).....	$51	$34
(4-7.9 units).....	$57	$38
(8-11.9 units).....	$63	$42
(12 and more units).....	$72	$48
California State College, Stanislaus		
Fall & Spring Semesters:		
(0-2.5 units).....	$42	
(3-6.5 units).....	$48	
(7-9.5 units).....	$54	
(10 or more units).....	$63	
Winter Term:		
(1-4 units).....	$18	
Facilities fee	$ 3	$ 2

Nonresident (U.S. and Foreign)

Nonresident tuition (in addition to those fees charged all students) for all campuses except California State College, Stanislaus:

	Sem.	Qtr.
Less than 15 units, per unit or fraction thereof	$ 43	$ 29
15 units or more, per term.....	$650	$433

California State College, Stanislaus:

	Term
Less than 13 units, per unit or fraction thereof	$ 43
13 or more units, per term.....	$563

Note: The total nonresident tuition charged shall not exceed $1,300 per academic year.

Summer Quarter

Fees for the summer quarter are the same as those indicated above for a regular quarter.

MISCELLANEOUS FEES

Application to the university (charged of all applicants—payable by check or money order at time of applying—*(nonrefundable)* ...	$20.00
Check returned for any cause...	5.00
Conference, Short Course or Institute, per person	Estimated cost
Course credit by special examination (per unit)	1.00
Failure to meet administratively required appointment or time limit.....	2.00
Graduation (not a state fee)	
Bachelor's degree.....	$10.00
Master's degree	10.00
Health facility fee.....	2.00
I.D. card.....	1.00
Late registration	5.00
Library	See schedule in library
Parking fee (per quarter).....	10.00
Transcript of record.....	1.00
Associated Students, Inc.*Membership fee (not a state fee)	
Fall quarter.....	10.00

Winter, Spring, Summer
quarter, each 5.00
University Union fee **(not a state fee)
Fall quarter 8.00
Winter, Spring quarter,
each 6.00
Summer quarter 3.00
*Education Code, Section 23801
**Education Code, Section 23805
Sponsored Program Fee
per quarter $100.00
(for certain foreign students only.)

Dependent on the time of withdrawal from the university, a student may be entitled to a partial refund of fees if applied for at the time of withdrawal. (See section on Withdrawal from the University.)

Refund of Fees

Materials and Service Fee:

There will be no refund of Materials and Service Fee for a decrease in units at any time.

Students who withdraw from all classes on or before the 14th calendar day following the 1st day of classes are entitled to a refund of all but $10 of the M & S Fee. Other fees are:

ASI Fee—before classes begin, 100 percent;
Fall Qtr.,
during 1st week $7.50
during 2nd week $5.00
Winter, Spring and Summer Qtrs.,
during 1st week $3.00
during 2nd week $2.00
University Union Fee—
before classes begin, 100 percent.
after classes begin, no refund.
Medical Facilities Fee—
before classes begin, 100 percent.
after classes begin, no refund.

Non-Resident Tuition Fees:

Students who pay a non-resident fee are entitled to a refund on non-resident fees paid when units are dropped. No refund will be made after the fourth week of classes. No refund will be made unless a written application for refund is filed at the time of the drop.

Refund scale for non-resident tuition fee

Drop during 1st week of classes
100% of non-resident fees
Drop during 2nd week of classes
75% of non-resident fees
Drop during 3rd week of classes
50% of non-resident fees
Drop during 4th week of classes
25% of non-resident fees
Drop after 4th week of classes -0-

In order to be eligible for a refund of any fees paid, a student must file an Application for Refund at the Records Office at the time of withdrawal. The application for refund form may be obtained from the records office.

Nonresident Tuition Fee Waiver

California school district employees who are not yet legal residents of California may be exempted from the non-resident tuition fee if they are provisionally certificated and if they are working toward fulfilling regular California credential requirements or completing a fifth year of study.

Children or spouses of California State University and Colleges employees are also eligible to apply for exemption from the nonresident fee.

Expenses

Estimated expenses for a California resident student living in a campus residence hall are $603 per quarter exclusive of personal expenses.

A student enrolling under the auspices of an agency supplying educational assistance should check in advance with the agency representative regarding payment of fees and/or costs.

The total cost for students living away from home will vary. However, typical costs will amount to approximately $1,700 for a three-quarter school year, *excluding* personal expenses.

Total expenses for nonresident and foreign students will be higher, as they will include tuition fees not required of legal California resident students.

Typical One Quarter Expenses

Associated Students, Inc. membership and college union fees	
Fall Quarter	$18.00
(Winter & Spring—$11 Summer—$18)	
Materials and service fee	48.00
Room and board (19 meals per week)	450.00
Books and supplies (estimated)	80.00
Parking	10.00
Health facility fee	2.00
Estimated total expenses	$603.00

Provision should be made for personal expenses which average $250 per quarter.

The student majoring in one of the environmental design disciplines should be prepared for expenditures that are somewhat greater than average. Experience has indicated that students spend from $150 to $250 per quarter for materials, equipment, and supplies during their initial year as environmental design students.

Debts Owed to the Institution

From time to time the student may become indebted to the institution. This could occur, for example, when the student fails to repay money borrowed from the institution. Similarly, debts occur when the student fails to pay institution, dormitory or library fees, or when the student fails to pay for other services provided by the institution at the request of the student. Should this occur, Sections 42380 and 42381 of *Title 5* of the *California Administrative Code* authorize the institution to withhold "permission to register, to use facilities for which a fee is authorized to be charged, to receive services, materials, food or merchandise or any combination of the above from any person owing a debt" until the debt is paid. For example, under these provisions the institution may withhold permission to register, and may withhold other services, such as grades and transcripts. If a student feels that he or she does not owe all or part of a particular fee or charge, the student should contact the campus business office. The business office, or another office on campus to which the student will be referred by the business office, will review the pertinent information, including information the student may wish to present, and will advise the student of its conclusions with respect to the debt.

Housing

The university on-campus residence program emphasizes educational activity as part of the total living experience. Concern for the student's personal, social, and intellectual development has resulted in a vigorous residence hall program based on student interests. Wing and hall governments, social events, cultural and recreational efforts and community living complement the academic schedule to create a living and learning environment.

Each of the six air-conditioned halls on the campus accommodates about 200 students in comfortable double rooms. Recreation and lounge facilities are provided for each hall, as are convenient laundry facilities, refreshment vending machines, kitchenettes, and ironing and study rooms. Student rooms are furnished with beds, dressers, wardrobes, bookcases, desks and chairs. Students supply their own pillows, blankets, towels, sheets, study lamps and room decorations. Dining facilities located in nearby Sycamore Canyon provide for outdoor or indoor dining. Breakfast, lunch, and dinner are offered weekdays, with brunch and dinner on Saturday and Sunday.

New students interested in on-campus housing should request a housing application at the time of application for admission to the university. Contracts issued for the academic year provide for both room and board. Residence hall fees were $1,275 for the 73-74 academic year and are expected to be increased to $1,325 . Payments may be made in periodic installments in accordance with the schedule available from the housing office.

Head resident positions are sometimes available to married graduate students who have no children. Interested applicants should communicate with the housing manager for information.

Off-Campus Housing

Privately-owned and operated off-campus housing is available for both men and women students. The university does not inspect or supervise these facilities. Inquiries about off-campus housing should be made in person at the housing office.

AVERAGE ANNUAL COSTS AND SOURCES OF FUNDS PER FULL-TIME EQUIVALENT* STUDENT IN THE CALIFORNIA STATE UNIVERSITY AND COLLEGES

The nineteen campuses of The California State University and Colleges are financed primarily through funding provided by the taxpayers of California. For the 1974/75 year, the total cost of operation is $603 million, which provides continuing support for 231,295 full-time equivalent (FTE*) students. This results in an average cost per FTE student of $2,608 per year. Of this amount, the average student pays $254. Included in this average student payment is the amount paid by nonresident students. The remaining $2,354 in costs are funded by state and federal taxes.

Averages do not fit all students alike or even any specific student. To arrive at an average figure that is meaningful, the costs outlined above exclude "user fees" for living expenses, housing, and parking, as well as costs for extension and summer session work. Computations are based on full-time equivalent students, not individuals, and costs are prorated by system totals, not by campus. The average costs for a full-time equivalent student in the system are depicted in the following chart:

1974/75
TOTAL COSTS OF CAMPUS OPERATION
(Including Building and Land Amortization)

Enrollment: 231,295 FTE

Amount	Amount	Average Cost Per Student (FTE)*	Percentage
State Appropriation (Support)	$448,163,528	$2,111	81.0
State Funding (Capital Outlay)**	28,615,000	124	4.8
Student Charges	58,806,800	254***	9.7
Federal (Financial Aids)	27,456,316	119	4.5
Total	$603,041,644	$2,608	100.0

*For budgetary purposes, full-time equivalent (FTE) translates total head count into total academic student load. The term assumes that a full-time student in The California State University and Colleges is enrolled for 15 units of academic credit. Some students enroll for more than 15 units; some students enroll for fewer than 15 units.

**The system's more than 14,000 acres of land and the wide range of facilities and equipment on the 19 campuses are currently valued at approximately $1.2 billion. Amortized over a 40-year period, they are valued at $125 per FTE student.

***The average costs paid by a student include the materials and service fee, health facilities fee, college union fee, student body fee, and the nonresident tuition. This amount is derived by taking the total of all student fees and dividing by the total full-time equivalent student enrollment. Individual students may pay more or less than $224 depending on whether they are part-time, full-time, resident or nonresident students.

SERVICES

Health and Medical

Medical services, paid for by the state and the student, are designed to provide, on an outpatient basis, the services usually rendered by the family physician. Any specialist care or hospitalization is at the student's expense unless student insurance is purchased at the time of enrollment (or the student is covered by another private insurance plan or under his parents' policy). All enrollees may utilize the health services daily, Monday through Friday, between 8:00 A.M. and 5:00 P.M., except holidays. In addition, a first aid room is maintained in room 121-A of the science building from 5:00 P.M. to 10:00 P.M., Monday through Thursday. Submission of the health form is mandatory.

Counseling

Professional counselors are available in the counseling center and other locations on campus for the purpose of providing students with the opportunity for confidential discussion about personal, social, vocational or academic problems. Both individual and group counseling are utilized. Counseling emphasizes the importance of developing self-confidence, self-esteem, and the ability to achieve meaningful interaction with others as a basis for solving problems.

The center conducts special programs including a study and reading center, and a test center where personality and vocational tests are available. A counselor is available for emergencies when the center is closed.

Academic and occupational guidance is provided by a faculty advisor in the student's major department. Personal and social concerns identified by this advisor and other members of the faculty are referred to the professional staff in the counseling center.

Orientation

Orientation programs for beginning and transfer students are conducted prior to the start of each quarter. In addition, a live-in program for new freshmen is held during the summer. These programs offer students an introduction to the campus, to student services, and to the academic program related to their major. Every effort is made to provide new students with information and advice which will facilitate a smooth and effective beginning at Cal Poly. The orientation programs are directed and coordinated by the counseling center.

Academic Advising

Each student is assigned a faculty advisor in the student's major department. A student should look especially to his advisor for help in program planning and vocational concerns, although any member of the faculty may be consulted when this seems desirable. It is important in planning a program to be sure that opportunities are not overlooked or lost by default. Tak-

ing courses in sequence, substituting courses when necessary, completing major requirements, dropping or adding courses, petitions for waivers or exceptions and other similar decisions should involve discussion between the student and his academic advisor.

Once assigned to a regular academic advisor a student remains with him unless there is some reason for a change. A change of advisor may be made if the student changes his major or the advisor is assigned to other duties. But an advisor only advises. The student, not the advisor, is responsible for meeting requirements and for remaining in good academic standing. It is the responsibility of each student to initiate and continue periodic meetings with his advisor. It is the responsibility of the advisor to be available. How often these meetings occur will depend primarily upon the student's needs.

Veterans Affairs

The university is approved for the training of veterans of the military services and their dependents that qualify under educational assistance programs established by the state and federal governments.

Authorization for training under all federal laws must be obtained from the Veterans Administration through its regional office at 11000 Wilshire Boulevard, Los Angeles, California 90024. Veterans with no prior training under the G.I. bills are urged to request their letters of eligibility at least two months before enrolling. Those who are transferring from another school should submit their transfer requests at least one month before entering.

Vocational Rehabilitation

Students who have a physical, emotional, or other disability which handicaps them vocationally may be eligible for the services of the State Department of Rehabilitation. These services include vocational counseling and guidance, training (with payment of costs such as books, fees, tuition, etc.) and job placement. Under certain circumstances students may also qualify for help with medical needs, living expenses and transportation.

Appointments may be made with the rehabilitation clerk in the records office or by contacting the State Department of Rehabilitation, 1006 West Fourth Street, Ontario, California, 91761, telephone 714-983-9527.

Career Placement

A centralized career-planning and placement service is available to all students of the university. A sincere effort is made to help each student find employment, but no guarantee of placement is made. Career counseling is provided for those students who are undecided about their career goals.

Many industrial, agricultural and business representatives visit the university to interview graduating students. Career placements are effected through this extensive on-campus interview program, which is supplemented by a career referral service.

For those who have already graduated, the placement center provides a current job referral service. Follow-up studies are conducted, which include contacting both the graduate and employer to appraise the

effectiveness of the various programs, as well as, to determine the satisfaction of both employer and employee.

Educational Placement

Every candidate for a teaching credential registers with the placement center before or during the quarter prior to completion of the credential requirements. Registration includes the preparation of personal data and assembling references for the educational placement file.

Cooperation of the candidate in keeping information in the file current is necessary for the most effective service whenever the teacher wishes to seek a new position.

Employment

PART-TIME EMPLOYMENT

The university provides work experience for a maximum number of students by employing them to assist in the operations of the entire campus. The number of student jobs is greater than in universities where regular full-time employees do much more of the work.

A number of positions in the local community for both skilled and unskilled employees are listed with the placement office. Information about these jobs, and on-campus interviews are arranged by the placement center.

Career-oriented part-time employment, including internships which provide students with an opportunity for them to apply their education in an actual on-the-job experience is emphasized.

SUMMER EMPLOYMENT

Students are encouraged to take career-oriented summer employment in fields related to their majors. On-the-job application of course material stimulates an interest in and shows a need for subsequent courses.

The placement center receives many summer job listings. In addition, many business and industry recruiters visit the campus to interview undergraduates for summer employment, which often leads to permanent employment.

TEACHING ASSISTANTSHIPS

Teaching assistantships are faculty appointments on a limited basis. A few departments may have openings on occasion. For further information, or to make application, a student should consult the chairman of the department in which he seeks the assistantship.

GRADUATE ASSISTANTSHIPS

There are a limited number of appointments as graduate assistants available to outstanding graduate students who are working on master's degree programs. The pay varies with the assignment and the duration of the appointment. Interested applicants should consult the chairman of the department in which degree study is being taken.

FINANCIAL AID

Cal Poly offers a variety of financial aid programs which are funded by government and private sources. These include grants, work-study opportunities, scholarships, and loans which are interest free while you are enrolled for at least a half-time load.

Detailed information and professional financial counseling as well as complete application instructions may be obtained from the financial aid office, which has been staffed with fully trained professional counselors to assist you with financing your education.

Alan Pattee Scholarship

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, are not charged fees or tuition of any kind at any California State University or College, according to the Alan Pattee Scholarship Act, *Education Code* Section 23762. Students qualifying for these benefits are known as Alan Pattee Scholars.

STUDENT ACTIVITIES AND CONDUCT

The quality of student life at Cal Poly is reflected in the breadth of out-of-class programs and informal activities developed by students. Co-curricular activities are an integral part of the educational program, and each student is urged to participate in the life of the academic community.

Student Government and Organizations

All students are members of the Associated Students of California State Polytechnic University, Pomona, and pay a membership fee which entitles the student to full participation in the activities of the association. Membership also makes the campus newspaper, *Poly Post,* available to all students. The association develops student-sponsored programs of maximum value and interest to the university community.

The government of student affairs and responsibility for property of the associated students are vested in the student senate and executive cabinet, the members of which are elected or appointed annually. In addition, boards and committees supervise publications, athletics, finances, university union programs and *Poly Vue*. Councils of representatives of the various departmental student organizations participate in student government on behalf of each of the academic schools.

Chartered clubs and organizations involve all departments and special interests, and the opportunity exists for every student to take an active part in club life.

Offices of the ASI and the staff of the student development department are housed in the student development center. The business office of the ASI and the university union is in the university union building.

Publications

Poly Post, the official campus newspaper, is published throughout the school year. *Madre Tierra* is the yearbook record of students activities carried on during the year. *Opus,* features art, photography, articles and examples of student literary effort.

Poly Vue

Poly Vue is the annual university open house held in the Spring. The event displays to parents and friends special events and progress of the university, and provides a time for social activities. The entire program is organized and carried out by the students, and includes academic department exhibits, a carnival, horse shows, and intercollegiate athletic events. A series of activities for high school and junior college students includes a communications day, agricultural events, and business skills and forensic competitions.

Music, Drama, Forensics

Opportunities are provided for students to participate in theatrical productions, and in music organizations which include band, orchestra vocal choirs, and smaller vocal and instrumental ensembles. Drama produc-

tions include quarterly one-act and three-act plays; musical events include Christmas and Easter programs and a road show tour of California communities. Inter-collegiate competition as well as local events are featured in a strong forensics program.

Athletics

Inter-collegiate competition is held under the policies and procedures of the athletic board. A program of inter-collegiate competition for men and women is offered in a variety of sports. Those sports available to women are: badminton, softball, volleyball, tennis and basketball. Competition is available to men in: baseball, basketball, football, cross-country, track and field, swimming, water polo, wrestling and gymnastics.

An extensive intramural program is an integral part of the university and includes team sports, individual sports and recreational activities.

Eligibility for Participation in Student Government and Organizations

University policy requires that students who undertake the responsibilities of major offices in student government or student organizations be in good standing, and making reasonable progress toward an educational goal. The following specific eligibility requirements for officers of the associated students, either elected or appointed, and for officers of organizations, either elected or appointed, implement that policy:

(1) Candidates and incumbents may not be on disciplinary probation.

(2) Undergraduate candidates and incumbents must have an all-college and Cal Poly grade point average of at least 2.00. Graduate candidates and incumbents must have a graduate grade point average of at least 2.70.

(3) In order to perform the duties of a student body officer, the student must be enrolled in this university during each quarter in which he performs the duties of that office. This requirement does not apply during summer quarter.

(4) Incumbents classified as undergraduates must successfully complete 36 units of academic credit per year (4 consecutive quarters). The minimum number of units to be successfully completed in any quarter shall be 12 units, with the exception that the minimum unit load requirement may be decreased to 8 units for a student upon successful petition to the chairman of his major department and his school dean.

(5) Incumbents classified as graduate students must successfully complete 24 units of academic credit per year (4 consecutive quarters). The minimum number of units to be successfully completed in any quarter shall be 6 units.

(6) The student's four quarter sequence will start with the quarter in which the student takes office.

(7) These requirements are independent of any additional student government or student organization requirements.

Eligibility for Intercollegiate Athletics

Eligibility for competition in intercollegiate athletics is regulated in general by the rules of the National Collegiate Athletic Association, the California Collegiate Athletic Association, and the University Policies and Procedures Statement for the Conduct of Intercollegiate Athletics.

Student Conduct

It is expected that all students are enrolled for serious educational pursuits and that their conduct will preserve an atmosphere of learning. All students are expected to assume the responsibilities of citizenship in the campus community. Association in such a community is purely voluntary, and any student may withdraw from it at any time that he considers the obligations of membership disproportionate to the benefits. While enrolled, students are subject to university authority, which includes the prerogative of dismissing students whose conduct is inimical to the aims of an institution of higher education.

Rules of student conduct are included in the California Administrative Code, Title 5, beginning at Section 41301.

A student who violates university policies or regulations is subject to disciplinary action which can result in a warning, reprimand, probation, suspension, or expulsion. Procedures under which the university may take disciplinary action against a student are specified by the Chancellor of the California State University and Colleges. These procedures are on file in the office of the Coordinator of Student Discipline and the office of the Dean of Students.

Student Responsibility

All members of the university faculty and staff have a primary mission of helping students in every way possible. We will do everything we can to make your progress toward a degree or a credential as rapid and as successful as possible. This assistance will help you meet necessary requirements, but *each student is individually responsible for meeting all requirements and deadlines*, academic and administrative, as presented in this publication or in any other announcements of the university or the school and department in which you are enrolled.

Plagiarism

Students are hereby informed that the university considers plagiarism a serious academic offense which subjects those engaging in the practice to severe disciplinary measures. Moreover, one form of plagiarism, the use of purchased term papers, has been considered so serious that the state legislature has enacted a law providing criminal penalties for sale or other distribution of such materials. Students are, therefore, cautioned against this and all other forms of plagiarism.

SPECIAL PROGRAMS

Early Admission

The early admission program allows a limited number of talented high school seniors to enroll for up to six units of university work per quarter while simultaneously completing requirements for graduation at their respective high schools. The university work thus completed is applicable only as university credit and may not be used to meet high school graduation requirements. Consideration for admission to this program is granted a student recommended by his high school principal.

Applications to the program must be submitted by April 30 preceding the fall quarter to which admission is requested. An applcation consists of the following:

1. A completed "Application for Admission—Early Admission Program."
2. A $20.00 non-refundable application fee.
3. A nomination letter from the high school principal.
4. Two copies of the high school transcript showing work completed through the first term of the junior year. (No college aptitude test score is required.)

A successful applicant will be notified of admission to the program by June 1.

Reserve Officers Training

Air Force and Army ROTC programs are available to Cal Poly students by special arrangements with units at nearby schools. The interested student usually applies for this program at the school offering the program during the sophomore year. Further information is available in the records office. Units earned in one of these programs are counted only as elective credit towards requirements for graduation.

International Programs

An overseas program is offered by The California State University and Colleges International Programs in which students enroll for a full academic year simultaneously at their home campuses, where they earn academic credit and maintain campus residency, and at a distinguished foreign university or a special program center.

Cooperating universities abroad include the University of Provence, France; the University of Heidelberg, Germany; the University of Florence, Italy; the Universidad Ibero-Americana, Mexico; the University of Granada and the University of Madrid, Spain; the University of Uppsala, Sweden; Tel Aviv University and the Hebrew University of Jerusalem, Israel; and Waseda University, Japan. In the United Kingdom, cooperating universities, which may vary from year to year, include Dundee, Leicester, London, Oxford, Liverpool, Lampeter, and Sheffield. In addition, California State University and Colleges students may attend a special program in Taiwan,

Republic of China, or an architectural program in Copenhagen, Denmark.

Eligibility is limited to students who will have upper division or graduate standing during their year of participation, who have a 2.5 overall grade point average, who show ability to adapt to a new environment, and who, in the cases of France, Germany, Mexico, and Spain, are proficient in the language of instruction at the foreign university. Selection is made by a faculty committee on the student's home campus and by a statewide faculty committee.

The international programs are supported by state funds to the extent that such funds would have been expended had the student concerned continued to study in California. Students assume costs for pre-departure orientation, insurance, transportation, housing, and meals. Home campus registration fees, tuition on the home campus for out-of-state students (if the student is not a California resident), and personal incidental expenses or vacation travel costs while abroad are also paid by the student. The Office of International Programs collects and administers funds for those items which the program must arrange or can negotiate more effectively, such as home campus fees, orientation costs, insurance, outbound transportation, and, in some centers, housing. Students accepted in the international programs may apply for any financial aid available at their home campuses, except work-study.

Application for the 1975-76 academic year must be submitted before February 14, 1975 (except for United Kingdom applicants who must submit applications by January 7, 1975). Applicants are notified of acceptance by April 1, 1975. Detailed information may be obtained from (*local insertion*) or by writing to The California State University and Colleges, International Programs, 5670 Wilshire Boulevard, Los Angeles, California 90036.

Educational Opportunity Program

The Educational Opportunity Program provides admissions as well as academic assistance and financial aid to students from low-income families who have been unable to realize their potential because of economic, cultural, or educational circumstances. Currently, Black, Chicano, American-Indian, and Caucasian students are attending Cal Poly under the Educational Opportunity Program. Special assistance is available from faculty members, a full time counselor and junior and senior student counselor-tutors. The academic program will stress individual adjustment, study activities, integration of course material, and a special seminar. At the option of the university, additional students may be involved in program activities. Sufficient documentation of their potential will be required and references from high schools, educational agencies, and interested parties will be considered in the E.O.P. selection process. Assistance in making these determinations will be provided by a university committee.

Financial aid funds available to students in the program are administered by the financial aid office in coopera-

tion with the Educational Opportunity Program. Sources include state and federal grants, college work study, national direct student loans, and federally insured student loans.


University Union

ACADEMIC REQUIREMENTS AND PROGRAMS

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DEGREES AND CREDENTIALS OFFERED

The university offers undergraduate curricula leading to the degrees of Bachelor of Arts and Bachelor of Science, and graduate curricula for the masters degree. In addition, programs are offered leading to teaching credentials authorizing service in California public schools. Degrees and teaching credential programs offered by the university are:

SCHOOL OF AGRICULTURE

BACHELOR OF SCIENCE in:

Agricultural Biology 72
Agricultural Business Management 77
Agricultural Engineering 82
Agronomy 87
Animal Science 90
Foods and Nutrition 96
Fruit Industries 99
Home Economics 102
International Agriculture 105
Ornamental Horticulture 108
Park Administration 111
Soil Science 114
Vocational Agriculture Education (Credential program only) 117

SCHOOL OF ARTS

BACHELOR OF ARTS in:

Art 122
Behavioral Science 127
Drama 142
English 151
History 163
Humanities 169
Liberal Studies 170
Music 171
Philosophy 176
Political Science 188

BACHELOR OF SCIENCE in:

Communication Arts 134
Economics 146
Physical Education 180
Recreation Administration 193
Social Sciences 197
Social Services 203

MASTER OF ARTS in:

English 390

MASTER OF SCIENCE in:

Economics 367
Physical Education 402

SCHOOL OF BUSINESS ADMINISTRATION

BACHELOR OF SCIENCE in Business Administration with majors in:

Accounting 210
Business Management 214
Data Processing 219
Finance, Insurance, and Real Estate 223
Marketing Management 230

BACHELOR OF SCIENCE in:

Hotel and Restaurant Management 227

MASTER OF BUSINESS ADMINISTRATION

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MASTER OF SCIENCE in:

Business Administration 355

SCHOOL OF ENGINEERING

BACHELOR OF SCIENCE in:

Aerospace Engineering 238
Chemical Engineering 243
Civil Engineering 248

Electrical and Electronics Engineering 253
Engineering Technology 262
Industrial Engineering 271
Mechanical Engineering 275

MASTER OF ENGINEERING 378

SCHOOL OF ENVIRONMENTAL DESIGN

BACHELOR OF SCIENCE in:
Architecture 284
Landscape Architecture 287
Urban Planning 291

MASTER OF ARCHITECTURE ... 345

MASTER OF LANDSCAPE ARCHITECTURE 394

MASTER OF URBAN PLANNING 407

SCHOOL OF SCIENCE

BACHELOR OF SCIENCE in:
Biology 298
Botany 303
Chemistry 306
Computer Science 311
Earth Sciences 313
Mathematics 317
Microbiology 323
Physics 330
Zoology 326

MASTER OF SCIENCE in:
Biological Sciences 352
Chemistry 361
Mathematics 399

TEACHER PREPARATION CENTER

MASTER OF ARTS in:
Education 371

COURSE NUMBERING SYSTEM

Courses are grouped into number series indicating the level at which they are presented.

1-9 Courses carrying no credit toward degree requirements.

100-200 Courses taught primarily in the freshman and sophomore years and generally introductory in nature.

300-399 Courses primarily for advanced undergraduate students, usually having prerequisites, bearing graduate degree credit upon the approval of the advisor.

400-499 Courses for advanced undergraduates, and graduate, and post-baccalaureate students; courses 461 and 462 shall not apply to master's degree requirements.

500-599 Courses open only to graduate and post-baccalaureate students or seniors with prior approval.

600-699 Courses open only to unconditionally classified graduate students.

900-999 Courses including specialized workshops, seminars, and institutes designed to provide professional and occupational improvement. Not acceptable for credit towards a master's degree.

REQUIREMENTS FOR BACHELOR'S DEGREE

General Requirements

A candidate for the bachelor's degree shall have

1) completed the courses in one of the listed four-year curricula with a minimum "C" grade average for all units in the major;
2) completed the required general education courses;
3) spent not less than three quarters in residence, two of these quarters immediately preceding graduation;
4) earned not less than 50 quarter units in residence;
5) earned a total number of grade points at least equal to twice the number of units attempted (achieve a "C" grade average);
6) completed for a Bachelor of Arts degree a minimum of 186 quarter units with a minimum of 60 of those units being of 300 or 400-level courses; completed for a Bachelor of Science degree a minimum of 198 quarter units with at least 27 of these units being in 300 or 400-level courses listed for the major. No major will contain less than 54 quarter units of courses required in the core for the major. Within these 54 units must be at least 15 units of 100 and 200-level courses. The courses in the major must be exclusive of those courses taken to satisfy the general education requirements.
7) a graduation check. An appointment for this records check shall be made in the evaluations office approximately three quarters before expected date of graduation.
8) filed an application for graduation in the registrar's office prior to the deadline listed in the academic calendar.

General Education Requirements

Every student must take a substantial proportion of course work for the bachelor's degree designed to develop his professional competence. In addition, he must develop the knowledge, skills, and understanding which will enable him to function as an intelligent and creative participant in his community. To achieve these goals, the university provides an integrated program of curricular and co-curricular activities which are organized to provide an educational experience appropriate to the needs of the individual student.

Under the provisions of Title 5 of the *California Administrative Code,* the university offers a variety of courses in general education. The pattern of courses included in the program is designed primarily to insure that:

1. the student develop the ability to express himself effectively in both written and oral communication;
2. he understands nature and is able

to relate himself to his biological and physical environment;

3. he is acquainted with man's cultural heritage and has developed the capacity to appreciate the creativity of others and to be creative himself;
4. he understands the economic, technological and social problems of contemporary society and appreciates the responsibilities and procedures of modern citizenship;
5. he has a basic understanding of the requirements of good health and is able to maintain his own physical well-being;
6. he has developed an understanding of himself and his relationships to others.

To be eligible for graduation with a bachelor's degree from California State Polytechnic University, Pomona, a student must complete a minimum of 60 quarter units of general education. A minimum of 48 quarter units must be taken from courses listed under the areas of natural sciences, social sciences, humanities and basic subjects. In addition, each student must complete other breadth requirements indicated below. No more than six units in the major academic discipline of the student may be counted toward meeting general education requirements.

The courses indicated below may fulfill the university's general education requirements. Each curriculum requires specific courses to be taken in fulfilling general education requirements. These courses are listed under the department offering the degree program.

*Students transferring from another collegiate institution must earn a number of grade points at least equal to twice the number of units attempted at this university.

Courses to fulfill the general education requirement shall be distributed as follows:

NATURAL SCIENCES—(minimum 2 courses)

BIO, 100, 110, 115, 201, 213, 300, 303, 328, 329; BOT 116, 120, 124, 125, 307; MIC 100; ZOO 137, 138, 234, 235; ESC 101, 111, 112, 115, 250, 321, 335; PHY 102, 121, 122, 123, 131, 132, 133; CHM 103, 104, 105, 111, 112, 113, 201, 211.

SOCIAL SCIENCES—(minimum 2 courses)

AMC 201, 202 or equivalent (required of all students)

Other Social Sciences

EC 201, 202, 213; GEO 101, 312; HST 101, 102, 103, 201, 202, 342; ANT 101, 102; SOC 201, 202, 206; PLS 201; PSY 201, 202, 205; COM 413.

HUMANITIES—(minimum 2 courses)

ENG 110, 111, 112, 201, 202, 203, 206, 306, 308, 403, 406; PHL 201, 202, 204, 211, 212, 304; DR 203; ART 110, 212, 213, 312; MU 100, 104, 310.

BASIC SUBJECTS—(minimum 2 courses)

ENG 104, or equivalent (required of all students)

Other courses

MAT 101, 102, 104, 105, 107, 108, 109, 114, 115, 116, 140, 141, 142, 204, 236; ENG 105; COM 216, 218, 219; SP 100, 203; FR 101, 102, 103, 201, 202, 203; SPN 101, 102, 103, 201, 202, 203; GER 101, 102, 103.

OTHER BREADTH REQUIREMENTS

PE 100 series or equivalent (3 units required of all students).

A minimum of four courses selected from a minimum of two schools

other than the school in which the student is majoring (required in all curricula).

Scholastic Requirements

Each student is expected to meet the academic standards required by the state, the university and by his instructors. He is expected to attend classes regularly.

The instructor of a class may excuse student absences from his class. An instructor, with the President's approval, may at any time exclude from his course any student guilty of unbecoming or disorderly conduct. A student thus excluded will fail the course unless the university determines otherwise.

Students may not remove an incomplete simply by re-enrolling in the course. In cases where repetition of the course is deemed appropriate, the student will be assigned a withdrawal or failing grade rather than an I grade. If a student subsequently completes a course which is recorded as incomplete on a transcript from another institution, it is his responsibility to submit a corrected official transcript and advise the registrar that he wishes to receive credit.

It is possible for a student to have three examinations scheduled for the same day. If that happens, the student has the liberty of asking the professor of the middle exam to pick a mutually convenient time for the exam.

MINIMUM SCHOLARSHIP REQUIREMENTS

Uniform minimum standards for academic probation or disqualification are in effect at all California State Universities and Colleges. Students will be placed on academic probation or disqualified under the following conditions:

1. A student will be placed on academic probation if his cumulative grade point average falls below 2.0 (C) either for all college-level work attempted or for all work attempted at this university. The student will be advised of probation status as promptly as possible.
2. A student will be removed from probation and restored to good standing when he earns a cumulative grade point average of 2.0 (C) for all university level work attempted and for all such work attempted at this university.
3. A student on probation *may* be disqualified from the university when his cumulative grade point average for all college level work attempted or for all such work attempted at this university is 7 or more grade points below 2.0 (C average) at the end of any quarter. Such a student *will* be disqualified at the end of the spring quarter if:
   a. freshman or sophomore (less than 90 quarter units of university work completed) is 22½ or more grade points below a 2.0 (C average).
   b. a junior (90 to 134 quarter units of university work completed) is 13 or more grade points below a 2.0 (C average)

c. a senior (135 or more quarter units of university work completed) is 9 or more grade points below a 2.0 (C average).

4. Scholastic disqualification notices are sent as soon as possible following the end of the quarter.
5. The dean of the school in which the student is enrolled as a major may take exceptions to these conditions when such action seems justified in individual cases.
6. A student who is disqualified for scholastic reasons will not be readmitted until at least one regular quarter has elapsed and then only after presentation to the university of satisfactory evidence that he has improved his chances of scholastic success. The request for readmission will be referred to the dean of the school in which the student wishes to enroll.

Academic Policies

DOUBLE MAJORS

Normally a student meets graduation requirements for a degree in one of the major departments. However, it is permissible for a student to be granted a degree with two majors if all requirements of both major curricula are met.

Any major completed by the student leading to the single degree being awarded will be listed on the diploma so long as only a single degree is considered. If the student has completed the requirements for both a BA and BS, he will be required to distinguish only one as the degree in order to determine the appropriate degree to be awarded, and the notation on the diploma.

No more than one diploma or degree will be granted to the same student at the same commencement. This is distinguished from the two majors leading to a single degree. However, all majors completed by a student will be listed on the official transcript of record.

TRANSFER CREDIT

A student who has attended accredited two-year or four-year colleges will be given full credit for college level courses successfully completed. Credit for courses taken at other institutions counts toward fulfillment of major curriculum requirements when applicable: Other courses count as elective credit.

Not more than 70 semester units (105 quarter units) may be allowed for credit taken in a junior college. No credit may be allowed for professional courses in education taken in a junior college.

A maximum of 36 quarter units of extension course credit may be applied toward the bachelor's degree.

No limit is placed upon the number of transferable credits from a four-year college or university, except that no student will be granted a bachelor of science degree in any curriculum without having met the general unit, grade, and residence requirements.

No credit will be given for work taken at an unaccredited institution until the student has successfully completed 30 quarter units of work at this university. At that time, and upon recommendation of the student's major department, credit will be given for the unaccredited work.

Once a student has commenced work at this university, he must secure the approval of his advisor prior to taking courses at another institution for credit toward major requirements at this university. (See also concurrent enrollment section.)

GRADING SYSTEM

The following grading system is in effect:
A—Superior
B—Above average
C—Average
D—Below average
I—Incomplete
SP—Satisfactory progress
F—Fail
W—Withdraw
AU—Audit (no credit)

Grade points are assigned as follows:
A—4 points
B—3 points
C—2 points
D—1 point
I— 0 point
F— 0 point
SP—0 point
Passing grades are A, B, C, or D. See graduate section for grading criteria for graduate courses.

An incomplete signifies that a portion of required course work has not been completed and evaluated in the prescribed time period due to unforeseen, but fully justified, reasons and that there is still a possibility of earning credit. It is the responsibility of the student to bring pertinent information to the instructor and to reach agreement on the means by which the remaining course requirements will be satisfied. A final grade is assigned when the work agreed upon has been completed and evaluated.

An "incomplete" must be made up within one calendar year immediately following the end of the term on which it was assigned. This limitation prevails whether or not the student maintains continuous enrollment. Failure to complete the assigned work will result in an "incomplete" being counted as equivalent to an "F" (or an "NC") for grade point average and progress point computation.

Students may not remove an incomplete by re-enrolling in the course. In cases where repetition of the course is appropriate, the student will be assigned a withdrawal or failing grade rather than an "I" grade.

If a student subsequently completes a course which is recorded as incomplete on a transcript from another institution, it is his responsibility to submit a corrected official transcript and advise the registrar that he wishes to receive credit.

The "SP" symbol is used in connection with courses that extend beyond one academic quarter. The symbol indicates that work in progress has been evaluated as satisfactory to date but that the assignment of a precise grade must await the completion of additional course work. Cumulative enrollment in units attempted may not exceed the total number applicable to the student's educational objective. All work is to be completed within one calendar year of the date of first enrollment and a final grade will be assigned to all segments of the course on the basis of overall quality. Any extension of this time period must receive prior authorization by the school dean.

The "W" symbol indicates that the student was permitted to drop the course after the 14th calendar day following the day on which classes begin with the approval of the instructor, the department chairman, and the school dean. It carries no connotation of quality of student performance and is not used in calculating grade-point average or progress points.

Grades will be mailed from the records office as soon as possible after the close of a quarter.

REPETITION OF COURSES

A student may repeat a course for the purpose of improving his standing in that course. A course may be repeated a maximum of two times. Whenever a course is repeated for credit, the grade submitted for the most recent enrollment will be the official grade, whether it is higher or lower than any previous grade recorded for the same course.

When a student wishes to repeat a course that is no longer offered, a substitute course may be taken if its equivalance to the previous course is certified on a petition for substitution which may be obtained from the Records Office.

Only the units attempted and the grade in the most recent enrollment in a course will be counted in the student's academic record. Previous enrollments in the course will remain on the permanent record card but will be identified as having been repeated for substitute credit.

This procedure may be applied to any course taken at this university. However, grades earned in courses taken at any other institution shall not be amended by course repetition at this university.

ACADEMIC RENEWAL

It is permissible for an undergraduate student to request the removal of up to three quarters or two semesters of previous academic work from baccalaureate degree consideration. The following two conditions must prevail before such a request may be made:

1. Five years have elapsed since the most recent work to be disregarded was completed.
2. Since the completion of the work to be disregarded, the applicant has completed, *at this university,* 22 quarter units with at least a 3.0 GPA, 45 quarter units with at least a 2.5 GPA, or 67 quarter units with at least a 2.0 GPA. Work completed at any other institution shall not be used to satisfy this requirement.

Having met the above conditions, the student may apply for removal of work from degree consideration in a letter to the Committee on Academic Renewal through the office of the Vice President for Academic Affairs. The letter shall specify which semester(s) or quarter(s) of previous work are to be removed from consideration with supporting statements providing evidence that

1. The work is substandard and not representative of the student's present scholastic ability and level of performance.
2. The level of performance represented by the work under consideration was due to extenuating cir-

cumstances, which are described.
3. The applicant would need to complete additional units of work and enroll for one or more additional quarters to qualify for the baccalaureate degree if the request is not approved.

If the committee acts favorably upon the request, the student's academic record will be annotated to show that *no* work taken during the disregarded term(s), even if satisfactory, may apply toward baccalaureate requirements. All work, whether or not disregarded, will remain legible on the student's academic record.

GRADUATE COURSES TAKEN BY UNDERGRADUATES

A senior in good standing may petition to use part of the senior year academic load as graduate or post-baccalaureate credit. The petition requesting such designation shall be submitted before the end of the quarter in which the work is performed. The following conditions shall be met:

1. The adviser endorses the request.
2. Neither the courses involved nor the credit for them is needed to complete requirements for the baccalaureate degree.
3. The courses are at the 300, 400, or 500 level.

When the petition has been approved, the courses for which such credit is requested will be identified on the permanent record card (transcript) with the letter "G". Such courses and units will not be applicable to the bachelor's degree. Retroactive requests for designation of graduate credit on a student's transcript will not be honored.

ADVANCED PLACEMENT

While in high school, ambitious and well-qualified students are encouraged to take college level courses which will prepare them for the Advanced Placement Examination given each spring by the College Entrance Examination Board. Any student who has scored a 3, 4, or 5 on such a course examination will automatically be given units of university credit at the time of admission. A maximum of 30 units, with no more than 12 units in any one field, is allowed for advanced placement. The use of such credits to satisfy university and departmental requirements is determined by the appropriate departments.

CREDIT BY EXAMINATION

A student may be permitted, at the discretion of his school dean, to obtain credit by examination for courses in subject matter fields in which he is especially qualified through previous education or experience and for which credit has not otherwise been given. A fee of $1 per unit is charged for such an examination. It may include written, oral, or skills tests, or a combination of all three types, and will be sufficiently comprehensive to determine that the student has essentially the same knowledge and skills as those students who successfully complete the course. A student is not permitted to obtain credit by examination in a course unless all prerequisites for the course as

specified in this catalog have been satisfied. The grade received is entered on the student's permanent record. The length of the examination will be consistent with the unit value of the course.

A six-week period must elapse before a second petition for credit by examination in the same course will be considered.

Units of credit received through this procedure may not apply toward the residence requirements for any of the degrees or credentials offered by the university.

Detailed instructions for applying for credit by examination may be obtained from the registrar's office.

CREDIT FOR MILITARY SERVICE

Nine units of elective credit will be allowed toward a baccalaureate degree for a student with an honorable discharge from the military services of the United States who submits evidence of satisfactory completion of one year of military training.

An additional 13½ quarter units of elective credit will be allowed toward graduation to any student submitting evidence that he has received a commission in the Army, Navy, Air Force, Coast Guard, or Marine Corps. Maximum total credit possible toward graduation for military service is 22½ quarter units. Credit is not given for completion of the six-month reserve training programs or for college level general educational development tests.

Credit for specific courses may be allowed if the student has satisfactorily completed equivalent study in a military service school. The guidelines of the American Council on Education are followed in determining eligibility and approval must be granted by the department teaching the specific course for which credit is sought.

HONORS

First-time freshmen may be awarded "Honors at Entrance" if during their tenth, eleventh, and twelfth grades they earned a grade point average of at least 3.5 in all subjects excluding physical education and military science, and have received a commendation from their high school principals for having contributed in the areas of citizenship and leadership.

The "Academic Honors List," announced at the end of each quarter, honors undergraduate students who have completed 12 or more units during the quarter with a 3.0 or better grade point average.

The "President's Honor List," announced at the end of the spring quarter, honors undergraduate students who have a grade point average of 3.0 or better for completion at the university of 12 or more units during any three of the four quarters of a university year.

Honors at Graduation

The University grants honors at graduation to students who have demonstrated academic excellence during their career at the university. The honors designation with the grade point average required is: summa cum laude—3.80-4.00; magna cum laude—3.60-3.90; cum laude—3.10-3.59.*

*The minimum GPA required for cum laude will change to 3.30-3.59 for students who graduate after June 1978.

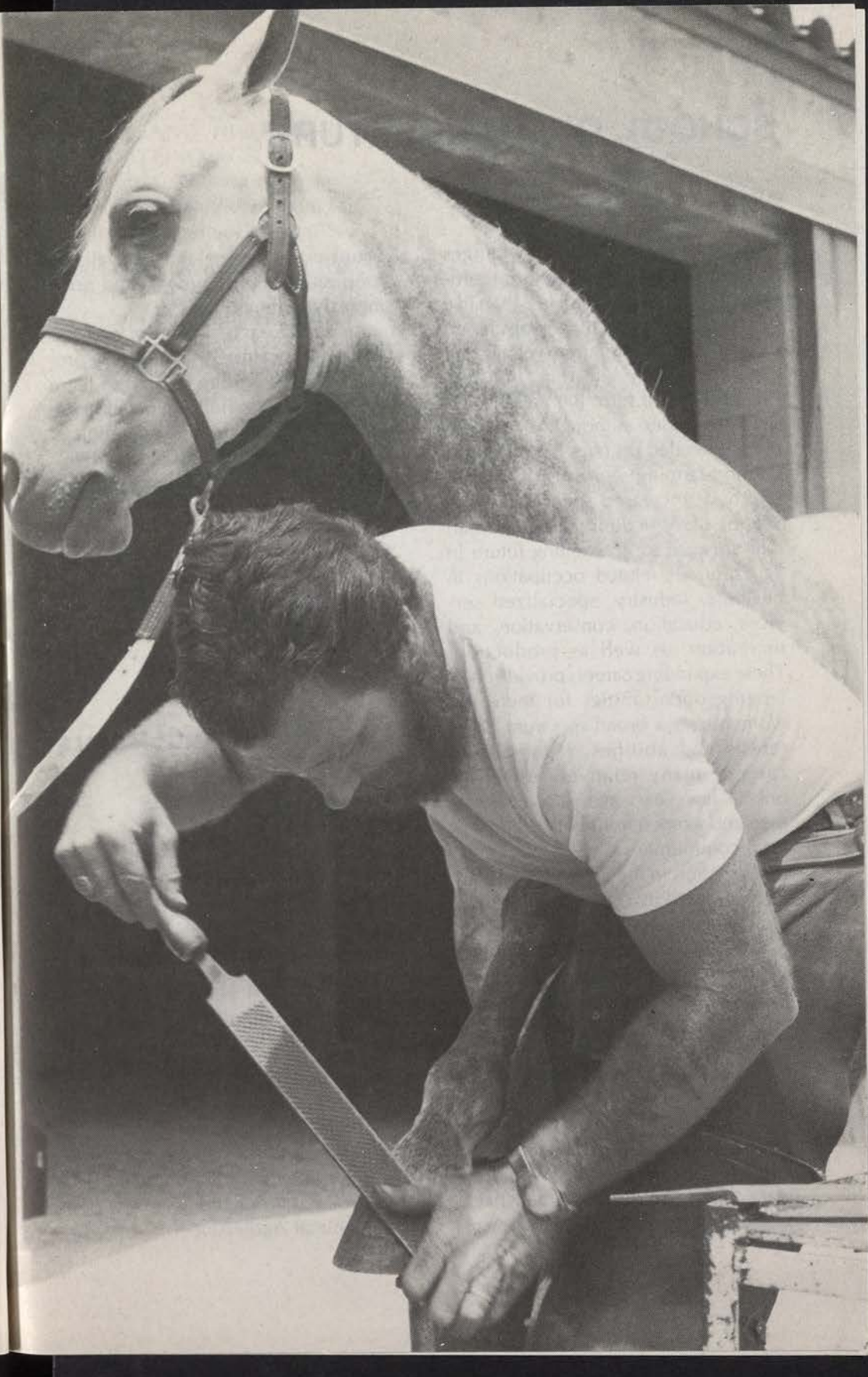
SIGMA XI

The members of the Society of the Sigma XI are scholars who have produced significant research in the pure or applied sciences. The object of the Society is to encourage original investigation in the physical, life, agricultural, earth, medical, and behavioral sciences, mathematics, and engineering. Membership is gained by being elected by an institutional chapter, by a duly authorized club, or by the Chapter-at-Large. The Cal Poly, Pomona Sigma Xi Club is of recent origin, and the existing membership consists solely of faculty members. After a probationary period, the Club will petition for authorization to elect Associate Members, and if granted this authorization, will elect qualified-graduate students to membership.

PHI KAPPA PHI

Phi Kappa Phi is a national all-university honorary. Its primary objective is the recognition and encouragement of superior scholarship in all fields of study. The Cal Poly chapter was established in 1973. Undergraduate students are considered for election to membership from all schools of the university only if they are in the top 5%of their class as a Junior, or the top 10%as a Senior. A limited number of outstanding graduate students may be elected to membership. Good character is an essential supporting attribute to those elected to membership.

Two things stand out as the guiding philosophy of Phi Kappa Phi. One is the conviction that by recognizing and honoring those who have excelled in scholarship, other students may be inspired to work for high rank. The other is the equally strong belief that scholarship is not limited to any single field of endeavor but may be, and should be, universal.



SCHOOL OF AGRICULTURE

Allen C. Christensen, Acting Dean

Dynamic technological changes have increased management efficiency to the point where less than five per cent of California's population lives and works on farms, yet agriculture is this state's leading industry. California is, in turn, the nation's agriculture leader. Although fewer people are needed on farms, positions in the non-farming segments of agriculture have increased spectacularly. A School of Agriculture graduate can look forward to an exciting future in agriculturally-related occupations in business, industry, specialized services, education, conservation, and recreation, as well as production. These expanding careers provide challenging opportunities for men and women over a broad spectrum of interests and abilities. Hundreds of careers, many relatively unknown only a few years ago, are attracting men and women from both urban and rural communities.

Instruction in the School of Agriculture is offered in 12 majors leading to the bachelor of science degree.

Animal production flocks and herds are maintained for undergraduate instruction and graduate experimental programs.

Facilities on or near the campus make possible practical laboratories for the various majors. The university farm consists of fertile soils typical of the Southern California area with enough variation in soil type and climate to give students a broad background of experience. Over 600 acres of university-owned land are available for pastures, crops, groves, and ornamental plantings.

To assure each student of occupational competence, the university provides an opportunity for him to learn the fundamental skills involved in the care, maintenance, and operation of agricultural equipment and facilities. Financing is available through the Kellogg Unit Foundation for individual student projects in most areas. A supervised work program is an important part of instruction, and all departments offer employment for student assistants.

Departments and Majors

AGRICULTURAL BUSINESS MANAGEMENT
- Milton R. White, Chairman
- Agricultural Business Management major (BS); options in Economics, Food Distribution, Management
- International Agriculture major (BS)

AGRICULTURAL ENGINEERING
- Floyd V. Matthews, Jr., Chairman
- Agricultural Engineering major (BS)

ANIMAL SCIENCE
- Eugene K. Keating, Chairman
- Animal Science major (BS); options in
  - Pre-Veterinary Science,
  - Animal Production,
  - Animal Agribusiness

FOODS AND NUTRITION AND HOME ECONOMICS
Ramiro C. Dutra, Chairman
Foods and Nutrition major (BS);
Home Economics major (BS)

ORNAMENTAL HORTICULTURE
Joel Carter, Chairman
Ornamental Horticulture major (BS);
Park Administration major (BS)

PLANT AND SOIL SCIENCE
Robert L. Procsal, Chairman
Agricultural Biology major (BS);
options in
Agricultural Biology,
Pest Management;
Agronomy major (BS);
Fruit Industries major (BS);
Soil Science major (BS)

VOCATIONAL AGRICULTURE
Paul Peterson, Coordinator

AGRICULTURAL BIOLOGY

One of the four majors offered in the Plant and Soil Science Department is agricultural biology. For other programs in the department see agronomy, soil science and fruit industries.

Edward C. Appel, Jr. Kenneth R. Hobbs Richard S. Kaae

Agricultural biology combines the agricultural and biological sciences. Protection of food, plants, animals and man and his buildings is emphasized through the management of the environment and its organisms. Agricultural biologists are involved with programs of protection that are environmentally compatible and socially responsible. These programs include the management of populations of insects, mites, nematodes, plant diseases, weeds and vertebrate pests.

Professional careers with county, state and federal departments of agriculture and allied governmental agencies are satisfying. Challenging positions in sales, advisory services and as consultants with the various pest management and related commercial organizations and agricultural production enterprises, both domestic and international, are available. Research, teaching and graduate studies are other interesting pursuits.

The marketing of agricultural products presents many opportunities for individuals with a knowledge of quality standards, and the environmental factors and organisms affecting fruits and vegetables.

Summer employment is encouraged and frequently arranged because it provides both valuable experiences and income for students.

Opportunities are expanding and are abundant for each of our graduates because they are capable of using their knowledge for the benefit of society. In addition to the development of knowledge necessary for occupational proficiencies, sources of information are emphasized. This enables the graduate to increase professional competence and to cope with the constantly growing volume of new information. Thus graduates are prepared for immediate employment in a wide range of positions and are prepared to enhance their careers after graduation.

Certification by the California Department of Agriculture as an agricultural biologist for employment with the county departments of agriculture, as an agricultural pest control advisor, and/or as an entomologist by the Entomological Society of America is available.

Options are offered in agricultural biology and pest management. The choice of program will depend upon the student's professional career objective.

CURRICULAR OPTIONS

Agricultural Biology. This broadly based option is especially suitable for the individual who desires a variety of activities, enjoys the outdoors and likes to work with plants or animals. The professions serving agriculture and related industries by advisory and enforcement activities are emphasized. Employment is with private business and governmental organizations.

Pest Management. This option develops a high degree of specialization for individuals oriented toward private and industrial consultancies, crop and livestock insect biology and as entomologists with governmental agencies through emphasis of total environmental problems and pest management practices.

CORE COURSES FOR MAJOR

(Required of all students)

Pest Control Equipment	AE	233	(3)
Agricultural Law	AGB	101	(3)
Introduction to Arthropods	AGB	165	(4)
Plant Identification	AGB	224	(4)
Insect Biology	AGB	228	(3)
Insect Biology	AGB	229	(4)
Principles of Pest Management	AGB	231	(4)
Regulatory Pest Management	AGB	322	(4)
Vertebrate Pest Management	AGB	323	(4)
Produce Market Quality	AGB	325	(3)
Career Planning in Ag Biology	AGB	372	(1)
Pest Control Practices	AGB	424	(3)
ID of Immature Arthropods	AGB	455	(3)
Senior Project	AGB	461	(2)
Senior Project	AGB	462	(2)
Undergraduate Seminar	AGB	463	(2)
Courses to complete Major			(31–37)

OPTION COURSES FOR MAJOR

(Required for specific option)

PEST MANAGEMENT

Bee Science	AGB	336	(3)
Urban Pest Management	AGB	342	(4)
Insect Population Behavior	AGB	377	(3)
Field Entomology	AGB	401	(4)
Biological Control	AGB	403	(3)
Advanced Pest Management	AGB	448	(3)
Plant Growth Regulators	AGB	470	(3)
Plant Nematology	BOT	423	(3)
Introduction to Statistics	MAT	107	(3)
Basic Microbiology	MIC	201	(5)

AGRICULTURAL BIOLOGY

Management Accounting	ABM	324	(4)
Fruit and Vegetable Standards	AGB	326	(4)
Principles of Ecology	BIO	325	(4)
Management Principles and Theory	BUS	307	(4)
or Personal Management	ABM	402	
Soil Fertility and Fertilizers	SS	233	(4)
Plant Pathology Electives			(7)

SUPPORT AND ELECTIVE COURSES

(Required of all students)

Weeds & Weed Control	AGR	233	(4)
American Civilization	AMC	201	*(4)
American Civilization	AMC	202	*(4)
Basic Biology	BIO	115	*(5)
Element of Botany	BOT	120	*(4)
General Plant Pathology	BOT	223	(4)
Plant Physiology	BOT	322	‡(5)
College Chemistry	CHM	104	*(3)
College Chemistry	CHM	105	*(3)
College Chemistry Lab	CHM	141	*(1)
College Chemistry Lab	CHM	142	*(1)
Elements of Organic Chemistry	CHM	201	(3)
Organic Chemistry Lab	CHM	250	(1)
Report Writing	COM	216	(3)
Freshman Composition	ENG	104	*(4)
Freshman Composition	ENG	105	*(4)
Basic Mathematics and	MAT	101	*(3)
Basic Mathematics	MAT	102	*(3)
or Intro Math Analysis	MAT	108	
and Intro to Math Analysis	MAT	109	
Physical Education 100 level	PE		*(3)
Psychology	PSY	201	*(4)
Human Relations	PSY	314	(4)
Public Speaking	SP	100	*(4)
Basic Soil Science	SS	231	(4)
Invertebrate Zoology	ZOO	137	†(5)
Humanities			(6)
Plant or Animal Production Electives			(7)
Electives			(20–28)

†May be used for the general education requirement. Select unspecified courses from the general education list. For general education breadth requirements, select four courses from a minimum of two schools other than the School of Agriculture.

‡CHM 321 or ZOO 324 may be substituted

Course Descriptions

AGB 101 Agricultural Law (3)

Agricultural Code and other laws affecting those agencies and individuals who promote and protect the agricultural industry of California; functions of state and county departments of agriculture and allied organizations. Sources of information. 3 lectures.

AGB 165 Introduction to Arthropods (4)

Arthropods and certain relatives affecting food, plants, animals, man and his buildings. Emphasizing insects, mites, ticks, spiders, snails, and slugs; their morphological and phylogenetic relationships; habits and habitats; important characteristics affecting the well-being of mankind. 3 lectures, 1 three-hour laboratory.

AGB 200 Special Problems for Lower Division Students (1-2)

Individual or group investigation, research, studies or surveys of selected problems. Total credit limited to 4 units, with a maximum of 2 units per quarter.

AGB 224 Plant Identification (4)

Identification of ornamental, orchard, and crop plants by contrast of odors, leaf shapes, and arrangements; fruit and flower types, growth habits; coloration of plant parts, and environmental variations. Consideration of scientific, common, and family name; general propagation and most serious pests. 3 lectures, 1 three-hour laboratory. Prerequisite: BOT 120.

AGB 228 Insect Biology (3)

Recognition and distribution of the important insects and mites attacking the major field, cereal, and truck crops. Host preference and identification of damage to plant parts. Seasonal history, habits, and problems relating to pest management programs. 2 lectures, 1 three-hour laboratory. Prerequisite: AGB 165 or equivalent.

AGB 229 Insect Biology (4)

Recognition and distribution of the important insects and mites attacking citrus, avocados, deciduous fruit, small fruit, berries, grapes, and nut trees. Host preference and identification of damage to plant parts. Seasonal history, habits, and problems relating to pest management programs. 3 lectures, 1 three-hour laboratory. Prerequisite: AGB 165 or equivalent.

AGB 231 Principles of Pest Management (4)

Concepts of pest management which include selective use and placement of pesticides, plant resistance, cultural and mechanical control, chemical and radiation sterilization, and the use of antimetabolites, hormones, pheromones, attractants, and repellants; selected combinations of these approaches; related laws. 3 lectures, 1 three-hour laboratory. Prerequisite: AGB 165, CHM 103 or the equivalents.

AGB 299 Special Topics for Lower Division Students (1-4)

Group study of a selected topic, the title to be specified in advance. Total credit limited to 8 units, with a maximum of 4 units per quarter. Prerequisite: Permission of instructor.

AGB 303 Horticultural Products (3)

Selection and use of fruits and vegetables. Includes post-harvest physiology, quality factors; varieties, availability, ripening, handling and storage considerations. Governmental agencies concerned with quality and wholesomeness of foods. For students other than Agricultural Biology majors. 3 demonstration—discussion meetings.

AGB 322 Regulatory Pest Management (4)

Programs of pest management, especially detection, survey, eradication, and quarantine. Purpose and application of United States and California plant quarantine laws and regulations, including biological, economic, and administrative aspects. Identification, habits, seasonal history and hosts of potential pests and diseases. 3 lectures, 1 three-hour laboratory. Prerequisite: AGB 165, BOT 223.

AGB 323 Vertebrate Pest Management (4)

Vertebrates in conflict with man; including those that interfere with the production and storage of food and fiber, transmit diseases, and damage buildings and other structures. Identification, biology, and economic importance. Management techniques. Related laws and regulations. 3 lectures, 1 three-hour laboratory.

AGB 325 Produce Market Quality (3)

The marketing of quality fruits and vegetables from grower to consumer. Identification, cause and detection methods of quality factors resulting from insects, mites, nematodes, birds, mammals, plant diseases, and non-parasitic disorders important when marketing major fruits and vegetables. 2 lectures, 1 three-hour laboratory. Prerequisite:BOT 223, AGB 228, 229.

AGB 326 Fruit and Vegetable Standards (4)

Quality provisions of the Agricultural Code relating to fruits, nuts, vegetables, eggs, and honey. Minimum standards for marketing, including maturity, container, marking, and size requirements. Parasitic and physiological market defects, heir identification, cause, and legal tolerances. 3 lectures, 1 three-hour laboratory. Prerequisite: AGB 325.

AGB 333 Medical Entomology (3)

Anthropod pests existing as nuisances in dwellings and other structures; dooryard pests, and pests attacking man and domestic animals. Emphasis on biology, recognition, habitat, ecology, distribution and disease transmission; techniques and materials used for control. 2 lectures, 1 three-hour laboratory. Prerequisite: AGB 165 or equivalent.

AGB 336 Bee Science (3)

Care, management, and manipulation of bees. Practical application of principles for effective establishment and maintenance of apiaries. Pollination and value of bees to agriculture. Recognition and control of bee diseases. Laws and regulations pertaining to beekeeping. 2 lectures, 1 three-laboratory.

AGB 342 Urban Pest Management (4)

Major pests attacking wood, plant and animal products; recognition of stages and damage; habitat, environmental requirements, seasonal history and means of control and exclusion; related laws and regulations. Prerequisite: AGB 165 or equivalent. 3 lectures, 1 three-hour laboratory.

AGB 372 Career Planning In Agricultural Biology (1)

Critical employer-employee evaluation. Employment techniques including preparation of application forms, data sheet, and portfolio; the interview and application follow-up. 1 lecture. Prerequisite: Junior standing.

AGB 377 Insect Population Behavior (3)

The study of pest populations in crop ecosystems in relation to chemical, biological, cultural, physical, and integrated control practices. Relationships among host, pest population, related biotic agents, soil, climate and management practices. 2 lectures. 1 three-hour laboratory.

AGB 400 Special Problems for Upper Division Students (1-2)

Individual or group investigation, research, studies, or surveys of selected problems. Total credit limited to 4 units, with a maximum of 2 units per quarter.

AGB 401 Field Entomology (1-4)

Collection, classification and study of insects and other arthropods from ecological zones, animals, crop plants, or other habitat situations. Field trip prior to start of Fall Quarter will replace some laboratory periods. Up to an additional 4 units may be taken. Approval before enrolling required.

AGB 403 Biological Control (3)

Natural and induced control of insect, mite, and weed pests using agents other than toxicants; collection, production and liberation of control agents; habits and identification of major groups of parasites and predators; recent developments in pest inhibition. 3 lectures. Prerequisite: Consent of instructor.

AGB 424 Pest Control Practices (3)

Summation of entomology courses through field observations of pest levels, development of integrated control programs, and evaluations of pest management results; discussions of experimental plot designs and statistical analysis of pest distribution. 2 lectures, 1 three-hour laboratory. Prerequisite: Senior standing.

AGB 441, 442 Internship in Agricultural Biology (1-3) (1-3)

On the job experience with public and private agencies for advanced students. Professional type experience new to the student so that a valuable contribution toward career development results. Written and oral reports necessary. Approval before enrolling required.

AGB 448 Advanced Pest Management (3)

The glandular systems of economically important arthropods which are now and may become sites for the interruption, distortion, or termination of natural functions in pest management activities. A consideration of mechanisms of growth, protection, and reproduction as a means of blocking life processes. 2 lectures, 1 three-hour laboratory.

AGB 455 Identification of Immature Arthropods (3)

The identification of immature arthropods that are economically important. Consideration of arthropods related to insects. Emphasis on those orders of insects with complete metamorphosis, including Coleoptera, Diptera, Lepidoptera, and Hymenoptera. 1 lecture, 2 three-hour laboratories.

AGB 461, 462 Senior Project (2) (2)

Selection and completion of a project under faculty supervision. Projects typical of problems which graduates must solve in their fields of employment. Project results are presented in a formal report. Minimum 120 hours total time.

AGB 463 Undergraduate Seminar (2)

New methods and developments, practices, and procedures in the field. 2 meetings.

AGB 470 Plant Grow Regulators (3)

The natural and synthetic substances used to control the growth of economic plants and their products. Emphasizes chemical characteristics, physiological plant responses, uses, and modes of application. Related laws and regulations. 2 lectures, 1 three-hour laboratory. Prerequisite: BOT 322 or CHM 321.

AGB 499 Special Topics for Upper Division Students (1-4)

Group study of a selected topic, the title to be specified in advance. Total credit limited to 8 units, with a maximum of 4 units per quarter. Prerequisite: permission of instructor.

AGRICULTURAL BUSINESS MANAGEMENT

M. Robert White, Chairman

Elton O. Brooks
Edison I. Cabacungan
David E. Cole
John D. Hanson
William C. Hughes
Charles H. Jameson
Milo G. Lacy

The agricultural business management major is primarily a curriculum of business courses applied to the agricultural industry. Options in agricultural economics, food distribution, and management are offered within the major. Because of the wide selection of course offerings, a broad range of occupational choices is available to the graduate. These include the banking and finance area, food and fiber processing, sales, and marketing positions and federal, state and county government units.

The economics option includes an additional emphasis on economic analysis, statistics and mathematics. This option is recommended for the student planning advanced degree work in agricultural economics and resource development. It also prepares students to enter management positions in the agri-business arena requiring a greater depth in quantitative skills.

The food distribution option is designed for all aspects of food distribution, including transportation, packaging, product sales, advertising, public relations, food brokerage, buying, wholesaling, and retailing. Opportunities for on-the-job seasonal employment are developed to assist students in obtaining practical experience and familiarity with the current practices in California agriculture.

The management option emphasizes employment preparation and is particularly valuable to the student who has not specifically selected a vocational field but desires a broad approach in the study and skills needed in the management areas of agricultural business.

As a supplement to classroom and laboratory meetings, field trips are taken to distribution centers, production areas, and other related industries within agriculture. Frequent visits by guest speakers from leading agricultural firms further ensure that the student gains practical, current knowledge. In addition to business management, sales, and sales-promotional training, students may elect studies in specified production fields to gain valuable production techniques and experience necessary for job competency.

As a senior, the student is encouraged to take part-time employment in a related agricultural industry of his interest and to work closely with management people in the development of his senior project.

CORE COURSES FOR MAJOR

(Required of all students)

Intro to Agricultural Business	ABM	101	(4)
Advertising & Promotion of Agricultural Products	ABM	225	(3)
Contemporary Economic Problems of Agriculture	ABM	300	(3)
Agricultural Marketing	ABM	304	(3)
Agricultural Labor Management	ABM	308	(4)
Agricultural Economics	ABM	311	(4)
Agricultural Policy	ABM	313	(4)
Management Accounting	ABM	324	(4)
Enterprise Accounting	ABM	325	(4)
Agricultural Enterprise Management	ABM	328	(4)
Intro to Agricultural Data Management	ABM	375	(3)
Personnel Management	ABM	402	(3)
Agricultural Prices	ABM	403	(4)
Economics of Food & Fiber Consumption	ABM	410	(3)
Transportation of Agricultural Commodities	ABM	416	(4)
Senior Project	ABM	461	(2)
Senior Project	ABM	462	(2)
Undergraduate Seminar	ABM	463	(2)
Introduction to Computing	DP	110	(4)
World Agricultural Resources	IA	101	(4)
Courses to Complete Major			(37-46)

OPTION COURSES FOR MAJOR

(Required in specific options)

Agricultural Economics

Agricultural Market Structure	ABM	412	(4)
Statistical Analysis for Agriculture	ABM	476	(4)
Price and Income Analysis	EC	311	(4)
Price and Income Analysis	EC	312	(4)
Economic Statistics	EC	321	(4)
Economic Statistics	EC	322	(4)
Introduction to Mathematical Analysis	MAT	108	(3)
Introduction to Mathematical Analysis	MAT	109	(3)
Logic and Semantics	PHL	202	(4)
Agricultural Production			(8)

(Select from AS 111, AGR 111, FI 230, OH 131, AS 327)

Food Distribution

Wholesaling of Agricultural Products	ABM	106	(3)
Agricultural Sales and Service Management	ABM	202	(3)
AG Supervision & Training	ABM	203	(2)
Retailing	ABM	306	(4)
Economics of Food Distribution	ABM	360	(3)
Cases in Food Distribution	ABM	361	(2)
Harvesting and Marketing	AGR	224	(4)
Meat Utilization	AS	327	(3)
General Fruit Production	FI	230	(3)
Fundamentals of Risk and Insurance	FIR	307	(4)
Introduction to Foods	FN	121	(3)
Salesmanship	MKT	208	(4)
Basic Horticultural Skills	OH	131	(4)

Management

Wholesaling of Agricultural Products	ABM	106	(3)
Agricultural Sales and Service Management	ABM	202	(3)
Agricultural Supervision and Training	ABM	203	(3)
Retailing of Agricultural Products	ABM	306	(4)
Enterprise Accounting	ABM	325	(3)
Enterprise Accounting	ABM	326	(3)
Land Appraisal	ABM	406	(4)

SUPPORT AND ELECTIVE COURSES

(Required of all students)

American Civilization or	AMC	201	*(4)
American Civilization or	AMC	202	*(4)
Business Law	BUS	301	*(4)
Report Writing	COM	216	*(3)
Principles of Economics	EC	201	*(4)
Principles of Economics	EC	202	*(4)
Freshman Composition	ENG	104	*(4)
Basic Mathematics	MAT	101	*(3)
Intro to Statistics	MAT	107	*(3)
Physical Education 100 level	PE		*(3)
Public Speaking	SP	100	*(4)
Courses to complete general education requirements and electives			**(36-40)

*May be used for the general education requirement. Select unspecified courses from the general education list.

**Must include four courses from a minimum of two schools other than the School of Agriculture for fulfillment of the breadth requirement.

Course Descriptions

ABM 101 Introduction to Agricultural Business (4)

Agricultural business structure and scope of operations. Principles of operations and financing. Seminar discussions. 4 lectures.

ABM 106 Wholesaling of Agricultural Products (3)

Principles, methods and techniques of buying, receiving, storing and handling agricultural products between the producer and the retail outlets. Functions of brokers, wholesaler—voluntary and cooperative types, case studies, field trips and guest speakers in seminar discussions. 3 lectures.

ABM 200 Special Problems for Lower Division Students (1-2)

Individual or group investigation, research, studies or surveys of selected problems. Total credit limited to 4 units, with a maximum of 2 units per quarter.

ABM 202 Agricultural Sales and Service Management (3)

Case studies and seminar discussions concerning principles of sales, personnel selection, training, and supervision. Sales control, credit collection, theory and method of evaluation of sales and service techniques. 3 lectures.

ABM 203 Agricultural Supervision and Training (2)

The principles and techniques of mechanical and technical job instruction; introductory research methods presented; job breakdown and job description as applied to agricultural business enterprises; student seminar-type discussions, demonstrations, and case study critiques. 2 lectures.

ABM 225 Advertising and Promotion of Agricultural Products (3)

Industry-sponsored agricultural advertising programs; tools of publicity, merchandising and public relations. Detailed examination of local types of advertising media, rates for short, seasonal promotions. Advertising provisions of marketing orders. Seminar-type discussions and guest speakers. 2 lectures and 1 three-hour laboratory.

ABM 299 Special Topics for Lower Division Students (1-4)

Group study of a selected topic, the title to be specified in advance. Total credit limited to 8 units, with a maximum of 4 units per quarter. Prerequisite: Permission of instructor.

ABM 300 Contemporary Economic Problems of Agriculture (3)

Seminar discussions of current social, economic and ecological problems. Overview of food supplies, population, agricultural pollution, food costs, consumerism, poverty, world food dilemma and societies' responsibility. 3 lectures. Prerequisite: EC 201 or consent of the instructor.

ABM 304 Agricultural Marketing (3)

Economic aspects of marketing agricultural products. Problems and alternative solutions of various marketing institutions. Current trends and developments in California product marketing. 3 lectures. Prerequisite: EC 201 or permission of the instructor.

ABM 306 Retailing of Agricultural Products (4)

Functions of buying, receiving, storing and handling products and merchandise for profitable store operations, site selection, costs, facilities, techniques, store operations and methods; application of computers to decision making; case studies; seminar discussions, and field trips. 3 lectures and 1 three-hour laboratory.

ABM 308 Agricultural Labor Management Relations (4)

Analysis of union contracts used in agricultural industry. Responsibilities of management and labor. Evolution of western agriculture labor and unionization. Trends and alternative effects of future bargaining in agriculture. 3 lectures, 1 three-hour laboratory, field trips.

ABM 311 Agricultural Production Economics (4)

Introduction to fundamental production economic principles applies to problems in agriculture. 4 lectures. Prerequisite: EC 202.

ABM 313 Agricultural Policy (4)

Contemporary development and economic analysis of public programs and policies affecting agriculture. Current policies and programs. Alternative policies evaluated. Seminar discussions. Policy case studies analyzed. 4 lectures. Prerequisite: EC 201 or consent.

ABM 320 Accounting for Landscape Architects (4)

General accounting principles with special emphasis on problems unique to the landscape architectural practioner. 3 lectures, 1 three-hour laboratory.

ABM 324 Management Accounting (4)

Fundamental processes of double entry accounting. Emphasis on practical application in agricultural management. 3 lectures, 1 three-hour laboratory.

ABM 325 Enterprise Accounting (3)

Techniques of financial analysis and accounting for income, costs and profits. Case studies employed using agricultural firms. Management of financial and credit resources. 3 lectures.

ABM 328 Agricultural Enterprise Management (4)

Criteria for decision making involving agricultural enterprises. Case studies used. Budgeting processes, credit use, and feasibility analysis. Source of economic information. Introduction to simulation of management process. Seminar discussions. 3 lectures, 1 three-hour laboratory.

ABM 360 Economics of Food Distribution (3)

Introductions to food distribution practices. Pricing and price determination principles. Mergers and acquisition; state and federal regulations. Trade restraints. 3 lectures. Prerequisite: ABM 306 or consent.

ABM 361 Case Studies in Food Distribution (2)

Seminar discussions of actual case problems. Financing organization, management, store location, operation, personnel, mergers and growth. 2 lectures. Prerequisite: ABM 306.

ABM 375 Introduction to Agricultural Data Management (3)

Principles and procedures involved in analysis, presentation of agricultural data for upper management. Application for agricultural business, decision making, sampling, calculation and interpretation of introductory parametric and non-parametric tests applied to market tests. Computer applications. 2 lectures, 1 three-hour laboratory. Prerequisite: MAT 107 and DP 110.

ABM 400 Special Problems for Upper Division Students (1-2)

Individual or group investigation, research, studies or surveys of selected problems. Total credit limited to 4 units, with a maximum of 2 units per quarter.

ABM 402 Personnel Management (3)

Worker-supervisor relationships and theory; employee motivation; union and management relations; recruitment and selection; performance appraisal; communications; individual and group incentive systems; employee counseling. Case studies analyzed. Seminar discussions held, role playing emphasized, guest speakers. 3 lectures.

ABM 403 Agricultural Prices (4)

Principles and methods of price analysis, forces affecting agricultural prices, price variations, cycles and trends, price reports and forecasting, governmental agricultural price control programs and price characteristics of specific agricultural commodities. 4 lectures. Prerequisite: EC 202.

ABM 406 Land Appraisal (4)

Principles, methods and techniques of appraising agricultural real property for loans, purchase and sale, tax assessments, condemnations, and other purposes. 3 lectures, 1 three-hour laboratory.

ABM 410 Economics of Food and Fiber Consumption (3)

Multidisciplinary approach. Studies and delineates agricultural food and fiber consumption variables. Investigates marketing from consumer point of view. Surveys disciplines relevant to consumer behavior and consumption trends. Case studies and seminar discussion used to facilitate comprehension of concepts involved. 3 lectures. Prerequisites: EC 201, 202.

ABM 412 Agricultural Market Structure (4)

Market structure analysis and public policy. Micro economic principles applied to the firm and industry. Case studies of structure, conduct and performance applied to industries. Seminar discussions. 4 lectures. Prerequisite: EC 202 or consent of the instructor.

ABM 416 Transportation of Agricultural Commodities (3)

Principles of transportation of perishable agricultural products, emphasizing current trends of rail, truck and air carriers. Types of equipment available, trends and regulations including agricultural exemptions and incentives. 3 lectures.

ABM 441-442 Internship in Agricultural Business Management (1-3) (1-3)

On-the-job training in agricultural business management providing collegiate level experience in food distribution, agricultural management. One unit credit for each 120 hours of experience and training. No more than 6 units of credit can be earned. Useful for preparation of senior project. Permission of coordinator required.

ABM 461, 462 Senior Project (2) (2)

Selection and completion of a project under faculty supervision. Projects typical of problems which graduates must solve in their fields of employment. Project results are presented in a formal report. Minimum 120 hours total time.

ABM 463 Undergraduate Seminar (2)

New methods and developments, practices, and procedures in the field. 2 meetings. Prerequisite: Senior project completed.

ABM 476 Statistical Analysis for Agriculture (4)

Application of statistical tools and techniques employed in agricultural economic analysis. Application of computer to selected parametric and non-parametric statistical techniques. 3 lectures. 1 three-hour laboratory. Prerequisites: ABM 375 or MATH 107 or equivalent.

ABM 499 Special Topics for Upper Division Students (1-4)

Group study of a selected topic, the title to be specified in advance. Total credit limited to 8 units, with a maximum of 4 units per quarter. Prerequisite: permission of instructor.

AGRICULTURAL ENGINEERING

Floyd V. Matthews, Jr., *Chairman*

Haven Q. Conard You-tsai Hung Charles M. Stark

Agricultural engineering is becoming increasingly important with the growth of agriculture to highly automated methods of operation. Because agriculture includes all operations and facilities utilized from the planting of seed to the packaged processed foods, many challenges await the agricultural engineer.

A student pursuing a major in agricultural engineering combines engineering sciences with basic biology to accomplish his educational objective. He may select areas of special interest such as food engineering, soil and water, electric power and processing, or power and machinery.

Because of the rapid expansion in the processing of convenience foods, a student in food engineering will be concerned with the design of equipment and facilities for food processing plants.

Opportunities are abundant for the student interested in soil and water. Irrigation, drainage, flood and erosion control, and water supply require study of soil mechanics, movement of water through the soil, and design criteria for canals, ditches and dams.

The trend to large dairy, beef, swine and poultry enterprises has necessitated the automation of feed handling and processing equipment. A knowledge of electric power and electronic controls is necessary to engineer these complex systems.

If the student selects the power and machinery area, he will learn how to design machines for automatic harvesting of fruits and vegetables. He will study the power testing of tractors and the effects of noise vibrations on the equipment operator.

Students contemplating entrance into agricultural engineering should take a maximum of physics, mathematics and science in high school.

The Agricultural Engineering Department maintains and manages a fleet of agricultural and construction equipment for instructional and farm use.

CORE COURSES FOR MAJOR

(Required of all students)

Agricultural Engineering Problems	AE	101	(4)
Engineering Analysis of Agricultural Machines	AE	210	(3)
Instruments and Controls	AE	250	(3)
Engines and Energy Conversion	AE	310	(3)
Agricultural Environments and Structures	AE	320	(5)
Strength of Biological Materials	AE	330	(3)
Agricultural Use of Radiations	AE	331	(3)
Man-Machine Systems	AE	410	(5)
Irrigation Engineering	AE	440	(4)

Erosion Control & Drainage Engineering	AE	441	(4)
Senior Project	AE	461	(2)
Senior Project	AE	462	(2)
Undergraduate Seminar	AE	463	(2)
Introduction to Engineering Graphics	ESG	120	(3)
or Engineering Graphics	ESG	121	(2)
Strength of Materials	ME	219	(3)
Thermodynamics	ME	301	(4)
Fluid Mechanics	ME	311	(4)

SUPPORT AND ELECTIVE COURSES

(Required of all students)

American Civilization	AMC	201	*(4)
American Civilization	AMC	202	*(4)
Basic Biology	BIO	115	*(5)
General Chemistry	CHM	111	*(3)
General Chemistry	CHM	112	(3)
General Chemistry Laboratory	CHM	151	*(1)
General Chemistry Laboratory	CHM	152	(1)
Report Writing	COM	216	(3)
Principles of Economics	EC	201	*(4)
Principles of Economics	EC	202	*(4)
Elements of Electrical Engineering	EEE	331	(4)
Freshman Composition	ENG	104	*(4)
Freshman Composition	ENG	105	*(4)
Analytic Geometry and Calculus	MAT	114	*(3)
Analytic Geometry and Calculus	MAT	115	*(3)
Analytic Geometry and Calculus	MAT	116	*(3)
Calculus and Differential Equations	MAT	214	'(4)
Calculus and Differential Equations	MAT	215	(4)
Calculus and Differential Equations	MAT	216	(4)
Engineering Statics	ME	211	*(3)
Engineering Dynamics	ME	212	(4)
Strength of Materials	ME	218	*(3)
Physical Education 100 level	PE		*(3)
General Physics	PHY	131	*(4)
General Physics	PHY	132	*(4)
General Physics	PHY	133	*(4)
Basic Soil Science	SS	231	(4)
Humanities			*(6)
Mathematics (Restricted)			(6)
Agricultural Science Electives (Re-stricted			(8)
Natural Science Electives (Re-stricted)			(6)
Directed Electives (Restricted)			(7)
Electives			(15)

*May be used for the general education requirement. Select unspecified courses from the general education list. For general education requirements select four courses from a minimum of two schools other than the School of Agriculture.

Course Descriptions

AE 101 Agricultural Engineering Problems (4)

An introduction to the field of agricultural engineering and the type of problems encountered. Machining and welding techniques, surveying land for agricultural enterprises, experimentation and report writing. 3 lectures, 1 three-hour laboratory.

AE 102 Fundamentals of Household Equipment and Materials (4)

Scientific principles applied to household equipment and its use. Electric wiring motors, switches, timers, and heat sensors used in appliances. Principles of infrared, ultrasonic, and microwave energy, refrigeration, and flow of heat through utensils and materials. 3 lectures, 1 three-hour laboratory.

AE 121 Construction Fundamentals (2)

Construction techniques, materials strength tests, structural engineering and planning. Carpentry and masonry tools, hardware and materials as applied to construction of various structures. Hand and power equipment, 1 lecture, 1 three-hour laboratory.

AE 122 Utility Systems (2)

Electrical power and lighting systems. Electrical principles, codes, construction techniques and wiring practices. Design of water pressure systems. Methods of installation. 1 lecture, 1 three-hour laboratory.

AE 123 Welding (2)

Fundamentals of arc and acetylene welding. Flat, horizontal, vertical, and overhead positions. Cutting, brazing, hard-facing. Practical arts and skills of metal fabrication. 1 lecture, 1 three-hour laboratory.

AE 124 Landscape Construction (4)

Fabrication techniques with wood, material strength tests. Fundamentals of structural engineering as applied to landscape and nursery construction. Safe and efficient use of hand and power tool equipment. 2 lectures, 2 three-hour laboratories.

AE 131 Surveying Fundamentals (2)

Measurement of distances, elevations, angles, and directions. Care and use of surveying equipment. Contours, maps, field notes, calculation methods. 1 lecture, 1 three-hour laboratory. Prerequisite: MAT 101 or 102.

AE 132 Surveying Applications (2)

Plane table mapping, earth yardage for land forming, cuts and fills by planimeter, curve surveys, topographic maps by transit-stadia. Desk calculator methods. 1 lecture, 1 three-hour laboratory. Prerequisite: AE 131.

AE 200 Special Problems for Lower Division Students (1-2)

Individual or group investigation, research, studies or surveys of selected problems. Total credit limited to 4 units, with a maximum of 2 units per quarter.

AE 210 Engineering Analysis of Agricultural Machines (3)

A functional and force analysis of soil working tools, planting equipment, pest control equipment, and harvesting equipment. The application of statics and dynamics to machine units. 2 lectures, 1 three-hour laboratory. Prerequisite: ME 212.

AE 215 Tractor Power and Machinery (4)

A study of the operating principles of internal combustion engines including detailed studies of valves, ignition, carburetion, and power measurement. Operating principles and adjustments of field machinery such as plows, harrows, planters, grain harvesters, and hay harvesting equipment. 3 lectures, 1 three-hour laboratory. Prerequisite: AE 241 or equivalent.

AE 231 Materials and Creative Construction (3)

Construction material characteristics; aesthetic qualities, functional application, strengths, durability, economics. Creative use of construction materials, tools, and equipment. 1 lecture, 2 three-hour laboratories. Prerequisite: Ability to safely operate power tools.

AE 233 Pest Control Equipment (3)

Principles of machines and power units as applied to various types of spraying, dusting, and fumigation equipment used in structural and agricultural industries. Structural pest control equipment. Structural repair techniques. 2 lectures, 1 three-hour laboratory. Prerequisite: MAT 101 or 102.

AE 240 Irrigation (4)

Principles and practices of irrigation. Irrigation design engineering. Pumps, wells, water conveyance and measurement. Surface, subsurface and sprinkler irrigation. Science of plant-soil-water relationships. Water requirements of crops. Leaching and drainage problems. 3 lectures, 1 three-hour laboratory. Prerequisite: AE 131, SS 231, MAT 101 or 102.

AE 241 Tractors (2)

Basic principles of engines and power transmission . Field and shop practice in operation, service, adjustment, and minor repair of wheeled and tracklayer tractors. Gasoline, LPG, and diesel engines. Includes bulldozer, backhoes, skiploaders, etc. 1 lecture, 1 three-hour laboratory.

AE 244 Special Projects (1-4)

Individual or group projects tailored to the student need for further development of knowledge and skill. Construction or modification of agricultural or shop equipment. 1 laboratory per unit. Limited to 4 units total, with maximum of 2 units per quarter.

AE 250 Instruments and Controls (3)

Fundamentals of instruments and their operational characteristics with respect to damping, range and accuracy. Electric, electronic, pneumatic, and hydraulic controls for sensing and actuating devices. 3 lectures. Prerequisite: MAT 116.

AE 299 Special Topics for Lower Division Students (1-4)

Group study of a selected topic, the title to be specified in advance. Total credit limited to 8 units, with a maximum of 4 units per quarter. Prerequisite: Permission of instructor.

AE 301 Facilities Maintenance Technology (4)

Application of basic science to the operation and maintenance of electrical and mechanical equipment; refrigeration, heating, cooking, dish-washing, cleaning, etc. Fire protection and safety are also included. Three lectures and one three-hour laboratory. Prerequisite: MAT 101 or equivalent.

AE 310 Engines and Energy Conversion (3)

Energy conversion and thermodynamics of engines. Power testing of tractors and agricultural power units. 2 lectures and 1 three-hour laboratory. Prerequisite: ME 301.

AE 320 Agricultural Environments & Structures (5)

Air-humidity relationships and engineering applications to atmospheres for fruits, vegetables and animals. Design of building walls, floors, and members to withstand forces of wind, snow, and product storage. 4 lectures, 1 three-hour laboratory. Prerequisite: ME 219.

AE 321 Automatic Irrigation Systems (4)

Engineering design, sprinkler equipment, clock control mechanisms, soil moisture sensing devices, pressure loss, trouble-shooting, electro-hydraulic systems. Application to turf installations. 3 lectures, 1 three-hour laboratory. Prerequisite: AE 122, SS 231, MAT 101 or 102.

AE 330 Strength of Biological Materials (3)

Resistance to mashing and resulting damage to such products as fruits, vegetables, grain, and eggs. Absorption of loads applied to these biological materials and how the loads are transmitted to container walls and floors. 3 lectures. Prerequisite: ME 219.

AE 331 Agricultural Use of Radiations (3)

Applications and sources of such energies as infrared, ultraviolet, electrostatic, microwave and sonic. Radio-frequency treatment of seed, and the influence of electricity on the movement of water in soil are included. 2 lectures and 1 three-hour laboratory. Prerequisite: PHY 133.

AE 400 Special Problems for Upper Division Students (1-2)

Individual or group investigation, research, studies, or surveys of selected problems. Total credit limited to 4 units, with a maximum of 2 units per quarter.

AE 401 Instruction in Advanced Shop Skills (3)

Management of the facility including maintenance of equipment, inventories, supplies, and planning including instructor's responsibilities and liabilities. 2 lectures and 1 two-hour activity period. Prerequisite: Junior standing or consent of instructor.

AE 410 Man-Machine Systems (5)

Effects of noise, vibrations, temperature, humidity, etc. on man and his ability to operate equipment. Also dimensions of body movements with respect to design of machines. Coordination of man and machines into a compatible system. 4 lectures and 1 three-hour laboratory. Prerequisite: MAT 216.

AE 411 Principles of Mechanical Harvesting (4)

Forces required to remove fruit from trees and vines and to remove vegetables from the soil and plants. Mechanical, electronic, pneumatic, and hydraulic means of distinguishing desirable from undesirable products. 3 lectures, 1 three-hour laboratory. Prerequisite: MAT 216.

AE 421 Park Equipment Management (4)

Principles of management and operation of park and horticultural equipment fleets. Economic considerations of leases, ownership, and rental. Principles of power determination and mechanism design evaluation. Mechanical, electrical, pneumatic, and hydraulic equipment investigations. 3 lectures, 1 three-hour laboratory. Prerequisite: Senior standing.

AE 430 Aerodynamics in Agriculture (4)

Engineering the density and velocity of air streams for drying, seeding, spraying, loading and unloading. Cleaning and separating agricultural products by air streams. Influence of wind direction and velocity on buildings and growing crops. 4 lectures. Prerequisite: ME 311.

AE 431 Drying of Biological Materials (4)

Principles of moisture movement and removal from fruits, vegetables, hay, and grain. Also freeze drying, vacuum drying, and dehydrofrigidation. 4 lectures. Prerequisite: MAT 216.

AE 440 Irrigation Engineering (4)

Operating characteristics of different systems of irrigation; sprinkler, border, flooding, etc. Calculation of water requirements for crops and soils. Engineering design of water application rates, soil absorption rates and automatic equipment. 3 lectures. 1 three-hour laboratory. Prerequisite: ME 311.

AE 441 Erosion Control and Drainage Engineering (4)

Engineering the methods of reducing the erosive velocity of water flow over land surfaces. Determining the optimum size of pipes and ditches to remove and convey water from the soil. 3 lectures. 1 three-hour laboratory. Prerequisite: ME 311.

AE 461, 462 Senior Project (2) (2)

Student will select an engineering problem in his area of interest. Project will be completed under appropriate faculty supervision and will culminate in a written report.

AE 463 Undergraduate Seminar (2)

Student presentation and discussion of recent research and development in Agricultural Engineering. 2 lectures.

AE 499 Special Topics for Upper Division Students (1-4)

Group study of a selected topic, the title to be specified in advance. Total credit limited to 8 units, with a maximum of 4 units per quarter. Prerequisite: permission of instructor.

AGRONOMY

One of the four majors offered in the Plant and Soil Science Department is agronomy. For other programs in this department see agricultural biology, soil science and fruit industries.

Robert L. Procsal, *Chairman*

Gerald L. Croissant Theodore L. Lieb

Agronomy is for the qualified student who is challenged by the thought of feeding the world. To prepare students the agronomy curriculum is designed to give a broad background in the art and science of crop production. Major and support courses emphasize current practices employed by commercial agriculture in California and other similar agricultural areas. With the realization that scientific and technological developments are changing constantly students are also taught agronomic fundamentals that will enable them to adapt and improve practices as changes occur. These fundamentals include principles of environmental management necessary to insure a continuous supply of agricultural products. Students are sufficiently prepared in the sciences to successfully pursue graduate work.

Agronomy students at Cal Poly have a unique opportunity to obtain actual experience in growing crop plants. The university farm regularly hires students to help maintain over 400 acres of vegetable crops, field crops, forages, cereals and pastures. Enterprising students are allowed to conduct individual or group crop projects involving small plots or several acres of land. These projects provide valuable training in all phases of crop farm operations and at the same time allow the students to share in the profits.

Employment possibilities are numerous. In addition to commercial crop production, students are prepared to work in the agricultural chemical industry, the seed industry, crop processing and marketing, and county, state, and federal agencies. Traditionally a man's field, women are now finding agronomy to be not only a fascinating study but a promising vocation.

CORE COURSES FOR MAJOR

(Required of all students)

Cereal Crops	AGR	122	(4)
Field Crops	AGR	221	(4)
Harvesting & Marketing of Vegetables	AGR	224	(4)
Vegetable Crop Production	AGR	226	(4)
Weeds and Weed Control	AGR	233	(4)
Crop Technology	AGR	322	(4)
Seed Production	AGR	331	(4)
Irrigated Pastures	AGR	333	(4)
Plant Breeding	AGR	404	(4)
Crop Diseases	AGR	421	(4)
Crop Mgmt Operations	AGR	437	(3)
Senior Project	AGR	461	(2)
Senior Project	AGR	462	(2)
Undergraduate Seminar	AGR	463	(2)
Basic Soil Science	SS	231	(4)
Soil Management	SS	232	(4)
Soil Fertility and Fertilizers	SS	233	(4)
Soil and Plant Analysis	SS	339	(3)

SUPPORT AND ELECTIVE COURSES

(Required of all students)

Management Accounting	ABM	324	(4)
Surveying Fundamentals	AE	131	(2)
Tractor Power and Machinery	AE	215	(4)
Tractors	AE	241	(2)
Introduction to Arthropods	AGB	165	(4)
Insect Biology	AGB	228	(3)
Principles of Pest Management	AGB	231	(4)
Introduction to Plant Science	AGR	111	(3)
American Civilization	AMC	201	*(4)
American Civilization	AMC	202	*(4)
Basic Biology	BIO	115	*(5)
Genetics	BIO	303	*(4)
Elements of Botany	BOT	120	*(4)
General Plant Pathology	BOT	223	*(4)
College Chemistry	CHM	104	*(3)
College Chemistry	CHM	105	*(3)
College Chemistry Lab	CHM	141	*(1)
College Chemistry Lab	CHM	142	*(1)
Elements of Organic Chemistry	CHM	201	*(3)
Organic Chemistry Lab	CHM	250	*(1)
Principles of Economics	EC	201	*(4)
Freshman Composition	ENG	104	*(4)
Freshman Composition	ENG	105	*(4)
Basic Mathematics	MAT	101	*(3)
Basic Mathematics	MAT	102	*(3)
Physical Education 100 level	PE		*(3)
Public Speaking	SP	100	*(4)
Humanities			*(6)
†Agricultural Engineering			(4)
‡Agricultural Business Management			(3)
Electives			(33)

*May be used for the general education requirement. Select unspecified courses from the general education list. For general education breadth requirements select four courses from a minimum of two schools other than the School of Agriculture.

†Select from AE 121, 122, 123.

‡Select from ABM 304, 308, 325, 402.

Course Descriptions

AGR 111 Introduction to Plant Science (3)

Diversification and importance of economic crop plants. Environmental factors as they affect plant growth. Physical characteristics of soil, soil-water relationships, terminology. 3 lectures.

AGR 122 Cereal Crops (4)

Production and management of the major California cereal crop varieties. Characteristics of these varieties in relation to applicable cultural practices, harvesting, cost of production, grain grading and processing, marketing, disease and pest control. 3 lectures, 1 three-hour laboratory.

AGR 123 Forage Crops (4)

Production, harvesting, and utilization of principal California forage crops, identification and utilization of range plants studied in the field. 3 lectures, 1 three-hour laboratory.

AGR 200 Special Problems for Lower Division Students (1-2)

Individual or group investigation, research, studies or surveys of selected problems. Total credit limited to 4 units, with a maximum of 2 units per quarter.

AGR 221 Field Crops (4)

Growing of California field crops other than cereals, such as row-planted cotton, flax, field beans, sugar beets, and miscellaneous fiber and oil crops. Characteristics of the major varieties in relation to the best cultural harvesting, marketing, disease and pest control practices. 3 lectures, 1 three-hour laboratory.

AGR 224 Harvesting and Marketing of Vegetables (4)

Harvesting methods and procedures; current handling and packaging techniques; grades and grading, minimum standards, containers, storage; requirements of crops for processing. 3 lectures, 1 three-hour laboratory.

AGR 226 Vegetable Crop Production (4)

Cultural practices, varieties, economics of production of major warm and cool season vegetables. Application of production techniques on college-operated acreage. 3 lectures, 1 three-hour laboratory.

AGR 233 Weeds and Weed Control (4)

Recognition and control of weeds injurious to California crop and range lands. Classification of weeds and their seed. Dissemination; cultural, chemical, and biological control practices; laws regarding weeds. 3 lectures, 1 three-hour laboratory.

AGR 299 Special Topics for Lower Division Students (1-4)

Group study of a selected topic, the title to be specified in advance. Total credit limited to 8 units, with a maximum of 4 units per quarter. Prerequisite: Permission of instructor.

AGR 322 Crop Technology (4)

Grades and qualities of California crops as they affect market values. Determination of factors affecting optimum harvesting and storage. Technological processes as they affect processing. 3 lectures. 1 three-hour laboratory. Prerequisite: AGR 122, 221, 224.

AGR 331 Seed Production (4)

California field, vegetable and flower seed production. Location methods of growing, harvesting, storing. Economic outlook for principal kinds. Certified seed production. Seed laws. 3 lectures, 1 three-hour laboratory. Prerequisite: AGR 122, 221, 226, 233.

AGR 333 Irrigated Pastures (4)

Culture, management, fertilization, composition, and costs of California irrigated pastures. Identification, adaptation, and utilization of major irrigated pasture varieties. 3 lectures, 1 three-hour laboratory.

AGR 336 Range Management (4)

Soil and plant characteristics of rangelands. Management practices used to maintain range resources and increase production of forage and livestock. Identification of important range plants. 3 lectures, 1 three-hour laboratory. Prerequisite: SS 221 or 231.

AGR 341 Farm Cultural Practices (3)

Practical application of primary and secondary crop production cultural practices with a relationship to field conditions. Sequence and necessity of operations from soil preparation through harvesting. Analysis of equipment efficiency to crop culture. 1 one-hour lecture, 2 three-hour laboratories. Prerequisite: AE 215 or AE 241 and any crop production course, or by permission of the instructor.

AGR 400 Special Problems for Upper Division Students (1-2)

Individual or group investigation, research, studies, or surveys of selected problems. Total credit limited to 4 units, with a maximum of 2 units per quarter.

AGR 404 Plant Breeding (4)

Principles and techniques of improving crop plants. Field plot design and statistics applied to experimentation in crop improvement. 3 lectures, 1 three-hour laboratory. Prerequisite: BIO 303.

AGR 421 Crop Diseases (4)

Methods of recognizing and controlling diseases of commercial vegetable and field crops. Chemical and cultural control methods that are presently being utilized in California. 3 lectures, 1 three-hour laboratory. Prerequisite: BOT 120, PTH 223.

AGR 437 Crop Management Operations (3)

Management decisions affecting the efficient operation of commercial vegetable, field, and orchard acreages. Cost determinations, leasing, labor relations, credit, machinery management, calendar of operations. 2 lectures, 1 three-hour laboratory. Prerequisite: senior standing.

AGR 461, 462 Senior Project (2) (2)

Selection and completion of a project under faculty supervision. Projects typical of problems which graduates must solve in their fields of employment. Project results are presented in a formal report. Minimum 120 hours total time.

AGR 463 Undergraduate Seminar (2)

New methods and developments. Practices and procedures in the field. 2 lectures.

AGR 499 Special Topics for Upper Division Students (1-4)

Group study of a selected topic, the title to be specified in advance. Total credit limited to 8 units with a maximum of 4 units per quarter. Prerequisite: permission of instructor.

ANIMAL SCIENCE

Eugene Keating, *Chairman*

Allen C. Christensen
Norman K. Dunn
Homer D. Fausch
Jack T. Gesler
Mack H. Kennington
Arlin D. Knight
Cedric Y. Matsushima
Edward A. Nelson
Robert H. Packard
Robert J. Schechter
John E. Trei
Tom W. Westing
Adolph A. Wysocki

A four-year curriculum leading to a Bachelor of Science degree in Animal Science with options in pre-veterinary science, animal production, and animal agri-business is offered by the department.

Courses offered by the department are designed to fulfill career needs for men and women in the science and business phases of the animal industry.

Specialized laboratories are provided for meat, wool, poultry, eggs, feed processing and animal production. The department maintains 330 acres of range land and 100 acres of irrigated pasture. Livestock includes a purebred breeding herd of Aberdeen-Angus and polled Herefords, and commercial feeder cattle; the Kellogg Arabian horses; flocks of purebred Rambouillet, Suffolk, and Hampshire sheep; a herd representing commercial breeds of swine; and flocks of laying hens, fryers and turkeys.

Location of the college provides rich opportunities for students to obtain specialized and practical educational experience in production, management, feeding, marketing and processing. Cooperation of prominent local breeders, feeders, producers, marketing organizations and related animal industry offers additional opportunity for field study.

Facilities for student-owned and operated livestock projects are made available by the Cal Poly Foundation.

The pre-veterinary science option meets requirements for admission to schools of veterinary medicine, related medical technical fields, and for graduate study in animal nutrition, meat science, animal breeding, and animal physiology.

The animal production option stresses preparation for management of livestock, horse and poultry enterprises. The option is of particular value to the student planning to teach agriculture at the secondary level or to serve in underdeveloped nations.

The animal agri-business option stresses preparation for management and marketing in animal agri-businesses of non-ranch type. Particular emphasis is given to agri-businesses needing animal specialists as a part of their management or marketing team. This option has been found to be of particular value to women as well as men majors.

For the student interested in meat science and processing, specialized courses are available. A student may develop a program emphasizing meat science by consulting with the appropriate departmental advisor.

CORE COURSES FOR MAJOR

(Required of all students)

Feeds & Feeding	AS	101	(4)
Introduction to Swine Production	AS	122	(4)
Introduction to Sheep Production	AS	123	(4)
Introduction to Beef Production	AS	131	(4)
Meat Science	AS	227	
or Meat Utilization	AS	327	
Advanced Livestock Feeding	AS	303	(3)
Animal Nutrition	AS	402	(4)
Animal Breeding	AS	404	(4)
Senior Project	AS	461	(2)
Senior Project	AS	462	(2)
Undergraduate Seminar	AS	463	(2)
Poultry Principles	PS	131	(4)
Physiology of Domestic Animals	VS	205	(4)
Animal Diseases	VS	301	(3)
Courses to complete major			(61)

OPTION COURSES FOR MAJOR

(Required in specific options)

PRE-VETERINARY SCIENCE

Select a minimum of 30 units:

Mammalian Endocrinology	AS	412	(4)
Chemical Principles	CHM	113	(4)
Organic Chemistry	CHM	212	(3)
Organic Chemistry	CHM	213	(3)
Quantitative Analysis	CHM	221	(4)
Organic Chemistry Lab	CHM	252	(1)
Organic Chemistry Lab	CHM	253	(1)
College Physics	PHY	121	(4)
College Physics	PHY	122	(4)
College Physics	PHY	123	(4)
Vertebrate Zoology	ZOO	138	(5)
Embryology	ZOO	323	(4)
Electives			(27-28)

ANIMAL PRODUCTION

Tractors	AE	241	(2)
Forage Crops	AGR	123	(4)
or Cereal Crops	AGR	122	
Irrigated Pastures	AGR	333	(4)
or Range Management	AGR	336	
Approved Animal Science			(30)
Electives			(18-19)

ANIMAL AGRI-BUSINESS

Select 30 units from	(30)
ABM 202, 225, 304, 308, 311, 325, 402, 403, 406, 402, 403, 406, BUS 144, 145, 244, 245, 301, 302, DP 110	
Approved Animal Science Selections	(14)
Electives	(17)

SUPPORT AND ELECTIVES COURSES

(Required of all students)

Management Accounting	ABM	324	(4)
Agricultural Enterprise Management	ABM	328	(4)
American Civilization	AMC	201	*(4)
American Civilization	AMC	202	*(4)
Basic Biology	BIO	115	*(5)
Genetics	BIO	303	*(4)
College Chemistry	CHM	104	*(3)
or General Chemistry	CHM	111	(3)
College Chemistry	CHM	105	*(3)
or General Chemistry	CHM	112	(3)
College Chemistry Laboratory	CHM	141	*(1)
or General Chemistry Laboratory	CHM	151	(1)
College Chemistry Laboratory	CHM	142	*(1)
or General Chemistry Laboratory	CHM	152	(1)
Elements of Organic Chemistry	CHM	201	*(3)
Organic Chemistry Laboratory	CHM	251	*(1)
Biochemistry	CHM	327	*(4)
Principles of Economics	EC	201	(4)
Freshman Composition	ENG	104	*(4)
Freshman Composition	ENG	105	*(4)
or Report Writing	COM	216	(3)
Basic Mathematics	MAT	101	*(3)
Basic Mathematics	MAT	102	*(3)
or Trigonometry	MAT	104	
or Introduction to Math Analysis	MAT	108	
General Bacteriology	MIC	201	(5)
Physical Education 100 level	PE		*(3)
General Psychology	PSY	201	*(4)
Public Speaking	SP	100	*(4)
General Soils	SS	221	(4)
or Basic Soil Science	SS	231	
Invertebrate Zoology	ZOO	137	*(5)
Humanities			*(6)

*May be used for the general education requirement. Select unspecified courses from the general education list. For general education requirements select four courses from a minimum of two schools other than the School of Agriculture.

Course Descriptions

AS 101 Feeds and Feeding (4)

An introductory course treating the fundamentals of animal nutrition, the composition of feeds, feeding standards and their application to livestock production. 3 lectures, 1 three-hour laboratory.

AS 111 Animal Agricultural Science (4)

Designed for non-animal science majors as an orientation course pertaining to basic physiological and economical considerations in the production and marketing of animals. 4 lectures.

AS 122 Introductory Swine Production (4)

History and development of swine industry. Types and breeds of swine. Hog production under California and Midwestern conditions. Common feeds used to supply nutrition requirements. Practice in handling, feeding, and selection. 3 lectures, 1 three-hour laboratory.

AS 123 Introductory Sheep Production (4)

Management of farm flocks of sheep with emphasis on common breeds, their identification and adaptation to California conditions. Principles of feeding, selecting, and evaluating sheep and their products. 3 lectures, 1 three-hour laboratory.

AS 124 Basic Equitation (2)

The fundamentals of the art of equitation. The anatomy of the horse as it pertains to riding. Equipment utilized in training and riding, care of the horse and safety precautions are emphasized. 2 three-hour laboratories.

AS 125 Introductory Horse Production (3)

History evolution, breeds and functions of horses. Basic principles of equine nutrition, reproduction, inheritance, disease and parasite prevention and control, skeletal and muscular form and function. 2 lectures, 1 three-hour laboratory.

AS 131 Introductory Beef Production (4)

Survey of market beef production in the United States. Breed characteristics, grades and classes of market cattle and carcasses. Importance of by-products. 3 lectures, 1 three-hour laboratory.

AS 141 Canine Care and Management (3)

Fundamentals of breeding, feeding, training, management and care of dogs. 2 lectures, 1 three-hour laboratory.

AS 150 Dairy Science (4)

Selection, breeding, feeding, and management of dairy cattle, composition and food value of dairy products. Dairy industry statistics and opportunities. 3 lectures, 1 three-hour laboratory.

AS 200 Special Problems for Lower Division Students (1-2)

Individual or group investigation, research, studies or surveys of selected problems. Total credit limited to 4 units, with a maximum of 2 units per quarter.

AS 227 Meat Science (3)

The practice of slaughtering and cutting of cattle, sheep and swine. Consideration of chemical composition, yields, grades, federal and state inspection and the fundamentals of curing and smoking meats. 2 lectures, 1 three-hour laboratory.

AS 234 Farrier Science (4)

Fundamentals of horseshoeing, anatomy and physiology of the horse's foot, pastern and legs. Trimming feet, fitting, nailing shoes, and introduction to corrective shoeing. 2 lectures, 2 three-hour laboratories.

AS 241 Introductory Livestock Evaluation (2)

Instruction in selection of beef cattle, sheep, swine, and horses according to utility, type and breed. 2 three-hour laboratories. Prerequisite: Sophomore standing.

AS 243 Canine Open (1)

Advanced obedience training; retrieving, jumping, off lead heeling and figure eight, drop on recall, broad jump, and long sits and downs. Theory and preparation for show ring competition and judging. 1 three-hour laboratory. Prerequisites: AS 141 or consent of instructor.

AS 299 Special Topics for Lower Division Students (1-4)

Group study of a selected topic, the title to be specified in advance. Total credit limited to 8 units, with a maximum of 4 units per quarter. Prerequisite: Permission of instructor.

AS 303 Advanced Livestock Feeding (3)

Nutritional requirements for maintenance, growth, fattening, reproduction, and lactation. Calculation of efficient and economical rations. Biological and replacement value of feeds. Recent developments in feeding. 3 lectures. Prerequisite: AS 101.

AS 305 Artificial Insemination of Domestic Animals (3)

Fundamentals and techniques used in the artificial breeding of cattle, sheep, swine and horses; physiological aspects of reproduction; evaluation of artificial insemination in the livestock industry. 2 lectures, 1 three-hour laboratory. Prerequisite: VS 206.

AS 306 Experimental Animal Methodology (4)

Fundamentals and techniques used in the breeding, feeding, care, management and experimentation with laboratory animals. Comparative studies of large versus small animals and the implications of recent findings derived from such studies. 3 lectures, 1 three-hour laboratory. Prerequisite: VS 205 or BAC 200.

AS 320 Animal Production in the Tropics (4)

Principles of animal production in the tropics and subtropics. Management of cattle, pigs, poultry, and other important ruminant animals, including discussion on economically important animal products. 3 lectures, 1 three-hour laboratory.

AS 322 Commercial Swine Production (4)

Management of swine herd. Selection of breeding stock. Feeding and nutritional needs of swine. Market channels, cycles and production costs. Disease control and common diseases of swine. 3 lectures, 1 three-hour laboratory. Prerequisite: AS 101, 122.

AS 323 Sheep and Wool Technology (5)

Management of commercial feedlot and range sheep operations. Shearing, packing, grading, and marketing wool. Critical analysis of the economic characteristics of wool. 4 lectures, 1 three-hour laboratory. Prerequisite: AS 101, 123.

AS 324 Advanced Equitation (2)

Advanced training in equitation with emphasis on schooling techniques for horse and rider. Theory and practice of preparation for show ring competition. 3 two-hour laboratories. Prerequisite: Basic Equitation or consent of instructor.

AS 325 Horse Industry (4)

A comprehensive consideration of equine reproduction and breeding-farm management, including breeding complications, mating hygiene, disease and parasite detection, mare and stallion selection, records and office procedures of stallion stations. 3 lectures, 1 three-hour laboratory. Prerequisite: AS 125.

AS 327 Meat Utilization (3)

Introduction to the technology of meat processing and utilization including cutting, curing, smoking, wrapping, freezing and storage problems. Economic aspects of procurement, portion control and preparation, inspection and grading. For women and interested non-majors. 2 lectures, 1 three-hour laboratory.

AS 331 Beef Cattle Science (5)

The management of commercial and purebred cattle. Cost of production as affected by geographical location. Improvement of performance and breeding efficiency with emphasis on cattle fertility and performance testing. 4 lectures, 1 three-hour laboratory. Prerequisite: AS 131.

AS 335 Horsemanship (2)

Theory and practice of basic training principles and methods. Handling, training, grooming of the young foal and yearling. Instruction in long line training and ground driving. 2 three-hour laboratories. Prerequisite: AS 325.

AS 337 Meat Evaluation (2)

Factors related to carcass quality, conformation, and finish, including meat classification, grading, and evaluation of carcass and wholesale cuts of beef, pork, and lamb. Field trips to nearby packing plants required. 1 lecture, 1 three-hour laboratory. Prerequisite: AS 227.

AS 341 Livestock and Wool Evaluation (3)

Intensive evaluation of livestock and wool by use of carcass evaluation, records of performance, fleece measurements, and standard breed type in preparation for intercollegiate competition, 3 three-hour laboratories. Prerequisite: AS 241.

AS 400 Special Problems for Upper Division Students (1-2)

Individual or group investigation, research, studies, or surveys of selected problems. Total credit limited to 4 units, with a maximum of 2 units per quarter.

AS 402 Animal Nutrition (4)

Metabolism of proteins, carbohydrates, fats, minerals, and vitamins. Relationship of proper nutrition to livestock production. 3 lectures, 1 three-hour laboratory. Prerequisite: CHM 327.

AS 403 Ruminant Nutrition (3)

Implications of recent findings in ruminant nutrition. The physiochemical processes of digestion and absorption. Metabolism and the importance of rumen microflora. Normal metabolism and abnormal metabolic disorders. Modes of action of feed additives. 3 lectures. Prerequisite: AS 402.

AS 404 Animal Breeding (3-4)

Application of genetics to animal breeding. Systems of mating, use of in-breeding, cross-breeding and selection in improving farm animals. 3 lectures, 1 three-hour laboratory. Prerequisite: BIO 303.

AS 412 Mammalian Endocrinology (4)

A general course surveying the glands of internal secretion and their role in development, growth, metabolic regulation, lactation, and reproduction of animals. 4 lectures. Prerequisite: VS 205 or equivalent.

AS 413 Physiology of Lactation (3)

Physiology of milk secretions. Factors affecting production. Mechanical and natural removal of mammary gland secretions. 3 one-hour lectures. Prerequisite: VS 205 and AS412 or equivalent.

AS 422 Feedlot Operations (3)

Management problems of commercial feedlots. Factors affecting efficiency and economy of gain. Procurement of livestock and feedstuffs. Disease control, record keeping, financing and physical plant. 2 lectures, 1 three-hour laboratory. Prerequisite: AS 303 and a minimum of one advanced production course.

AS 423 Livestock Marketing (3)

Livestock marketing practices and procedures. Study of factors affecting livestock and meat prices. Functions of livestock marketing agencies. 2 lectures, 1 three-hour laboratory. Prerequisite: AS 122, 123, 131.

AS 424 Nutritive Analysis (2)

Laboratory course involving the principles and practices in quantitative analysis of feedstuffs. 2 three-hour laboratories. Prerequisite: CHM 321.

AS 427 Meat Processing and Technology (5)

Manufacturing of processed meats, and meat products as related to processing operations, sanitation, product formulation, quality control, and smokehouse operations. 3 lectures, 2 three-hour laboratories. Prerequisite: AS 227, CHM 201.

AS 432 Animal Improvement Plans (4)

The design and evaluation of animal breeding systems. 3 lectures, 1 three-hour laboratory. Prerequisite: AS 404.

AS 434 Farrier Problems (3)

Corrective and specialized horseshoeing. Instruction in constructing normal and corrective horseshoes and techniques in applying them. 1 lecture, 2 three-hour laboratories.

AS 441 Internship in Animal Science (1-16)

On-the-job training in animal science, providing collegiate level experiences in animal production, agri-business and related areas. Experiences may be useful for preparation of senior projects. Prerequisites: permission of coordinator required in advance.

AS 461, 462 Senior Project (2) (2)

Selection and completion of a project under a minimum of supervision. Projects typical of problems which graduates must solve in their fields of employment. Project results are presented in a formal report. Minimum 120 hours total time.

AS 463 Undergraduate Seminar (2)

New methods and developments, practices, and procedures in the field. 2 lectures. Prerequisite: Senior standing.

AS 499 Special Topics for Upper Division Students (1-4)

Group study of a selected topic, the title to be specified in advance. Total credit limited to 8 units, with a maximum of 4 units per quarter. Prerequisite: permission of instructor.

Poultry Science

PS 131 Poultry Principles (4)

Detailed consideration of avian anatomy and physiology as it affects production. Strain evaluation and selection, incubation, feeds and nutrition, sanitation and disease prevention and control. 3 lectures, 1 three-hour laboratory.

PS 231 Poultry Production (4)

The fundamentals of poultry production. Management, ration formulation, production facilities and marketing systems as they relate to various classes of poultry. 3 lectures, 1 three-hour laboratory. Prerequisite: PS 131.

PS 331 Poultry Marketing (4)

The fundamentals of poultry meat and egg marketing. Market channels, processing, and quality maintenance. Management and merchandising problems peculiar to the poultry industry. 3 lectures, 1 three-hour laboratory. Prerequisite: PS 231.

Veterinary Science

VS 205 Physiology of Domestic Animals (4)

Physiological processes of the more important organs of the animal body. 4 lectures. Prerequisite: Sophomore standing.

VS 206 Anatomy of Domestic Animals (3)

Laboratory demonstrations and discussions involving the comparative anatomy of the skeleton, musculature and digestive systems of the horse, cow, sheep, and pig. 2 lectures. 1 three-hour laboratory. Prerequisite: BIO 115.

VS 301 Animal Diseases (3)

Study of factors contributing to animal diseases and their control. 3 lectures. Prerequisite: ZOO 137, MIC 200.

VS 302 Animal Parasitology (4)

The study of animal parasites and their relationship to diseases and infestations of horses, cattle, sheep, swine, and poultry. 3 lectures, 1 three-hour laboratory. Prerequisite: ZOO 137.

VS 303 Poultry Diseases (3)

Consideration of the etiology, symptomatology, and control of infectious, nutritional, and parasitic diseases of poultry. 3 lectures.

VS 304 Immunological Procedures in Animal Production

The application of immunology to disease control in farm animals; the use of immunological techniques in animal research; and potential as a tool in livestock production. 3 lectures. Prerequisites: VS 205.

FOODS AND NUTRITION

Ramiro C. Dutra, *Chairman*

Nenita Cabacungan Ruthanna Davis Cheryl L. Loggins

Anahid T. Crecelius

The department provides programs of study which enable students to meet the needs of family and community living and lead to challenging and rewarding professional opportunities in a broad field of activities.

The department offers two curricula, one in foods and nutrition and the other in home economics.

The primary objective of the foods and nutrition curriculum is to prepare graduates for careers as dietitians, nutritionists and food administrators in hospitals, educational and social institutions, food research laboratories, businesses, and government agencies. This curriculum meets the academic standards of the American Dietetic Association and qualifies the graduate for admission to A.D.A. approved internships. High school students planning to major in foods and nutrition are advised to build a background in foods, chemistry and biology. Junior college students should concentrate on chemistry (including organic), biology (including bacteriology) and communication skills.

CORE COURSES FOR MAJOR

(Required of all students)

Introduction to Foods	FN	121	(4)
Meals	FN	221	(4)
Food Procurement	FN	224	(3)
Nutrition	FN	235	(4)
Nutrition of the Life Cycle	FN	236	(3)
Food Technology	FN	302	(4)
Quantity Food Preparation	FN	331	(4)
Experimental Foods	FN	333	(3)
Community Nutrition	FN	336	(3)
Cultural Aspects of Food	FN	338	(3)
Advanced Nutrition	FN	421	(4)
Advanced Nutrition	FN	422	(3)
Diet Therapy	FN	423	(4)
Food Service Design	FN	427	(4)
Food Chem & Toxicology	FN	432	(4)
Institutional Management	FN	436	(3)
Senior Project	FN	461	(2)
Senior Project	FN	462	(2)
Undergraduate Seminar	FN	463	(2)

SUPPORT & ELECTIVE COURSES

(Required of all students)

Management Accounting	ABM	324	(4)
Personnel Management	ABM	402	(3)
Fundamentals of Household Equipment and Materials	AE	102	(4)
American Civilization	AMC	201	*(4)
American Civilization	AMC	202	*(4)
Meats Utilization	AS	327	(3)
Basic Biology	BIO	115	*(5)
College Chemistry	CHM	104	*(3)
College Chemistry	CHM	105	*(3)
College Chemistry Lab	CHM	141	*(1)
College Chemistry Lab	CHM	142	*(1)
Elements of Organic Chemistry	CHM	201	*(3)
Organic Chemistry Lab	CHM	250	*(1)
Biochemistry	CHM	321	(4)
Report Writing	COM	216	(3)
Introduction to Computing	DP	110	(4)
Principles of Economics	EC	201	*(4)
Freshman Composition	ENG	104	*(4)
Freshman Composition	ENG	105	*(4)
Basic Mathematics	MAT	101	*(3)
Basic Mathematics	MAT	102	*(3)
Introduction to Statistics	MAT	107	*(3)
Basic Microbiology	MIC	201	(5)
Food Microbiology	MIC	320	(4)
Health Education	PE	207	(3)

Physical Education 100 level	PE		*(3)
General Psychology	PSY	201	*(4)
Educational Psychology	PSY	340	*(4)
Public Speaking	SP	100	*(4)
Introduction to Cultural Anthropology	ANT	102	(4)
Human Physiology	ZOO	235	*(4)
Humanities			(6)
Electives			(23)

*May be used for the general education requirement. Select unspecified courses from the general education list. For general education breadth requirements select four courses from a minimum of two schools other than the School of Agriculture.

Course Descriptions

FN 121 Introduction to Foods (4)

Principles and techniques of basic food preparation. Elements of food sanitation, legislation, and consumer choices. 2 lectures, 2 three-hour laboratories.

FN 200 Special Problems for Lower Division Students (1-2)

Individual or group investigation, research, studies or surveys of selected problems. Total credit limited to 4 units, with a maximum of 2 units per quarter.

FN 205 Nutrition and Physical Activity (3)

The modern concept of nutrition as related to diet and body function emphasizing the requirements during adolescence and adulthood. Energy metabolism. Dietary basis of physical efficiency. Nutrition of athletes. Problems in the selection of the pre-game meal. 3 lectures. Prerequisite: CHM 103 and BIO 115 or equivalent. For students not majoring in Foods and Nutrition.

FN 221 Meals (4)

Design and preparation of economical, palatable and nutritionally-balanced meals for family groups and community groups. Etiquette of proper table setting and service. 2 lectures, 2 three-hour laboratories. Prerequisite: FN 121.

FN 224 Food Procurement (3)

Principles of purchasing for the food service industry. Study of regulatory agencies, grading and distribution channels. Preparation of specifications, receiving and storage procedures. Two (2) lectures, 1 three-hour laboratory. Prerequisite: FN 121.

FN 235 Nutrition (4)

Role of the carbohydrates, lipids, proteins, minerals and vitamins in human nutrition. Dietary standards and recommended allowances. 3 lectures, 1 three-hour laboratory. Prerequisite: CHM 201, 250 or equivalent.

FN 236 Nutrition of the Life Cycle (3)

Nutritional needs of pregnancy, lactation, childhood, adolescence, adulthood and geriatrics. Planning and computation of normal diets for all phases of the life cycle. 3 lectures. Prerequisite: FN 205 or FN 235.

FN 299 Special Topics for Lower Division Students (1-4)

Group study of a selected topic, the title to be specified in advance. Total credit limited to 8 units, with a maximum of 4 units per quarter. Prerequisite: Permission of instructor.

FN 302 Food Technology (4)

Technical principles of food processing including pasteurization, sterilization, homogenization, dehydration, conventional freezing, freeze-drying and fermentation as they relate to the preservation of various types of foods and beverages. Field trips, 3 lectures, 1 three-hour laboratory. Prerequisite: MIC 201 or equivalent.

FN 331 Quantity Food Preparation (4)

Principles and practices in planning, preparing and serving food in large quantity. Experience with institutional food service. 2 lectures, 2 three-hour laboratories. Prerequisite: FN 121.

FN 333 Experimental Foods (3)

Application of the experimental approach to food preparation. Semi-independent studies. 1 lecture, 2 three-hour laboratories. Prerequisite: FN 121, CHM 201, 250.

FN 336 Community Nutrition (3)

Types of nutritional surveys. Economics and nutrition. Role of public and private agencies in community nutrition programs. Role of the nutritionist in domestic assistance programs. Two (2) lectures, 1 three-hour laboratory. Prerequisite: FN 205, FN 235, CHM 321, or consent of instructor.

FN 337 Food Service in Institutions (4)

Organization and administration of food service units. Planning, purchasing, storage, and production of quality foods for quantity service. Specification, planning, use and care of equipment. Work flow. Microbiology and food sanitation. Safety and legislation for food service in institutions. 3 lectures, 1 three-hour laboratory. For students not majoring in foods and nutrition.

FN 338 Cultural Aspects of Food (3)

Contemporary aspects of dietary habits and cookery as related to national, ethnic, and religious influence. 2 lectures, 1 three-hour laboratory.

FN 400 Special Problems for Upper Division Students (1-2)

Individual or group investigation, research, studies, or surveys of selected problems. Total credits limited to 4 units, with a maximum of 2 units per quarter.

FN 421 Advanced Nutrition (4)

Qualitative, quantitative and intermediary metabolic studies of diets. Laboratory analysis of biological materials. 2 lectures, 2 three-hour laboratories. Prerequisite: CHM 321, FN 235.

FN 422 Advanced Nutrition (3)

Hormonal effects upon nutrient absorption, transport and utilization. Diseases of hormonal origin and their dietary management. 3 lectures. Prerequisite: FN 421.

FN 423 Diet Therapy (4)

Relationship between diet and health with particular emphasis on specific dietary requirements associated with certain diseases and conditions. 3 lectures, 1 three-hour laboratory. Prerequisite: FN 421.

FN 427 Food Service Design (4)

Selection, maintenance and arrangement of food service equipment with emphasis on materials, construction and specifications. Design of subsystems within the total food service system. 2 lectures, 2 three-hour laboratories. Prerequisite: FN 337 or FN 436.

FN 432 Food Chemistry and Toxicology (4)

Chemical composition of foods. Chemical changes occurring during processing and storage. Detection of deterioration, adulteration and contamination with toxic materials. Laboratory analysis of various types of food. 2 lectures, 2 three-hour laboratories. Prerequisite: CHM 201, 250.

FN 436 Institutional Management (3)

Principles of good organization and management and their application to the effective operation of food service. Production of quality food for group service within a predetermined budget. Responsibilities of the food service manager. 2 lectures, 1 three-hour laboratory. Prerequisite: FN 331 or FN 337.

FN 437 School Nutrition Management (4)

Organization and administration of school food service and school nutrition education. Study of school food systems. Experience in school kitchens. Three (3) lectures, 1 three-hour laboratory. Prerequisites: FN 121 and FN 235.

FN 461, 462 Senior Project (2) (2)

Selection and completion of a project under faculty supervision. Projects typical of problems which graduates must solve in their fields of employment. Project results are presented in a formal report. Minimum 120 hours total time.

FN 463 Undergraduate Seminar (2)

Student study and presentation of new methods and developments, practices, and procedures in the fields of specialization in foods and nutrition. 2 meetings. Prerequisites: Senior standing.

FN 499 Special Topics for Upper Division Students (1-4)

Group study of a selected topic, the title to be specified in advance. Total credit limited to 8 units, with a maximum of 4 units per quarter. Prerequisite: permission of instructor.

FRUIT INDUSTRIES

One of the four majors offered in the Plant and Soil Sciences Department is fruit industries. For other programs in this department see agricultural biology, agronomy, and soil science.

Albert E. Canham Lloyd A. Newell

Fruit industries majors become qualified in the scientific as well as practical study of production management, processing and marketing of citrus, avocados, other sub-tropicals and deciduous fruit tree crops.

The curriculum presents a balanced course of study of natural sciences, plant sciences, economics, business management and humanities. The graduate is prepared for professional and occupational advancement in orchard management, packinghouse management, marketing, fruit tree nurseries, chemical and equipment sales, education, research and other related areas.

CORE COURSES FOR MAJOR

(Required of all students)

Management Accounting	ABM	324	(4)
Insect Biology	AGB	229	(4)
Crop Management Operations	AGR	437	(3)
Irrigation	AE	240	(4)
Fruit Science Fundamentals	FI	101	(3)
Citrus Production	FI	102	(4)
Citrus Production	FI	103	(4)
Avocado Production	FI	201	(4)
Pomology	FI	203	(4)
Citrus Diseases	FI	226	(4)
Fruit Propagation	FI	245	(1)
Fruit Propagation	FI	246	(1)
Citrus and Avocado Market	FI	321	(3)
Fruit Processing and Handling	FI	322	(3)
Packinghouse Management	FI	323	(3)
Fruit Storage	FI	425	(2)
Senior Project	FI	461	(2)
Senior Project	FI	462	(2)
Undergraduate Seminar	FI	463	(2)
Soil Management	SS	232	(4)
Soil and Plant Analysis	SS	339	(3)

SUPPORT AND ELECTIVE COURSES

(Required of all students)

Personnel Management	ABM	402	(3)
Surveying Fundamentals	AE	131	(2)
Intro to Arthropods	AGB	165	(4)
Weeds and Weed Control	AGR	233	(4)
American Civilization	AMC	201	*(4)
American Civilization	AMC	202	*(4)
Basic Biology	BIO	115	*(5)
Elements of Botany	BOT	120	*(4)
General Plant Pathology	BOT	223	(4)
Plant Physiology	BOT	322	(5)
Business Law	BUS	301	*(4)
Fundamentals of Chemistry	CHM	103	*(4)
College Chemistry	CHM	104	*(3)
College Chemistry	CHM	105	*(3)
College Chemistry Lab	CHM	141	*(1)
College Chemistry Lab	CHM	142	*(1)
Elements of Organic Chemistry	CHM	201	*(3)
Organic Chemistry Lab	VHM	250	(1)
Principles of Economics	EC	201	*(4)
Principles of Economics	EC	202	*(4)
Freshman Composition	ENG	104	*(4)
Freshman Composition	ENG	105	*(4)
Basic Mathematics	MAT	101	*(3)
Introduction to Mathematical Analysis	MAT	108	*(3)
Physical Education...	PE-100 series		*(3)
General Psychology	PSY	201	*(4)
Public Speaking	SP	100	*(4)
Basic Soil Sciences	SS	231	(4)
Soil Fertility & Fertilizers	SS	233	(4)
Agricultural Engineering (See Advisor)			(4)
Humanities			*(6)
Electives			(24)

*May be used for the general education requirement. Select unspecified courses from the general education list. For general education requirements select four courses from a minimum of two schools other than the School of Agriculture.

COURSE DESCRIPTIONS

FI 101 Fruit Science Fundamentals (3)

Basic cultural practices common to all fruit crops. Site selection, orchard planning, pruning procedures, soil factors, tree nutrition and growth, propagation procedures, variety and rootstock selection factors. General features of the fruit industry. 3 lectures.

FI 102 Citrus Production (4)

Economic importance of the industry areas of production, environmental requirements, citrus climatology, frost and wind protection, citrus botany, commercial varieties and rootstocks, nursery methods. 3 lectures, 1 three-hour laboratory.

FI 103 Citrus Production (4)

Citrus orchard planning and development; cultural practices; tree management procedures and their application to commercial orchards; economic factors of production.

FI 201 Avocado Production (4)

Industry development, environmental requirements, variety adaptation, tree management, cultural requirements, and production practices and economics. 3 lectures, 1 three-hour laboratory.

FI 202 Subtropical Fruits (4)

Subtropical fruits including the date, olive, fig, macadamia and other selected fruits for commercial planting. Climatic and cultural requirements, fruiting and growth habits, varietal characteristics. 3 lectures, 1 three-hour laboratory.

FI 203 Pomology (4)

Commercial deciduous fruits and nuts. Varieties, production areas, seasonal cultural practices and requirements. 3 lectures, 1 three-hour laboratory.

FI 200 Special Problems for Lower Division Students (1-2)

Individual or group investigation, research, studies or surveys of selected problems. Total credit limited to 4 units, with a maximum of 2 units per quarter.

FI 226 Citrus Diseases (4)

Diseases of citrus under California conditions, their symptoms, identification and methods of control. 3 lectures, 1 three-hour laboratory. Prerequisite: BOT 223, FI 122.

F 231 Grape Production (4)

Production, processing, and marketing of raisins, table and wine grapes. 3 lectures, 1 three-hour laboratory.

FI 245 Fruit Propagation (1)

Topworking and grafting fruit plants. Types of grafts used, selection of propagating material. 1 three-hour laboratory.

FI 246 Fruit Propagation (1)

Nursery propagation of fruit plants. Budding, tipgrafting, cuttings, seedbed preparation, care and management of the nursery. 1 three-hour laboratory.

FI 299 Special Topics for Lower Division Students (1-4)

Group study of a selected topic, the title to be specified in advance. Total credit limited to 8 units, with a maximum of 4 units per quarter. Prerequisite: Permission of instructor.

FI 321 Citrus and Avocado Marketing (3)

Procedures in marketing citrus and avocados. Organization, importance, and function of cooperative and private marketing corporations in the assembling, processing and distribution of these fruit crops. 3 lectures. Prerequisite: FI 123.

FI 322 Fruit Processing and Handling (3)

Physical operations of citrus and avocado packinghouses in relation to harvesting, processing, and packing; fruit storage and diseases; pre-cooling, refrigeration and transportation. 2 lectures, 1 three-hour laboratory. Prerequisite: FI 226.

FI 323 Packinghouse Management (3)

Management relations in citrus and avocado packinghouse procedures. Regulatory aspects of fruit quality, grades and standards. Use and manufacture of products from citrus and avocados. 2 lectures, 1 three-hour laboratory. Prerequisite: FI 322.

FI 341 Orchard Management Practices (3)

Practical application of orchard cultural practices and procedures. Seasonal importance of operations in relation to overall objectives in orchard management. Use of specialized equipment emphasized. 1 lecture, 1 three-hour laboratory. Prerequisites: AE 241 and any fruit production course, or consent of instructor.

FI 400 Special Problems for Upper Division Students (1-2)

Individual or group investigation, research, studies or surveys of selected problems. Total credit limited to 4 units, with a maximum of 2 units per quarter.

FI 425 Fruit Storage (2)

Behavior of citrus and avocados under storage conditions. Respiration and internal change determinations of fruit in storage. 1 lecture, 1 three-hour laboratory. Prerequisite: Senior standing.

FI 461, 462 Senior Project (2) (2)

Selection and completion of a project under faculty supervision. Projects typical of problems which graduates must solve in their fields of employment. Project results are presented in a formal report. Prerequisite: Senior standing.

FI 463 Undergraduate Seminar (2)

Intensive study of the technical and management problems and new developments in the operation and management of fruit orchards. 2 lectures. Prerequisite: Senior standing.

FI 499 Special Topics for Upper Division Students (1-4)

Group study of a selected topic, the title to be specified in advance. Total credit limited to 8 units with a maximum of 4 units per quarter. Prerequisite: permission of instructor.

HOME ECONOMICS

Ramiro C. Dutra, *Chairman*

Ruby Beilby

Audrey Scollard

Ruby L. Trow

Marilynn Filbeck

The field of home economics offers a variety of opportunities to its graduates. The scope of training in the field is broad. The major is organized in several areas: clothing and textiles; equipment, housing, and interiors; foods and nutrition, home management, family economics and consumer education; child development and family relations.

One of the areas of home economics which offers many opportunities is that of teaching. For graduates completing credential requirements, teaching positions are to be found at the levels of nursery school, junior high school, and senior high school. Other areas which employ home economists are business, industry, and social welfare.

In addition to providing major and minor programs, home economics courses are taken by students from other disciplines who have an interest in the home, family living, and consumer protection.

CORE COURSES FOR MAJOR

(Required of all students)

Introduction to Foods	FN	121	(4)
Meals	FN	221	(4)
Nutrition and Physical Activity	FN	205	(3)
or Nutrition	FN	235	(4)
Clothing Construction	HE	130	(3)
Apparel Selection	HE	137	(3)
Textiles	HE	188	(4)
Clothing Construction	HE	230	(3)
Interior Design & Furnishings	HE	323	(4)
Household Equipment	HE	325	(4)
Home Management	HE	342	(4)
Family Housing & Environ.	HE	420	(4)
Family Finance	HE	440	(4)
Senior Project	HE	461	(2)
Senior Project	HE	462	(2)
Undergraduate Seminar	HE	463	(2)
Child Psychology: Early Childhood	PSY	310	(4)
Family Relations	SOC	206	(3)

SUPPORT AND ELECTIVE COURSES

(Required of all students)

Fundamentals of Household Equipment and Materials	AE	102	(4)
American Civilization	AMC	201	*(4)
American Civilization	AMC	202	*(4)
Basic Biology	BIO	115	*(5)
College Chemistry	CHM	104	*(3)
College Chemistry	CHM	105	*(3)
College Chemistry Lab	CHM	141	*(1)
College Chemistry Lab	CHM	142	*(1)
Elements of Organic Chemistry	CHM	201	*(3)
Organic Chemistry Lab	CHM	250	*(1)
Principles of Economics	EC	201	*(4)
Freshman Composition	ENG	104	*(4)
Freshman Composition	ENG	105	*(4)
Advanced Writing	ENG	301	(4)
or Advanced Writing 302 or 303			
Basic Mathematics	MAT	101	*(3)
Health Education	PE	207	(3)
Physical Education 100 level	PE		(3)
General Psychology	PSY	201	(4)
Principles of Sociology	SOC	201	*(4)
Public Speaking	SP	100	*(4)
Human Physiology	ZOO	235	*(4)
Humanities, Literature			*(4)
Humanities, Art			*(4)

Directed Electives ..... (27)
Electives ..... (35-37)
*May be used for the general education requirement. Select unspecified courses from the general education list. For general education requirements select four courses from a mnimum of two schools other than the School of Agriculture.

Course Descriptions

HE 130 Clothing Construction (3)

Techniques and equipment used in garment construction. 6 hours activity.

HE 137 Apparel Selection (3)

Factors involved in apparel selection; historical, economic, aesthetic, psychological, and sociological aspects of individual and family clothing selection. 2 lectures, 1 three-hour laboratory.

HE 188 Textiles (4)

Introductory study of textiles; natural and synthetic fibers, yarn and fabric construction, dyes and finishes as they influence fabric selection, performance, and care. 3 lectures, 1 three-hour laboratory.

HE 200 Special Problems for Lower Division Students (1-2)

Individual or group investigation, research, studies or surveys of selected problems. Total credit limited to 4 units, with a maximum of 2 units per quarter.

HE 230 Clothing Construction (3)

Current problems in clothing construction. Comparison and evaluation of various construction processes in relation to fabric, design, and intended use. 6 hours activity. Prerequisite: HE 130.

HE 299 Special Topics for Lower Division Students (1-4)

Group study of a selected topic, the title to be specified in advance. Total credit limited to 8 units with a maximum of 4 units per quarter. Prerequisite: permission of instructor.

HE 307 Institutional Interiors (4)

Selection, care and use of materials for hotel, restaurant and institution interiors. Product availability, design, purchase, installation and maintenance. 4 lectures.

HE 315 Nursery School Practicum (3)

Observation and participation in group care of pre-school children; analysis of nursery school curriculum and objectives; application of principles and concepts of child growth and development in the care of young children. 2 lectures, 1 three-hour laboratory. Prerequisite: PSY 310.

HE 323 Interior Design and Furnishings (4)

The study of design principles as applied to interiors. Consideration of individual and family needs in the use of furnishings, textiles, accessories, and architectural materials related to interior design. 3 lectures, 1 three-hour laboratory.

HE 325 Household Equipment (4)

Application of scientific principles and experimental procedures in selection, use, and care of equipment used in the home. 3 lectures, 1 three-hour laboratory.

HE 330 Apparel Design and Construction (3)

Application of flat pattern methods to pattern design. Development of individual slopers and testing by construction of a garment. 6 hours activity. Prerequisite: HE 230.

HE 342 Home Management (4)

Introductory study of the economic, social and institutional forces that influence management of home and family. Management principles in relation to use of family resources, the consumer's role, family values and goals, problem solving, and decision making. 4 lectures.

HE 400 Special Problems for Upper Division Students (1-2)

Individual or group investigation, research, studies or surveys of selected problems. Total credit limited to 4 units, with a maximum of 2 units per quarter.

HE 415 Nursery School Organization and Management (3)

Types of pre-school programs; physical facilities, curriculum and personnel needs and responsibilities. State and local regulations. 3 lectures. Prerequisite: HE 315 or consent of instructor.

HE 420 Family Housing and Environment (4)

Planning housing to meet family and individual needs as related to design and to current social and economic factors. Consideration of construction methods and materials. Relationship between family housing and total environment. 4 lectures.

HE 423 Advanced Interiors and Furnishings (4)

Advanced study of design and furnishings with emphasis on functional planning for residences. Historical style development of furniture and textiles. Changing cultural patterns, materials and methods, designers and philosophies. 3 lectures, 1 three-hour laboratory. Prerequisite: HE 323 or equivalent.

HE 430 Advanced Clothing Construction (3)

Principles and techniques used in tailoring of coats and suits. Style, fabric, findings, construction methods. 6 hours activity. Prerequisite: HE 230.

HE 440 Family Finance (4)

Economic factors which influence family life. Planning, controlling and evaluating family resources. Factors which affect consumer choice. Consumer role of the family. 4 lectures. Prerequisites: upper division standing.

HE 442 Home Management with Limited Resources (3)

Special management problems of low-income families, urban families, employed homemakers, physically handicapped homemakers. Application of management principles and concepts developed through field work with families. 2 lectures, 1 three-hour laboratory. Prerequisite: HE 342.

HE 453 Home Economics Gainful Employment Programs (4)

Program development. Criteria for student work experiences. Vocational education legislation. Collaboration of advisory committees from community and industry. Job placement. Three (3) lectures, 1 three-hour laboratory. Prerequisite: a methods course in home conomics or equivalent.

HE 461, 462 Senior Project (2) (2)

Selection and completion of a project under faculty supervision. Projects typical of problems which graduates must solve in their fields of employment. Project results presented in formal report. Minimum 120 hours total time.

HE 463 Undergraduate Seminar (2)

Trends, current concepts, and developments in Home Economics and Home Economics Education. 2 lectures. Prerequisite: senior standing.

HE 473 Fashion Merchandising (4)

Impact of fashion and style trends on merchandising; attracting the consumer and selling the product; non-textile materials and function of fashion-oriented personnel. 3 lectures, one three-hour laboratory. Prerequisite: senior standing.

HE 488 Textile Technology (4)

Structure and synthesis of textile fibers, physical testing of fibers and fabrics, fiber identification, new developments in textile production, special dyes and finishes. 3 lectures, 1 three-hour laboratory. Prerequisite: HE 188.

HE 499 Special Topics for Upper Division Students (1-4)

Group study of a selected topic, the title to be specified in advance. Total credit limited to 8 units with a maximum of 4 units per quarter. Prerequisite: permission of instructor.

INTERNATIONAL AGRICULTURE

Recent studies of world resources indicate a growing need that known agricultural production and marketing technologies be integrated into each country's own situation. The need for capable and well trained people to effect these changes is expanding. Opportunities exist for both the domestic student as well as the foreign national trained in this major. This university is uniquely suited to offer the program in international agriculture because of its agricultural facilities, faculty, and programs and its easy accessibility to the large number of U.S. firms with international agriculture interests located in or near Los Angeles County.

The international agriculture major is designed to train students for employment with firms that do or plan to operate internationally at the beginning management level in either the production or marketing (sales) phase of the business. The flexibility in the course of study that is available is developed by the student in consultation with his departmental advisor. The production phase can include livestock and/or plants with the respective ancillary support courses of farm mechanization, pest control, irrigation, soils, fertilization, etc. The marketing (sales) phase includes an additional emphasis on the business aspects applied to different economic and political entities.

The specific studies in agriculture selected are intensive and designed to develop in each student, regardless of his background in agriculture, the knowledge and skills necessary for proficiency in the field. The program includes activities designed to equate the highly-developed agricultural technology of this country to the less highly-developed technologies in foreign countries. In addition the international agriculture student's curriculum deals with an international core of world studies and a specialization in one agricultural area. The student will become fluent in at least one foreign language and will be familiar with the cultures of the world region in which he intends to work to make him an effective force in the international agriculture field.

Added practical experience working in a foreign country also is a part of the program. Each student may spend from three to six months working for a firm or educational institution. Typically the cooperating firms or educational institutions have been in Central and South America. Graduates of this major also are qualified for employment in the Peace Corps and other similar volunteer programs.

CORE COURSES FOR MAJOR

(Required of all students)

Agricultural Marketing	ABM	304	(3)
Introduction to Agricultural Data Mgmt	ABM	375	(3)
Irrigation	AE	240	(4)
Introduction to Plant Science	AGR	111	(3)
Irrigated Pastures	AGR	333	(4)
Range Management	AGR	336	(4)
Feeds and Feeding	AS	101	(4)
World Agricultural Resources	IA	101	(4)
Int. Ag. Org. Struc.	IA	301	(4)
Agricultural Mkt Develop	IA	302	(4)
Ag. Land & Proj. Plan.	IA	303	(4)
Intl Mktng of Agriculture Prod	IA	330	(3)
Ag Water Res Util	IA	350	(3)
Mgmt of Agricultural Coops	IA	360	(3)
Surv Ag Pol Dev Nat	IA	362	(3)
Seminar in Tropical Agriculture	IA	371	(1)
Farm Management in Low Income Agriculture	IA	380	(3)

Summer Field Experience	IA	401	(3)
Senior Project	IA	461	(2)
Senior Project	IA	462	(2)
Undergraduate Seminar	IA	463	(2)
Introduction to Plant Science	SS	221	(4)
International Agriculture Electives			(6)
Courses to complete major			(12)

SUPPORT AND ELECTIVE COURSES

(Required of all students)

Contemporary Economic Problems of Agriculture	ABM	300	(3)
Supervision & Training	ABM	303	(2)
Agricultural Production Economics	ABM	311	(4)
Management Accounting	ABM	324	(4)
Management Accounting	ABM	325	(4)
Agricultural Enterprise Management	ABM	328	(4)
Introduction to Arthropods	AGB	165	(4)
Principles of Pest Management	AGB	231	(4)
American Civilization	AMC	201	*(4)
American Civilization	AMC	202	*(4)
Life Science	BIO	110	*(3)
Heredity and Man	BIO	300	*(3)
Fundamentals of Chemistry	CHM	103	*(4)
Report Writing	COM	216	*(3)
Principles of Economics	EC	201	*(4)
Principles of Economics	EC	202	*(4)
Freshman Composition	ENG	104	*(4)
Basic Mathematics	MAT	101	*(3)
Intro to Statistics	MAT	107	(3)
PE 100-series			*(3)
Fundamentals of Physics	PHY	102	*(4)
Public Speaking	SP	100	*(4)
Foreign Language Proficiency or Equivalent Proficiency in English (equivalent to three quarters of study)			(12)
Humanities Electives			*(6)
Electives			**(13)

*May be used for the general education requirement. Select unspecified courses from the general education list.

**Must include four courses from a minimum of two schools other than the School of Agriculture for fulfillment of the breadth requirement.

Course Descriptions

IA 101 World Agricultural Resources (4)

Resource base for agricultural production on various continents. Potential for increasing food supplies. Role of agriculture in economic development. 4 lectures.

IA 200 Special Problems for Lower Division Students (1-2)

Individual or group investigation, research, studies or surveys of selected problems. Total credit limited to 4 units, with a maximum of 2 units per quarter.

IA 201 Agricultural Ecology (4)

Ecological factors affecting agricultural production in the tropics with emphasis in Latin America including the influence and interaction of environmental factors such as climate, soil, and man on crop and animal adaptation and distribution in the tropics. 4 lectures.

IA 299 Special Topics for Lower Division Students (1-4)

Group study of a selected topic, the title to be specified in advance. Total credit limited to 8 units, with a maximum of 4 units per quarter. Prerequisite: Permission of instructor.

IA 301 International Agriculture Organizational Structures (4)

Analysis and comparison of corporate, cooperative, philanthropic, and governmental agriculture organizations affecting international agriculture. Special emphasis will be given to organizations whose activities interface with California agricultural production. Seminar discussions — 3 lectures, field trips, 1 three-hour laboratory. No prerequisites.

IA 302 Agricultural Market Development (4)

Marketing systems for agriculture in marketing less developed economies. Analysis of marketing policies used to expand and improve food production. 4 lectures. Prerequisite: IA 101, EC 201.

IA 303 Agricultural Land and Project Planning (4)

Principles of agricultural project and planning primarily for developing nations. Involves case studies, project analysis, systems applications to total project development including soils, transportation, water, markets, and production feasibility. 3 lectures, 1 three-hour laboratory. No prerequisites.

IA 330 International Marketing Agricultural Products (3)

Marketing of agricultural products in foreign markets. Special emphasis on selecting export markets, procedures for establishing contacts, promotion, financing, insuring, shipping, tariffs, customs, regulations and other matters related to agricultural commodities. Management practices and problems of California firms with international operations. 3 lectures.

IA 350 Agricultural Water Resource Utilization (3)

Analysis and survey of the management and profitable utilization and development of water resources as a requisite to efficient agricultural enterprise operations. Special emphasis upon developing nations including governmental and legal ramifications in water utilization. 3 lectures. No prerequisites.

IA 360 Management of Agricultural Cooperatives (3)

Structure, management and organization of the Agricultural Cooperative with emphasis upon current management practice. Includes comparison of cooperative with other business forms, ideals, history, and progress of the cooperative movement; problems in establishing a new cooperative; financing and membership problems. 3 lectures.

IA 362 Survey of Agricultural Policy in Developing Nations (3)

Review, analysis and discussion of relevant international government agricultural policy affecting development, trade, and food production. History, current status and projections of policy trends. 3 lectures. No prerequisites.

IA 371 Seminar in Tropical Agriculture (1-2)

Seminar on special problems encountered in tropical agriculture. Content will vary from one offering to another. Course may be repeated up to three units of credit. Taught in Spanish language. 1 lecture-discussion. Prerequisite: Senior standing, SPN 203 or demonstrated proficiency in Spanish language.

IA 380 Farm Management in Low Income Tropical Agriculture (3)

The traditional farm family. Nature of farmer's resources and his control. Farm records. Cost relationships. Budgeting. Types of farm management decisions and guiding principles applicable. Handling of risk and uncertainty, credit, labor, machinery. Impact of public policies on farm management. 3 lectures. Prerequisite: EC 201.

IA 382 Agricultural Extension Methods (3)

Attitudes of traditional farm family; characteristics of effective farmer education programs; farm leader identification, extension training methods, and training of agricultural extension workers. 3 lectures. Prerequisite: advanced standing.

IA 400 Special Problems for Upper Division Students (1-2)

Individual or group investigation, research, studies or surveys of selected problems. Total credit limited to 4 units, with a maximum of 2 units per quarter.

IA 401 Field Experience in Latin America (3-8)

Individualized field research experience in Latin America. Class hours variable depending on credit. Prerequisite: Advanced standing; consent of advisor and instructor, one course in International Agriculture; competence in Spanish language recommended.

IA 461, 462 Senior Project (2) (2)

The student selects and completes a research project under faculty supervision typical of those he will be required to handle in his field of employment. Research findings and conclusions are presented in a formal report. Minimum of 120 hours required. Prerequisite:Senior standing.

IA 463 Undergraduate Seminar (2)

Oral presentation of senior project. Discussion of trends in foreign agricultural production and marketing. 2 lectures. Prerequisite: Senior project completed.

IA 499 Special Topics for Upper Division Students (1-4)

Group study of a selected topic, the title to be specified in advance. Total credit limited to 8 units, with a maximum of 4 units per quarter. Prerequisite: permission of instructor.

ORNAMENTAL HORTICULTURE

Joel W. Carter, *Chairman*

Oliver A. Batcheller
Blanche Dansereau
Tom T. Yoshikawa
James L. Degen
David Lannom

Ornamental horticulture is among the largest of California's agricultural industries. The state's great population growth and resulting urbanization has increased the need for landscape plantings, parks, golf courses, and beautification of the environment. The department provides degrees in two majors, ornamental horticulture and park administration.

The ornamental horticulture major prepares men and women for positions in the production and marketing of horticultural products, principally nursery and floricultural crops. It provides excellent background for students desiring careers in the florist industry, teaching or research.

The university's facilities offer outstanding opportunities for practical application of methods and principles used in the industry. The beautifully landscaped campus serves as an arboretum and botanical garden for applied laboratory course work. The department has 12,000 square feet of greenhouse space, 5,000 square feet of lath and saran shade houses, five acres of growing grounds and other nursery facilities. Students may grow and market their own nursery stock, cut flowers or potted plants for their profit and experience. Practical experience is often obtained in university arranged part-time jobs and projects at nearby nurseries, gardens, and parks.

CORE COURSES FOR MAJOR

(Required of all students)

Basic Horticultural Skills	OH	131	(4)
Spec. Plant Prop.	OH	222	(4)
Ret. Nursery Mgmt.	OH	224	(4)
or Whole. Nursery Mgmt.	OH	225	
Plant Materials	OH	231	(4)
Plant Materials	OH	232	(4)
Plant Materials	OH	233	(4)
Greenhouse Management	OH	323	(4)
Diseases of Ornamental Plants	OH	327	(4)
Native Plant Materials	OH	336	(3)
Landscape Management	OH	343	(4)
or Commercial Flower Prod.	OH	365	
Senior Project	OH	461	(2)
Senior Project	OH	462	(2)
Senior Seminar	OH	463	(2)
Landscape Drawing	PA	211	(4)
Aboriculture	PA	328	(3)
Turf Management	PA	333	(4)
Basic Soil Science	SS	231	(4)
Soil Fert. & Fertilizers	SS	233	(4)

SUPPORT AND ELECTIVE COURSES

(Required of all students)

Pest Control Equipment	AE	233	(3)
Introduction to Arthropods	AGB	165	(4)
American Civilization	AMC	201*	(4)
American Civilization	AMC	202*	(4)
Basic Biology	BIO	115*	(5)
Principles of Taxonomy	BIO	306	(3)
Principles of Ecology	BIO	325	(4)
Elements of Botany	BOT	120*	(4)
General Plant Pathology	BOT	223	(4)
Plant Physiology	BOT	322	(5)
Business Law	BUS	301*	(4)
College Chemistry	CHM	104*	(3)
College Chemistry	CHM	105*	(3)
College Chemistry Lab	CHM	141	(1)
College Chemistry Lab	CHM	142	(1)
Report Writing	COM	216*	(3)
Principles of Economics	EC	201*	(4)
Freshman Composition	ENG	104*	(4)
Freshman Composition	ENG	105*	(4)
Historical Geology	ESC	112**	(3)
Fruit Science Fundamentals	FI	101	(3)
Humanities			(8)
Basic Math	MAT	101*	(3)
Basic Math	MAT	102*	(3)

Physical Education 100 level	PE		(3)
General Psychology	PSY	201	*(4)
Public Speaking	SP	100	*(4)
Soil Materials	SS	439	(3)
Free Electives			(12)
Directed Electives			(21)

*May be used for the General Education requirement.

**General Education Breadth requirement.

Course Descriptions

OH 131 Basic Horticultural Skills (4)

The basic skills of horticulture. Techniques and plans for their use in the gardening and nursery trade. 3 lectures, 1 three-hour laboratory.

OH 200 Special Problems for Lower Division Students (1-2)

Individual or group investigation, research, studies or surveys of selected problems. Total credit limited to 4 units, with a maximum of 2 units per quarter.

OH 222 Specialized Plant Propagation (4)

Commercial propagation — grafting, budding, layering, separation, divisions, cuttings, tissue culture, and orchid flasking. Field trips to commercial operations. 3 lectures, 1 three-hour laboratory. Prerequisites: OH 131, 231, BOT 120 or 124.

OH 223 Basic Floral Design (3)

Introduction to basic floral design, covering preparation of flowers, color harmony, and design principles. 1 lecture, 2 three-hour laboratories.

OH 224 Retail Nursery Management (4)

Legal aspects and economics of operating a commercial retail nursery. Federal, state and local regulations. Site selection; layout of shop and sales yard; purchase supplies; inventory control; sales and service; advertising related to operating a retail nursery business. 3 lectures, 1 three-hour laboratory. Prerequisite: OH 131

OH 225 Wholesale Nursery Management (4)

Wholesale nursery management, propagation, transplanting, potting, canning, shifting of nursery stocks. Proper soil mix, fertilizer, insecticides, and fungicides used in nursery management. Quality and inventory control, shipping practices, credit management. Automation, mechanization and other labor saving equipment available. 3 1-hour lectures, 1 three-hour laboratory. Prerequisite: OH 131

OH 231, 232, 233 Plant Materials (4) (4) (4)

The study of trees, shrubs, vines and herbaceous plants used in California; shown during their best growing season. This includes: identification, habit of growth, cultural requirements and landscape use. 3 lectures, 1 three-hour laboratory. Prerequisite: BIO 115.

OH 299 Special Topics for Lower Division Students (1-4)

Group study of a selected topic, the title to be specified in advance. Total credit limited to 8 units, with a maximum of 4 units per quarter. Prerequisite: Permission of instructor.

OH 323 Greenhouse Management (4)

Design and management of different types of greenhouses and plant shelters. Maintenance, heating, cooling, humidification systems and their controls. Mechanization, automatic and semi-automatic fertilization and watering systems. 3 lectures, 1 three-hour laboratory. Prerequisite: OH 131.

OH 327 Diseases of Ornamental Plants (4)

Effect of diseases on ornamental plants found in nurseries, greenhouses, flowers, and identification, control, and prevention. Field trips to production areas to study field conditions. 3 lectures, 1 three-hour laboratory. Prerequisite: BOT 223.

OH 334 House Plants (2)

A study of house plants. Their identification, culture and care. Factors for selecting plants for use in interior landscaping. 1 two-hour lecture.

OH 335 Sub-tropical Plant Materials (3)

Sub-tropical plant materials, including ferns, bamboos, palms, house plants. Identification, growth habits, cultural requirements and landscape use. 2 lectures, 1 three-hour laboratory.

OH 336 Native Plant Materials (3)

Native California plants suitable for landscape purposes. Their identification, habits of growth, cultural requirements, and landscape use. 2 lectures, 1 three-hour laboratory.

OH 343 Landscape Management (4)

The selection and techniques necessary for the proper management of ornamental plants. 3 lectures, 1 three-hour laboratory. Prerequisite: OH 131, 231, 232, 233, or consent of instructor.

OH 353 Home Environmental Horticulture (4)

Solving home environmental problems. The planning and installation, maintenance and management of the garden, lawns, and groundcovers. Emphasis on how plants are propagated, selected, and cared for in a successfully landscaped area. For majors other than Ornamental Horticulture and Park Administration. 3 lectures, 1 hour recitation.

OH 365 Commercial Flower Production (4)

Controlling production of potted and cut flowers by using photoperiod, temperature adjustment, vernalization and chemicals to schedule maturity of a crop. Automated water, shading and fertilization systems. Disease and pest control. 3 lectures, 1 three-hour laboratory. Prerequisites: OH 131, 323, SS 231, 233.

OH 366 Specialty Crop Production (4)

Study of specialty floricultural and ornamental (foliage) crops with particular emphasis on production techniques. Systems for producing, and methods to manipulate the environment are studied. 3 lectures, 1 three-hour laboratory. Prerequisite: OH 131, OH 323, OH 365, Junior Standing.

OH 400 Special Problems for Upper Division Students (1-2)

Individual or group investigation, research, studies or surveys of selected problems. Total credit limited to 4 units, with a maximum of 2 units per quarter.

OH 461, 462 Senior Project (2) (2)

Selection and completion of a project under faculty supervision. Projects typical of problems which graduates must solve in their fields of employment. Project results are presented in a formal report. Minimum 120 hours total time.

OH 463 Undergraduate Seminar (2)

An open forum of senior students in which the latest developments, practices, and procedures are discussed. Each student is responsible for the development and presentation of a topic in his chosen field. 2 lectures.

OH 499 Special Topics for Upper Division Students (1-4)

Group study of a selected topic, the title to be specified in advance. Total credit limited to 8 units, with a maximum of 4 units per quarter. Prerequisite: permission of instructor.

PARK ADMINISTRATION

Joel W. Carter, *Chairman*

Kent Kurtz George Price

The park administration major in the ornamental horticulture department provides opportunities to obtain the skills and knowledge needed for top management positions in park systems. A thorough foundation in ornamental horticulture is supplemented with courses which relate to such subjects as recreation, public administration, business management, public relations, design and conservation to application in a parks system. Although graduates may begin their careers as park rangers, supervisors, or assistants, the curriculum gives them the background for advancement to higher positions such as superintendent, general manager or director of parks and recreation. Emphasis is placed on the operation of city parks with consideration of regional, state, national and commercial parks. Preparation for careers in golf course management, landscape contracting, and grounds maintenance is provided.

Field trips are taken to many types of parks and recreation facilities in Southern California. Students are encouraged and assisted to obtain part-time and summer employment with parks agencies, golf courses, landscape contractors, and the university grounds department.

CORE COURSES FOR MAJOR

(Required of all students)

Park Equipment Management	AE	421	(4)
Basic Horticultural Skills	OH	131	(4)
Plant Materials	OH	231	(4)
Plant Materials	OH	232	(4)
Plant Materials	OH	233	(4)
Native Plant Materials	OH	336	(3)
History and Orientation of Parks	PA	214	(3)
Recreation Concepts	PA	219	(3)
Aquatic Facility Management	PA	325	(4)
Diseases of Ornamental Plants	PA	327	(4)
Arboriculture	PA	328	(3)
Turf Management	PA	333	(4)
Landscape Contracting	PA	415	(3)
Landsc. Spec. & Est.	PA	416	(4)
Park Facility Management	PA	425	(4)
Park Policies and Practices	PA	426	(4)
Park Budgets and Finance	PA	427	(3)
Golf Course Management	PA	436	(4)
Senior Project	PA	461	(2)
Senior Project	PA	462	(2)
Undergraduate Seminar	PA	463	(2)

SUPPORT AND ELECTIVE COURSES

(Required of all students)

Management Accounting	ABM	324	(4)
Personnel Management	ABM	402	(3)
or Industrial Supervision	BUS	313	
Construction Fundamentals	AE	121	(2)
or Utility Systems	AE	122	(2)
Utility Systems	AE	122	(2)
Surveying Fundamentals	AE	131	(2)
Surveying Applications	AE	132	(2)
Automatic Irrigation Systems	AE	321	(4)
American Civilization	AMC	201*	(4)
American Civilization	AMC	202*	(4)
Basic Biology	BIO	115*	(5)
Elements of Botany	BOT	120*	(4)
Typewriting	BUS	144	(2)
Business Law	BUS	301	(4)
Fundamentals of Chemistry	CHM	103*	(4)
Report Writing	COM	216	(3)
Principles of Economics	EC	201*	(4)
Freshman Composition	ENG	104*	(4)
Freshman Composition	ENG	105*	(4)
Fundamentals of Earth Science	ESC	101	(4)
Basic Mathematics	MAT	101*	(3)
Basic Mathematics	MAT	102*	(3)
Landscape Drawing	PA	211	(4)
Landscape Design	PA	212	(4)
Park & Rec. Planning	PA	213	(4)
Beginning Golf	PE	157*	(1)
Physical Education, 100-level			*(3)

General Psychology	PSY	201*	(4)
Public Speaking	SP	100*	(4)
Basic Soil Science	SS	231	(4)
Soil Fertility and Fertilizers	SS	233	(3)
Introduction to Arthropods	AGS	165	(4)
Humanities (2 courses)		*	(8)
Electives			(11-13)

*May be used for the general education requirements. Select unspecified courses from the general education list.

Course Descriptions

PA 200 Special Problems for Lower Division Students (1-2)

Individual or group investigation, research, studies or surveys of selected problems. Total credit limited to 4 units, with a maximum of 2 units per quarter.

PA 211 Landscape Drawing (4)

Techniques of landscape graphics and an introduction to basic design analysis. 3 lectures, 1 three-hour laboratory.

PA 212 Landscape Design (4)

Continued design problems involving the physical properties and landscape use of plants and inorganic materials in the garden, park, golf course, and institutional grounds. 3 lectures, 1 three-hour laboratory. Prerequisite: PA 211, or permission of instructor.

PA 213 Park and Recreation Planning (4)

Park and recreation area and facility analysis. Determining need, carrying capacity, design criteria and optimum layout. 3 lectures, 1 three-hour laboratory. Prerequisite: PA 212, or permission of instructor.

PA 214 Orientation and History of Parks (3)

A history of the development of national, state, and municipal park systems. A consideration of changing philosophies affecting their development. 3 lectures.

PA 219 Recreation Concepts (3)

Past and present concepts of recreation. Their effect on the park administrator in dealing with such problems as land acquisition, park design, and use of parks and park facilities. 3 lectures.

PA 299 Special Topics for Lower Division Students (1-4)

Group study of a selected topic, the title to be specified in advance. Total credit limited to 8 units, with a maximum of 4 units per quarter. Prerequisite: Permission of instructor.

PA 325 Aquatic Facility Management (4)

Management of all types of water related recreation facilities including fountains, reflecting pools, wading pools, swimming pools, lakes and ponds, beaches and marinas. The supervision and organization of aquatic recreation activities such as wading, swimming, boating, surfing and fishing. 3 lectures. 1 three-hour laboratory.

PA 327 Diseases and Pests of Park Plants (4)

The effect of diseases and pests on ornamental plants found in parks, parkways, golf courses and institutional grounds; their identification, control, and prevention. Field trips to parks to study field conditions, 3 lectures, 1 laboratory.

PA 328 Arboriculture (3)

Care and management of specimen ornamental trees. Cavity repair, bracing and cabling, pruning. Practice in the use of lines and in climbing. Safety practices. 2 lectures, 1 three-hour laboratory. Prerequisite: OH 131, 231.

PA 332 Athletic Turfgrass Management (3)

The grasses, materials and techniques involved in the maintenance and management of all types of athletic and recreational fields. 3 lectures. Prerequisite: Junior standing or consent of instructor. For non-majors.

PA 333 Turf Management (4)

Considerations in the management of turf, including such specialized areas as golf courses, bowling greens, athletic fields and park lawns. 3 lectures, 1 three-hour laboratory. Prerequisite: Junior standing or consent of instructor and SS 221 or 231.

PA 400 Special Problems for Upper Division Students (1-2)

Individual or group investigation, research, studies or surveys of selected problems. Total credit limited to 4 units, with a maximum of 2 units per quarter.

PA 415 Landscape Contracting (3)

Management of landscape contracting firms. Bonding, insurance, contracts, ownership, licensing and other legal aspects of improvement to real property. Orientation to the landscaping industry. 3 lectures, Prerequisite: senior standing or permission of the instructor.

PA 416 Landscape, Specifications and Estimating (4)

Calculation of costs, manpower, and quantities of materials in landscape development. Preparation of specifications and estimates used in bidding. 3 lectures, 1 three-hour laboratory. Prerequisite: PA 415.

PA 425 Park Facilities Management (4)

Management of facilities normally within the jurisdiction of the park department, including, but not limited to, the management of park structures, play equipment, surfaced areas, and sanitary facilities. 3 lectures, 1 three-hour laboratory.

PA 426 Park Policies and Procedures (4)

Policies and procedures governing park departments, including, but not limited to, public relations, relationship to other governmental agencies. Analysis of park problems, planning, and scheduling. Emphasis on the municipal level. 3 lectures, 1 three-hour laboratory.

PA 427 Budgeting and Finance of Parks (3)

The administration of public funds by park departments for acquisition, development, and operation of park areas. A study of tax structures, bonds, purchasing, and budgeting techniques. 3 lectures. Prerequisite: PA 426.

PA 436 Golf Course Management (4)

The management, supervision, maintenance and operation of golf courses. A study of the equipment, scheduling, promotion and personnel required and related facilities of public and private courses. 3 lectures, 1 three-hour laboratory. Prerequisites: PA 333.

PA 461, 462 Senior Project (2) (2)

Selection and completion of a project under faculty supervision. Projects typical of problems which graduates must solve in their fields of employment. Project results are presented in a formal report. Minimum 120 hours total time.

PA 463 Undergraduate Seminar (2)

An open forum of senior students in which the latest developments, practices and procedures are discussed. Selected field trips. 2 lectures.

PA 499 Special Topics for Upper Division Students (1-4)

Group study of a selected topic, the title to be specified in advance. Total credit limited to 8 units, with a maximum of 4 units per quarter. Prerequisite: permission of instructor.

SOIL SCIENCE

One of the four majors offered in the Plant and Soil Science Department is soil science. For other programs in this department see agricultural biology, agronomy, and fruit industries.

Gaylord Patten James A. Pomerening George W. Schmitz

The curriculum in soil science prepares students for careers related to the use, management, and conservation of soils. The soil scientist is concerned with the chemical, physical, mineralogical and biological properties of soils in order to evaluate its capabilities and limitations for purposes of developing sound management decisions. Employment opportunities exist with federal, state and international agencies, research and consulting laboratories and agricultural chemical companies. Soil scientists are engaged in a variety of professional careers. They are employed by the federal government in mapping soils and the dissemination of technical soil information to farmers, ranchers, foresters, engineers, wildlife biologists, urban planners and all other users of soil information. States and municipalities employ the soil scientist in environmental and land use appraisal and planning. Soil scientists serve on the staffs of commercial chemical companies as technical specialists. With stricter laws on environmental pollution in effect, the need for trained, qualified scientists to advise on the application of plant nutrients and farm chemicals is now essential. Graduates in soil science find employment as soil specialists on management teams of commercial farming operations. The teaching of agricultural sciences in high schools is available to the graduate who pursues the teacher preparation program in college along with his major in soil science. A portion of soil science graduates continue their education for higher degrees after completion of the bachelor of science degree. The advanced degree leads to teaching and research positions with universities, government agencies and private industry. The current awareness of the importance of our soil as a vital and life sustaining part of our ecology, points up the future need for soil scientists in the preservation and management of our environment.

CORE COURSES FOR MAJOR

(Required of all students)

Surveying Fundamentals	AE	131	(2)
Surveying Applications	AE	132	(2)
Irrigation	AE	240	(4)
Introduction to Plant Science	AGR	111	(3)
Range Management	AGR	336	(4)
Basic Soil Science	SS	231	(4)
Soil Management	SS	232	(4)
Soil Fertility and Fertilizers	SS	233	(4)
Soil and Water Conservation	SS	333	(4)
Soil & Plant Analysis	SS	339	(3)
Soil Chemistry	SS	431	(4)
Soil Physics	SS	432	(5)
Soil Classification and Survey	SS	433	(4)
Senior Project	SS	461	(2)
Senior Project	SS	462	(2)
Undergraduate Seminar	SS	463	(2)
Crop Production Courses			(8)

SUPPORT AND ELECTIVE COURSES

(Required of all students)

Agricultural Business Management Course	†		(4)
Introduction to Arthropods	AGB	165	(4)
Weeds and Weed Control	AGR	233	(4)
American Civilization	AMC	201	*(4)
American Civilization	AMC	202	*(4)
Animal Science Course	†		(4)
Basic Biology	BIO	115	*(5)
Elements of Botany	BOT	120	*(4)
General Plant Pathology	BOT	223	(4)
College Chemistry	CHM	104	*(3)
College Chemistry	CHM	105	*(3)
College Chemistry Lab	CHM	141	*(1)
College Chemistry Lab	CHM	142	*(1)
Elements of Organic Chemistry	CHM	201	(3)
Quantitative Analysis	CHM	221	(4)
Organic Chemistry Lab	CHM	250	(1)
Principles of Economics	EC	201	*(4)
Freshman Composition	ENG	104	*(4)
Freshman Composition	ENG	105	*(4)
Physical Geology	ESC	111	*(3)
Physical Geology Lab	ESC	151	*(2)
Earth Science Course	†		(4)
Trigonometry	MAT	104	*(4)
College Algebra	MAT	105	*(4)
Basic Microbiology	MIC	201	(5)
Physical Education 100-series			*(3)
College Physics	PHY	121	*(4)
College Physics	PHY	122	(4)
Public Speaking	SP	100	*(4)
Humanities	†		*(7)
Electives			(28)

*May be used for the general education requirement. Select unspecified courses from the general education list. For general education breadth requirements, select four courses from a minimum of two schools other than the School of Agriculture.

†Consult with advisor.

Course Descriptions

SS 200 Special Problems for Lower Division Students (1-2)

Individual or group investigation, research, studies or surveys of selected problems. Total credit limited to 4 units, with a maximum of 2 units per quarter.

SS 221 General Soils (5)

Fundamentals of soils, including their physical and chemical properties and the relation of these properties to the origin, classification, use and management of the soils. Primarily for non-technical majors. 4 lectures, 1 three-hour laboratory. Prerequisite: CHM 103.

SS 231 Basic Soil Science (4)

Introduction to soils, including physical, chemical and biological properties of soils, soil-plant interrelations, soil formation and classification, and soil moisture. 3 lectures, 1 three-hour laboratory. Prerequisite: CHM 103 or equivalent.

SS 232 Soil Management (4)

Examination and application of the principles of soil management as they relate to plant growth and environmental quality; Emphasizing an integration of soil-water-plant relationships. 3 lectures, 1 three-hour laboratory. Prerequisite: SS 221 or SS 231.

SS 233 Soil Fertility and Fertilizers (4)

Soil fertility and its relation to plant nutrition. Fertilizer materials, production, application and usage. 3 lectures, 1 three-hour laboratory. Prerequisite: SS 221 or 231.

SS 299 Special Topics for Lower Division Students (1-4)

Group study of a selected topic, the title to be specified in advance. Total credit limited to 8 units, with a maximum of 4 units per quarter. Prerequisite: Permission of instructor.

SS 333 Soil and Water Conservation (4)

Climate, topography, soils and land use in relation to soil and water losses. Principles, methods, and programs of soil and water conservation. 3 lectures, 1 three-hour laboratory. Prerequisite: SS 221 or 231.

SS 339 Soil and Plant Analysis (2)

Use of soil and plant analysis to determine nutrient needs of plants and the diagnosis and correction of plant growth problems. 2 lectures, 1 three-hour laboratory. Prerequisites: CHM 105, SS 211 or SS 231.

SS 400 Special Problems for Upper Division Students (1-2)

Individual or group investigation, research, studies or surveys of selected problems. Total credit limited to 4 units, with a maximum of 2 units per quarter.

SS 431 Soil Chemistry (4)

Chemical composition of soils, cation and anion exchange, soil colloids and their significance, nutrient release and fixation reactions. 3 lectures, 1 three-hour laboratory. Prerequisite: SS 231, CHM 221, or consent of instructor.

SS 432 Soil Physics (5)

Physical properties and their significance to soil behavior. Mechanical composition, density and porosity, water movement and retention, aeration. 3 lectures, 2 three-hour laboratories. Prerequisite: SS 231, PHY 121.

SS 433 Soil Classification and Survey (4)

Principles and methods of soil classification. Soil survey techniques and soil survey interpretations. Soil morphology and its relation to soil genesis, classification, survey and interpretations. 3 lectures, 1 three-hour laboratory. Prerequisite: SS 221 or 231.

SS 439 Soil Materials (3)

Soil properties and practices for the establishment and maintenance of ornamental plantings. Use of soil analysis, amendments fertilization, irrigation, drainage and slope stabilization for ornamental plants. 2 lectures, 1 three-hour laboratory. Prerequisite: SS 221 or SS 231.

SS 461, 462 Senior Project (2) (2)

Selection and completion of a project under faculty supervision. Projects typical of problems which graduates must solve in their fields of employment. Project results are presented in a formal report. Minimum 120 hours total time.

SS 463 Undergraduate Seminar (2)

A study of current developments in soil science and a discussion of periodical literature. 2 lectures.

SS 499 Special Topics for Upper Division Students (1-4)

Group study of a selected topic, the title to be specified in advance. Total credit limited to 8 units with a maximum of 4 units per quarter. Prererquisite: permission of instructor.

VOCATIONAL AGRICULTURE EDUCATION

Paul Peterson, *Coordinator*

The primary function of the vocational agricultural education program is the preparation of teachers of vocational agriculture for the public secondary schools of California. Specialized pre-professional and professional courses are offered for undergraduate and graduate (fifth year) students. Technological, scientific, and broad general education course work for agriculture teaching candidates is offered throughout the School of Agriculture and other schools including the college-wide Teacher Preparation Center.

Students with an interest in becoming agriculture teachers enroll in an agriculture major and obtain a B.S. degree. Students are required to have course work in four areas of agriculture. These are (1) agricultural business management or farm management, 7-8 units, (2) agricultural engineering or agricultural mechanics, 8-10 units, (3) animal science, 10 units, and (4) plant/soil science and ornamental horticulture, 10 units.

Students who plan to obtain a credential must have two years of practical experience in agriculture, and should consult with the Coordinator of Vocational Agriculture early in their college career. Vocational agriculture teacher candidates are advised to wisely use the electives available in the major to complete courses required for the teaching credential which are not normally specified in the undergraduate major. A single subject academic minor must be selected from those offered at Cal Poly. Work toward the minor should be started no later than the sophomore year to enable incorporation of minor requirements in the student's total curriculum. Information on the minor requirements may be obtained from the Teacher Preparation Center.

New credential legislation mandate changes in the current credential program — the Coordinator of Agricultural Education, the Dean of Agriculture, or the Director of the Teacher Preparation Center will supply information at your request.

CORE COURSES FOR MAJOR

(Required of all majors in vocational agricultural education. See Teacher Preparation Section for additional secondary education requirements.)

Introduction to Vocational Agriculture Programs	AG	300	(2)
Young and Adult Programs and Youth Leadership	AG	410	(3)
Agricultural Mechanics	AG	420	(3)
Seminar (concurrent with student teaching)	AG	430	(3)
Program Planning and Development	TEP	550	(3)

In addition 7-8 units, 8-10 units, etc. will be taken in four required areas. The exact nature of this work will be determined in consultation with the agriculture advisor.

Courses in Related Agriculture

AG 300 Introduction to Vocational Agriculture Programs (2)

Overview of vocational agriculture programs including goals and purposes. Qualifications essential to success in vocational agriculture. Programs of studies to meet requirements for instruction in vocational agriculture. 2 lecture discussions.

AG 311 Fundamentals of Agricultural Science (3)

Overview of the plant and animal industries. Principles and practices in producing, processing, and distributing food and fiber. Concepts designed particularly for the discriminating consumer. 3 lectures.

AG 410 Young and Adult Programs and Youth Leadership (3)

Organization, history, philosophy, administration and procedures in advising Future Farmer Chapters and conducting classes for out-of-school youth and adults. Surveys and plans for development of rural and urban adult programs. F.F.A. and Young Farmer programs, techniques and methods. 2 lectures, 1 activity.

AG 420 Agricultural Mechanics (3)

Agricultural mechanics in vocational agriculture programs and facilities. Organizing a course of study and implementing a program. Demonstrations and analysis of techniques. 2 lectures and 1 activity period combined, 4 hours.

AG 430 Program Planning and Development (3)

Study of career opportunities in agriculture. Program development in such areas as the Future Farmers of America, and other youth groups. Supervised practice including cooperative work experience in agriculture. Development of up-to-date approaches in an integrated program. Operating policies and procedures. 3 lectures.

AG 550 Seminar in Agriculture (1-3)

Current findings and research problems in the field of agriculture and their application to the industry. Seminar, 1 to 3 hours. Maximum of six units may be earned. Prerequisite: Consent of instructor.



SCHOOL OF ARTS

Albert J. Aschenbrenner, Dean
George P. Hart, Associate Dean

The School of Arts offers nine bachelor of arts degrees, six bachelor of science degrees, one master of arts degree and two master of science degrees. Information concerning the master's curricula may be found in the graduate listings.

Bachelor's degree programs are offered in a wide range of humanities, behavioral and social sciences and physical education through the eleven departments of the school.

An important university-wide function of the school is to provide instruction in certain basic offerings in general education. Thus, a major emphasis falls on preparing graduates for their roles as active, participating citizens of the several communities to which they will ultimately belong.

A majority of the co-curricular activities of the university are closely related to the academic programs within the School of Arts. These activities are open to students throughout the entire university. Dramatic productions, musical programs, and art exhibits are produced and sponsored by the respective departments. Communications media, including publications, radio and television, speech and forensics programs, are advised by faculty in the communication arts department and offer a wide variety of experience for students. Intercollegiate and intramural athletics for both men and women are offered by the physical education department.

Departments and Majors

BEHAVIORAL SCIENCES
William Larson, Chairman
Behavioral Sciences major (BA)

COMMUNICATION ARTS
Gary D. Keele, Chairman
Communication Arts major (BS); Options in Broadcast Journalism, Newspaper and Magazine Journalism, Public Relations, Specialized Communications, Speech

ECONOMICS
Gertrude C. Boland, Chairman
Economics major (BS)
Master of Science in Economics

ENGLISH AND MODERN LANGUAGES
Robert E. Morsberger, Chairman
English major (BA)
Humanities major (BA)
Master of Arts in English

ETHNIC STUDIES
Charles C. Irby, Chairman
American Indian Studies
Black Studies
Chicano Studies

HISTORY
Werner H. Marti, Chairman
History major (BA)

LIBERAL STUDIES
Harold F. Simmons, Chairman
Liberal Studies major (BA)

MUSIC, DRAMA AND ART
Philip R. Browne, Chairman
Music major (BA)
Drama major (BA)
Art major (BA)

PHYSICAL EDUCATION
Leo H. Teghtmeyer, Chairman
Physical Education major (BS)
Recreation Administration major (BS)
Master of Science in Physical Education

POLITICAL SCIENCE
John Esterline, Chairman
Political Science major (BA)

SOCIAL SCIENCES
Joan M. Greenway, Chairman
Social Sciences major (BS); Options in Social Sciences and Economics
Philosophy major (BA)

SOCIAL SERVICES
Signe Starnes, Chairman
Social Services major (BS)

ART

Diane Divelbess, *Coordinator*

Charles D. Frederick
Maren H. Henderson
Karl E. Winchell
Walter W. Glaser
Stanley C. Wilson

The art major program provides a sequence of courses leading to the bachelor of arts degree in studio art. The program is geared to creative problem solving, to aesthetic understanding and production of art forms, and to the development of solid skills in both studio and academic endeavors.

Students majoring in art should expect to develop a wide range of skills rather than a narrow specialization. Such skills will enable them to find employment in art and related fields, or to pursue their education at the graduate level.

Because art is one of the approved subjects for the California Single Subjects Teaching Credential, a student majoring in art at Cal Poly may wish to prepare for a career in teaching.

A number of art courses are available for the general university student as well.

CORE COURSES FOR THE MAJOR

(Required of all students)

Introduction to Painting	ART	120	(3)
Introduction to Clay	ART	130	(3)
Introduction to Drawing	ART	140	(3)
Art Materials & Skills	ART	150	(3)
Craft Materials & Skills	ART	190	(3)
History of Western Art	ART	212	(4)
History of Western Art	ART	213	(4)
History of Western Art	ART	214	(4)
Schematic Drawing	ART	243	(3)
Lettering	ART	251	(3)
Printmaking	ART	260	(3)
Fundamentals of Sculpture	ART	280	(3)
Senior Project	ART	461	(2)
Senior Project	ART	462	(2)
Undergraduate Seminar	ART	463	(2)
Minimum of 24 units in art chosen in consultation with advisor			(24)

SUPPORT AND ELECTIVE COURSES

(Required of all students)

American Civilization	AMC	201*	(4)
American Civilization	AMC	202*	(4)
Freshman Composition	ENG	104*	(4)
Physical Education (3 100-level courses)	PE	*	(3)
Courses to complete General Education Requirements			**(45)
Approved electives, chosen in consultation with advisor			(24)
Free Electives			+(33)

*May be used for general education requirements. Select appropriate courses from the general education list.

**Must include a total of four courses from a minimum of two schools other than the School of Arts for fulfillment of the breadth requirement.

+The total curriculum must include 60 units of upper division courses.

Course Descriptions

ART 110 The Visual Arts (4)

Introduction to the visual arts. A comprehensive survey/analysis to foster appreciation and understanding of traditional and experimental art forms as they relate to human needs. 4 lectures.

ART 120 Introduction to Painting (3)

Image as painting. Varied projects designed to foster development of visual equivalents for ideas and emotions using basic painting skills. 6 hours of activity.

ART 130 Introduction to Clay (3)

Exploration of fundamentals of ceramic materials utilizing slab, coil, and mold making. Emphasis on developing creative ability. 6 hours of activity.

ART 140 Introduction to Drawing (3)

Analysis and practice of drawing. Problems involving development of perception. Emphasis on concepts and methods. 6 hours of activity.

ART 150 Art Materials and Skills (3)

Development of appreciative and creative skills. Variety of materials used, with an emphasis on two dimensional design concepts. 6 hours of activity.

ART 190 Craft Materials and Skills (3)

Basic projects with various craft materials. Development of three-dimensional skills and concepts through the materials and their properties. Criteria applied to craft materials. 6 hours of activity.

ART 200 Special Problems for Lower Division Students (1-2)

Individual or group investigation, research, studies or surveys of selected problems. Total credit limited to 4 units, with a maximum of 2 units per quarter.

ART 212 History of Western Art (4)

Comprehensive survey and analysis of the development of art in Western civilizations from prehistoric times to the Renaissance. 4 lectures.

ART 213 History of Western Art (4)

Comprehensive survey and analysis of the development of art in Western civilizations from the Renaissance to the 18th century. 4 lectures.

ART 214 History of Western Art (4)

Comprehensive survey and analysis of the development of art in western civilization from the 18th to the 20th centuries. 4 lectures.

ART 224 Acrylic Painting (3)

Methods and techniques with acrylics. Emphasis on form and composition. 6 hours activities. Prerequisite: ART 120 or permission of instructor.

ART 225 Transparent Watercolor Painting (3)

Methods and techniques with transparent watercolor. Outdoor sketching and studio projects. 6 hours activities. Prerequisite: ART 120 or permission of instructor.

ART 237 Ceramics (3)

An introduction to ceramic design. Basic methods of forming, decorating, glazing, and firing pottery forms with an emphasis on the use of the potter's wheel. 6 hours activities.

ART 243 Schematic Drawing (3)

Developing graphic images through schematic analysis methods, e.g., perspective. Emphasis on developing perceptual and conceptual abilities with a minimum of mechanical devices. 6 hours activities. Prerequisite: ART 140 or permission of instructor.

ART 251 Lettering (3)

Development of appreciative and skillful usage of alphabets. Techniques of forming and spacing letters. 6 hours activities.

ART 260 Printmaking (3)

Methods and techniques of printmaking. Relief, intaglio, and silk screen processes. 6 hours activities. Prerequisite: ART 150 or permission of instructor.

ART 280 Fundamentals of Sculpture (3)

Fundamentals of sculpture involving modeling or carving clay, plaster, wood, stone, and metal. 6 hours activities.

ART 295 Crafts Design (3)

Development of concepts, methods, and skills in basic craft media such as ceramics, wood, metal, and fiber construction. 6 hours activities.

ART 299 Special Topics for Lower Division Students (1-4)

Group study of a selected topic, the title to be specified in advance. Total credit limited to 8 units, with a maximum of 4 units per quarter. Prerequisite: permission of instructor.

ART 312 Foundations of Modern Art (4)

Comprehensive survey and analysis of the founding movements and development of the visual arts in the West from mid-19th to mid-20th century. 4 lectures.

ART 313 Art of the 20th Century (4)

Analysis of the visual arts in Europe and the United States from post-World War II to the present. 4 lectures. Prerequisite: ART 312.

ART 314 History of Art of the United States (4)

Survey of the art of the United States from colonial times to the present. European tradition, frontier art forms, regionalism, social realism, international art style. 4 lectures.

ART 315 Art of Ancient Civilizations (4)

Survey of the arts of ancient civilizations, primarily Egypt and Mesopotamia, showing the interrelations and cultural exchanges of the ancient world. 4 lectures.

ART 316 Art of the Classical World (4)

Survey of the arts of the classical world; the development of Greek, Etruscan, and Roman art. 4 lectures.

ART 319 Art of Mexico and the Southwest (4)

The arts of pre-Columbian Mexico, the Spanish Conquest, and the colonial period of Mexico to the present; the American Southwestern Indian arts. 4 lectures.

ART 326 Oil Painting (3)

Studio course in oil painting techniques. 6 hours activities. Prerequisite: ART 120 or permission of instructor.

ART 328 Figure and Portrait Painting (3)

Methods and techniques of representing human and other animate forms with painting media. 6 hours of activity. Prerequisites: ART 224 or 326; 343.

ART 331 Ceramics (3)

Intensified study of ceramic and sculptural forms produced on the potter's wheel; study of glaze calculation and firing processes. 6 hours activities. Prerequisite: ART 237.

ART 335 Raku (3)

Introduction to asymmetrical forms with an emphasis on low-fire glaze calculations. Aspects of primitive kiln construction with concentration on reduction firings. 6 hours activities. Prerequisite: ART 130 or permission of instructor.

ART 336 Kiln Construction (3)

The design and understanding of kiln construction with emphasis on the building and firing processes. 6 hours activities. Prerequisites: ART 237, 335.

ART 338 Ceramic Glazes-Low Fire (3)

Analysis of chemical compounds commonly used in ceramic glazes for use in temperatures below cone 5. 6 hours activities. Prerequisites: ART 331, 335.

ART 339 Ceramic Glazes-High Fire (3)

Analysis of chemical compounds commonly used in ceramic glazes for use in temperatures exceeding 2150° F. 6 hours activities. Prerequisite: ART 338.

ART 343 Life Drawing (3)

Skills and techniques in drawing the human figure from studio models. 6 hours activities. Prerequisite: ART 140 or permission of instructor.

ART 344 Life Drawing (3)

Drawing for creative expression from costumed studio models using variety of drawing materials. 6 hours activities. Prerequisite: ART 343 or permission of instructor.

ART 345 Drawing for Graphic Expression (3)

Advanced problems in draftsmanship with special emphasis on linear and textural expression. 6 hours activities. Prerequisite: ART 140 or permission of instructor.

ART 346 Drawing for Illustration (3)

Developing graphic images that accurately depict things and situations. Communicating concepts through graphic media. 6 hours activities. Prerequisites: ART 243; and 343 or 344.

ART 351 Graphic Layout (3)

Design principles of visual communication. Projects in packaging, book design, corporate image, advertising and mass media communication. 6 hours activities. Prerequisites: ART 150 and 251 or permission of instructor.

Art 353 Two-Dimensional Design (3)

Elements and principles of two-dimensional design related to projects for specific functions. 6 hours activities. Prerequisite: ART 150 or permission of instructor.

ART 361 Relief Printmaking (3)

Exploration of materials and processes in relief printing including block carving, collage and assemblage techniques. 6 hours activities. Prerequisite: ART 260 or permission of instructor.

ART 362 Silk Screen Printmaking (3)

Silk screen as an art form, emphasizing techniques with paper, glue, and lacquer film stencils. 6 hours activities. Prerequisite: ART 260 or permission of instructor.

ART 363 Intaglio Printmaking (3)

Techniques and skills in intaglio methods of printmaking including drypoint, etching, aquatint, mezzotint and engraving. 6 hours of activities. Prerequisite: ART 260 or permission of instructor.

ART 383 Sculpture: Resins (3)

Contemporary aesthetics and processes with resin. Includes waster mold, multiple flexible mold, reinforcements, colorants, and finishes. 6 hours activities. Prerequisite: ART 280 or permission of instructor.

ART 385 Sculpture: Non-ferrous Cast Metals (3)

Aesthetic selection and use of materials in lost wax, resin-bonded sand, and ceramic shell casting techniques. 6 hours activities. Prerequisite: ART 280 or permission of instructor.

ART 387 Three-Dimensional Design (3)

Theory and application of aesthetic elements and principles of three-dimensional forms and their relationship to human needs. 6 hours activities. Prerequisite: ART 280 or 295 or permission of instructor.

ART 393 Jewelry (3)

Fundamental metal processes in jewelry design. Cutting, forging, soldering, casting, etching of copper, bronze, and silver. 6 hours activities. Prerequisite: ART 190 or 295 or permission of instructor.

ART 400 Special Problems for Upper Division Students (1-2)

Individual or group investigation, research, studies or surveys of selected problems. Total credit limited to 4 units, with a maximum of 2 units per quarter.

ART 405 Art in the Classroom (3)

Art education theory and curriculum design. Evaluation techniques, art materials and skills. 3 lectures. Prerequisite: permission of instructor.

ART 410 History of Tribal Arts (4)

Art of tribal cultures — African, Oceanic, North American Indian — within context of religious beliefs and social function. 4 lectures.

ART 426 Multimedia Painting (3)

Painting projects in mixed media. Discovering visual effects by combining traditional and nontraditional methods and techniques. 6 hours activities. Prerequisite: ART 224 or 225 or 326 or permission of instructor.

ART 428 Advanced Painting (4)

Development of advanced concepts and techniques in painting. Traditional and experimental approaches. Individual develoment. 8 hours activities. Prerequisites: ART 224 or 326 and 328 or 426 or permission of instructor.

ART 430 Advanced Ceramics (4)

Development of designs in clay, with an emphasis on mass production. 8 hours activities. Prerequisites: ART 338 and 339 or permission of instructor.

ART 446 Advanced Drawing (3)

Advanced drawing techniques with variety of media. Individual expression through creative problem solving. 6 hours activities. Prerequisites: ART 346; 343 or 344; 345; or permission of instructor.

ART 461, 462 Senior Project (2) (2)

Selection and completion of a project under faculty supervision and culiminating in a public exhibit or presentation of research. Minimum 120 hours total time. Prerequisite: senior standing and completion of 12 units in area of emphasis.

ART 463 Undergraduate Seminar (2)

An open forum of senior students in which the latest developments and practices in art criticism, education, and professional studio and gallery management are discussed. 2 lectures.

ART 484 Sculpture: Welding (3)

Development of skills and aesthetic sensitivity required in fabricating welded metal sculpture. 6 hours activities. Prerequisite: ART 280 or permission of instructor. Recommended: MTE 251.

ART 499 Special Topics for Upper Division Students (1-4)

Group study of a selected topic, the title to be specified in advance. Total credit limited to 8 units, with a maximum of 4 units per quarter. Prerequisite: permission of instructor.

BEHAVIORAL SCIENCES

William R. Larson, *Chairman*

Wayne C. Brown	Shirlee J. Juarez	Frederick B. Meeker
John H. Burma	Louis J. King	Joseph L. Philbrick
Sidney Carlin	Marcia E. Lasswell	Robert M. Schwieder
Gary A. Cretser	William K. Lombardo	Donald V. Shupe
William F. Hill	Wilfred T. Masumura	Joics B. Stone

The department offers courses leading to the degree of bachelor of arts in the behavioral sciences. The curriculum for this degree is composed of courses in psychology and sociology, with additional emphasis on anthropology courses from elsewhere in the university.

Instruction in the department is intended to provide a background for understanding human behavior, in both individual and collective aspects. The interdisciplinary orientation and offerings of the department allow the student to select a major curriculum, in concert with faculty advisors, which best supports his aspirations for post-college employment or advanced education. A minimum number of required courses has been established, in order that a high degree of flexibility can be achieved in personal curriculum planning with approved electives selected through consultation with faculty advisors. The introductory courses in psychology and sociology are prerequisites to most of the upper division offerings.

The Criminal Justice and Corrections program is a multidisciplinary grouping of existing courses which have been specifically selected to fulfill the needs of students presently working in or planning for careers in law enforcement or corrections. Full scholarship funds are available for all students qualifying under Law Enforcement Program criteria. Special counselling and advisement for students in any major who are interested in criminal justice or corrections may be obtained from the department's coordinator. Detailed information is available from the departmental office.

CORE COURSES FOR THE MAJOR

(Required for all students)

Intro Cult Anth	ANT	102	(4)
Meth Beh Sci	BHS	204	(4)
Senior Seminar	BHS	498	(4)
General Psychology	PSY	201	(4)
General Psychology	PSY	202	(4)
Social Psychology	PSY	401	(4)
Prin of Soc	SOC	201	(4)
Prin of Soc	SOC	202	(4)
Soc Org	SOC	310	(4)
Approved electives in BHS, PSY, SOC, ANT 300-400 level (courses to be chosen in consultation with advisor)			(24)

SUPPORT AND ELECTIVE COURSES

(Required for all students)

American Civilization	AMC	201	*(4)
American Civilization	AMC	202	*(4)
Freshman Composition	ENG	- 104*	(4)
Physical Education (3 100-level courses)*			(3)
Courses to complete General Education Reqmts.			**(45)
Approved Electives (300-400 level) chosen in consultation with advisor			(24)
Free Electives			†(42)

*May be used for the general education requirement. Select appropriate courses from general education list.

**Must include four courses from a minimum of two schools other than the School of Arts for fulfillment of the breadth requirement.

†The total curriculum must include 60 units of upper division courses.

Course Descriptions

BHS 101-110 Para-Professional Training (3)

Para-professional training in behavioral sciences. Specific topics selected to fulfill a particular program. Each course 3 units. Total credit limited to 30 units, 15 per quarter. 3 lectures. Prerequisite: enrollment in an approved para-professional program or permission of instructor.

BHS 200 Special Problems for Lower Division Students (1-2)

Individual or group investigation, research, studies, or surveys of selected problems. Total credit limited to 4 units, with a maximum of 2 units per quarter.

BHS 204 Methods in the Behavioral Sciences (4)

An introduction to the methods and techniques used in carrying out primary investigation in the behavioral sciences. 3 lectures, 1 two-hour activity. Prerequisites: SOC 201, 202, PSY 201, 202

BHS 299 Special Topics for Lower Division Students (1-4)

Group study of a selected topic, the title to be specified in advance. Total credit limited to 8 units with a maximum of 4 units per quarter. Prerequisite: permission of instructor.

BHS 307 Statistics for the Behavioral Sciences (4)

Correlational techniques and inferential statistics useful to behavioral scientists. Product moment and rank order correlation coefficients, t-ratios, introduction to analysis of variance, selected non-parametric statistics. Selection, application, and interpretation of appropriate statistics for analysis of behavioral data. 3 lectures, 1 two-hour activity. Prerequisites: MAT 107, BHS 204.

BHS 400 Special Problems for Upper Division Students (1-2)

Individual or group investigation, research, studies, or surveys of selected problems. Total credit limited to 4 units, with a maximum of 2 units per quarter.

BHS 450 Computer Methods in Behavioral Science (4)

Survey of computer methods in behavioral science research. Simulations, games, analytic models, humanistic applications, and special techniques. Practice in programming of applied behavioral science problems. 3 lectures, 1 two-hour activity. Prerequisites: Behavioral Sciences major and junior standing; or permission of instructor.

BHS 461, 462 Senior Project (2) (2)

Selection and completion of a project under faculty supervision. Projects typical of problems which graduates must solve in their fields of employment or interest. Formal written report required.

BHS 463 Undergraduate Seminar (2)

Study and discussion of recent developments in behavioral sciences, contrasted with students' senior project. Prerequisites: BHS 461, 462, permission of instructor.

BHS 498 Senior Seminar (4)

Contemporary concepts, issues, and studies in the behavioral sciences. 4 seminar-discussions. Prerequisites: BHS major and senior standing.

BHS 499 Special Topics for Upper Division Students (1-4)

Group study of a selected topic, the title to be specified in advance. Total credit limited to 8 units, with a maximum of 4 units per quarter. Prerequisite: permission of instructor.

Psychology

PSY 201 General Psychology (4)

Basic concepts, methods, and vocabulary of psychology with emphasis on the scientific study of development, learning, perception, sensation, thinking, and physiological foundations. 4 lectures.

PSY 202 General Psychology (4)

Critical consideration of the methods and concepts in the study of mental tests, motivation, personality differences, abnormal behavior, therapy, social psychology, and industrial psychology. 4 lectures. Prerequisite: PSY 201.

PSY 205 Personal Adjustment (3)

The development of insight into human behavior; understanding self and others; principles of mental health and their application to personal adjustment. 3 lectures.

PSY 301 Experimental Psychology: Research, Design, and Methodology (4)

Contemporary experimental design. Use of appropriate control procedures. Critiques of sample designs and techniques, evaluation of recent literature. 3 lectures, 1 two-hour activity. Prerequisites: BHS 204, PSY 202.

PSY 303 Physiological Psychology (4)

Genetic, anatomical and physiological factors related to the behavior of organisms. Relevance of psycho-physiological mechanisms to an understanding of man in his environment. 3 lectures, one 2-hour activity. Prerequisites: BHS 204, PSY 202.

PSY 305 Basic Developmental Psychology (4)

Developmental areas, including genetic factors. The effects of environmental enrichment and deprivation on development. Principles applying to motor-perceptual and social behavior. Cross-species approach to comparative analysis of development. 4 lectures. Prerequisite: PSY 201.

PSY 310 Child Psychology: Early Childhood (4)

Developmental aspects of the physical, social, emotional, and intellectual growth of the child from birth through the pre-school years. Emphasis on factors that facilitate and impede development; early learning and the development of language; growing awareness of self in relation to environment. 4 lectures. Prerequisite: PSY 201.

PSY 311 Child Psychology: The Middle Years (4)

Developmental aspects of the physical, social, emotional growth of the child from kindergarten years through pre-adolescence. Emphasis on development of social abilities and social awareness; thought processes; awareness of self in relation to environment. 4 lectures. Prerequisite: PSY 310 or permission of instructor.

PSY 312 Adolescent Psychology (4)

Physical, social, emotional, and intellectual growth of the adolescent. Emphasis on personality formation, social adjustment, and the problem of self-identity. 4 lectures. Prerequisite: PSY 201.

PSY 314 Human Relations (4)

Development of skills in dealing with others, especially as a committee member and chairman of groups. Development of skills through class lecture and discussion plus small-group involvement with actual business-personnel problems. 3 lectures, 1 two-hour activity. Prerequisite: PSY 201.

PSY 315 Human Relations (4)

Introduction to human motivation in the one-to-one relationship. Effect upon individual behavior of the changing contemporary American culture; techniques of successful two-way communications; structure for professional interviewing. 3 lectures, 1 two-hour activity. Prerequisite: PSY 314.

PSY 316 Human Relations (2)

Study and experiment in techniques for facilitating introspection and self-analysis. 1 lecture, 1 two-hour activity. Prerequisites: PSY 314, 315.

PSY 321 The Psychology of Identity (4)

Psychological aspects of conflict, isolation, assimilation; the psychology of prejudices and discrimination; psychological factors in minority group leadership, group membership identity, and group membership consciousness. 4 lectures. Prerequisite: upper division standing or permission of instructor.

PSY 332 Industrial and Personnel Psychology (4)

Survey of applications of psychology to selection and motivation of employees. Work and efficiency, morale, fatigue, and job safety. Application of psychological principles to man-machine systems including multiple sensory input. 3 lectures, 1 two-hour activity.

PSY 334 Cognitive Processes (4)

Processes by which humans acquire and maintain knowledge. Focus on the relationships of perception, language and thinking, and concept attainment. Major theories of cognitive development. 4 lectures. Prerequisite: PSY 202 or equivalent.

PSY 340 Educational Psychology (4)

Psychological principles of the learning process and mental hygiene at the elementary and secondary level. Emphasis on learning and the motivation of the learner. 4 lectures. Prerequisite: PSY 201.

PSY 401 Social Psychology (4)

Advanced study of human behavior as a product of interaction and social process: nature of group life in relation to social groupings, social conflict, public opinion, group morale, social control, leadership. Small groups, team composition, and nature of prejudice. 4 lectures. Prerequisite: PSY 201 or permission of instructor.

PSY 402 Theories of Learning (4)

Examination of classical learning theories in conjunction with critical examination of current theories. Status and form of contemporary theory. 4 lectures. Prerequisites: PSY 202 and junior standing.

PSY 403 Psychology of Personality (4)

Advanced study of major contemporary approaches to personality. Emphasis on development and structure of personality. Biological, psychological, and socio-cultural determinants. Dynamics and changes of personality. 4 lectures. Prerequisite: PSY 201.

PSY 410 Theories and Systems of Psychology (4)

The major contending theories and systems of contemporary psychology with a focus on humanistic and empirical psychology. History of psychological theories. 4 lectures. Prerequisites: PSY 201, 202.

PSY 412 Theories of Counseling (4)

Systematic and comparative analysis of current psychotherapies; their philosophies, purposes, and procedures. 4 lectures. Prerequisite: PSY 202.

PSY 415 Abnormal Psychology (4)

The causes, description, and treatment of the extremes of human behavior. Emphasis on an integrated analysis from a psycho-social viewpoint. 4 lectures. Prerequisite: PSY 201.

PSY 416 Psychological Testing (4)

The uses and misuses of psychological tests; construction, standardization, and statistics involved in testing, including objective and projective tests in all areas of measurement, i.e., achievement, motivation, aptitude, personality, and vocational preference. 4 lectures. Prerequisites: PSY 201, 202; or permission of instructor.

PSY 450 Principles of Behavior Modification (4)

Principles of behavior modification as applicable to home, school, and institutional settings. Currently used approaches to behavioral change studied through analysis of experimental situations and published reports. 4 lectures. Prerequisite: PSY 201 or equivalent.

PSY 451 Practicum in Behavioral Modification (4)

Practical experience in behavior shaping. Participation with patients and staff at Pacific State Hospital. Use of audio tapes, films, and other data devices to monitor progress in behavioral shaping. 2 lecture-discussions, 2 three-hour laboratories. Prerequisite: PSY 450 or permission of instructor.

PSY 460 Advanced General Psychology (4)

Survey of advanced topics in general psychology. Theories of information and data, problems of measurement and scaling. Classic and contemporary psychophysics. Probabilistic models of learning and memory. Contemporary theories of motivation and perception. 4 lectures. Prerequisites: BHS 204, permission of instructor.

PSY 500 Principles of Group Behavior in Business Management (4)

Psychological theories of group behavior applied to various aspects of management. Motivation, perception, and communication among various groups and levels of management; group interaction and process. Lecture-discussion, 4 hours. Prerequisites: PSY 201, graduate standing, or permission of instructor.

PSY 550 Special Topics in Psychology (1-4)

Review of selected topics in psychology, chosen according to needs and interests of students. Seminar, 1 to 4 hours. May be repeated for a maximum of 8 units. Prerequisite: permission of instructor.

Sociology

SOC 201, 202 Principles of Sociology (4) (4)

Sources of materials and methods of sociological study; concepts and principles; structure and process of group life; social institutions. Applications of techniques in field study. 4 lectures.

SOC 206 Family Relations (3)

Analysis of dating, courtship, engagement; religious, social, marital, and legal factors relating to marriage and early adjustment. Preparation for marriage. 3 lectures.

SOC 301 Contemporary Social Problems (4)

Analysis of leading social problems facing American society today: drugs, crime, poverty, others. 4 lectures. Prerequisite: junior standing.

SOC 302 Criminology (4)

Causal theories, nature, extent, control, and prevention of crimes. Emphasis on prevention and rehabilitation, both inside and outside penal institutions. 4 lecture-discussions. Prerequisites: SOC 201, 202, junior standing.

SOC 310 Social Organization (4)

Structure and function of selected social organizations, with emphasis on social processes, social evolution, and social planning. 4 lectures. Prerequisites: SOC 201, 202.

SOC 320 Ethnic Relations in America (4)

Social and social-psychological theory in relation to prejudice and discrimination. Emphasis on current ethnic contacts and conflicts in the United States. 4 lecture-discussions. Prerequisites: SOC 201, 202.

SOC 321 Family as a Social Institution (4)

Social and cultural aspects of the development of the family as an institution, focusing upon its structures, functions, forms of disorganization; suggestions for adjustments to current trends. 4 lecture-discussions. Prerequisites: SOC 201, 202.

SOC 322 Sociology of Poverty (4)

Sociological and social-psychological aspects of poverty. Involvement of primary relationship with the poverty family. 4 lectures. Prerequisite: SOC 201.

SOC 323 Sociology of Minority Communities (4)

Sources of materials and methods of the sociological study of minority communities; concepts and principles; differential structure and process of minority group life; social institutions in the context of value system conflict; indigenous efforts to alleviate community problems. 4 lectures. Prerequisite: junior standing.

SOC 330 Population and Society (4)

Population trends and problems in modern society. Focus on demographic characteristics of world population, with special reference to urban concentrations and underdeveloped nations. 4 lecture-discussions. Prerequisites: SOC 201, 202.

SOC 333 Research Methods in Sociology (4)

Survey of methods for conducting or evaluating sociological research; field techniques. Unobtrusive methods; questionnaire and scale design; interviewing schedules and coding; data organization. 3 lectures, 1 two-hour activity. Prerequisites: SOC 201, 202; or PSY 201, 202; BHS 204.

SOC 350 Collective Behavior and Social Movements (4)

Analysis of mass behavior: crowds, riots, fads, fashions, public opinion, and social movements. 4 lectures. Prerequisites: SOC 201, 202.

SOC 401 Urban Sociology (4)

The organization of the modern city; emphasis on the social problems of the modern industrial urban center. Analysis of trends in urban and suburban communities; ecological patterns and change. 4 lectures. Prerequisite: junior standing or permission of instructor.

SOC 402 Socialization: Self and Society (4)

Analysis of social interaction relating to development of self; reciprocal influences between individual and society. Development of social roles and the symbolic nature of interaction. 4 lectures. Prerequisites: SOC 201, 202.

SOC 405 Development of Social Thought (4)

A study of sociological thought. Emphasis on whole theoretical systems and the writings of the early sociological theoreticians. 4 lectures. Prerequisites: SOC 201, 202.

SOC 410 Social Stratification (4)

Theories and research concerning social stratification; emphasis on contemporary American society, including the measurement and analysis of social status and stratification models; the meaning of social class for individuals and society; correlates of social class. 4 lectures. Prerequisites: SOC 201, 202.

SOC 420 Juvenile Delinquency (4)

Juvenile delinquency in California and elsewhere; types and extent; theories of causation; laws, courts, correctional institutions, probation; delinquent subcultures, middle-class delinquency; new programs. 4 lecture-discussions. Prerequisites: SOC 201, 202.

SOC 425 Social Gerontology (4)

Review of psycho-social aspects of senescence. Aging as a social problem; demographic issues; the aged as a minotiry; aging and poverty. Four lecture-discussions. Prerequisites: SOC 201, 202.

SOC 550 Special Topics in Sociology (1-4)

Review of selected topics in sociology, chosen according to needs and interests of students. Seminar, 1 to 4 hours. May be repeated for a maximum of 8 units. Prerequisite: permission of instructor.

COMMUNICATION ARTS

Gary D. Keele, *Chairman*

Thomas A. Burdick
David A. Church
Robert G. Clark
Ross F. Figgins
Russell V. Lapp
Linda L. Malm
Dan L. Miller
Glen D. Phillips
Alfred E. Sheldon
Stanley H. Taylor
Frank A. Tennant
Ben F. Thompson
Martin I. Wang

An increasingly complex society needs individuals to inform, interpret, and explain to the public the problems of that society. The communication arts major prepares students to fill communication positions in the mass media, business, government, and education.

Five options are offered to students in the major — broadcast communication, newspaper/magazine journalism, public relations, specialized communication, and speech communication.

The broadcast communication option is designed for students planning careers in radio and television broadcasting.

The newspaper/magazine journalism option is designed for students planning careers in editorial and supervisory assignments with newspapers, magazines, and industrial publications.

The public relations option should be chosen by students planning careers in public relations, advertising, and communications positions which require skills and knowledge in these areas.

The specialized communication option should be chosen by students who will use communication skills in a specific area of interest such as economics, education, or theatre, or in positions in government and industry.

The speech communication option provides students with a background in message preparation, analysis, and presentation.

Students completing the major are qualified to take advantage of a variety of educational opportunities and to pursue advanced study in professionally oriented graduate schools.

CORE COURSES FOR MAJOR

(Required of all students)

Intro to Mass Comm	COM	101	(4)
Intro to Comm Theory	COM	201	(4)
Applied Communication	COM	463	(6)
Courses to Complete Major			(40)

OPTION COURSES FOR MAJOR

(Required in specific options)

Broadcast Communication

Broadcast Media	COM	204	(3)
Intro to the Film	COM	241	(4)
Intro to Broadcast Techniques	COM	242	(4)
News and Special Events	COM	301	(5)
Writing for Broadcast Media	COM	332	(4)
Intermed Broadcast Techniques	COM	342	(4)
TV and Radio News Analysis	COM	411	(4)
The Documentary Film	COM	431	(4)
Documentary Film Production	COM	432	(4)
Remote Broadcast Production	COM	442	(4)

Newspaper/Magazine Journalism

Reporting	COM	102	(4)
Photography	COM	131	(3)
Principles of Printing	COM	206	(4)
Photojournalism	COM	231	(2)
Communications Law	COM	304	(4)
Editing Laboratory	COM	305	(2)
In-Depth Reporting	COM	307	(4)
Reporting Public Affairs	COM	309	(4)
Editorial Writing	COM	310	(2)
Magazine Publishing	COM	312	(3)
Communications Ethics	COM	401	(4)
Newspaper Operations	COM	403	(4)

Public Relations

Reporting	COM	102	(4)
Photography	COM	131	(3)
Principles of Printing	COM	206	(4)
Adv. Copy., Layout, & Prod.	COM	302	(4)
Communications Law	COM	304	(4)
Editing Laboratory	COM	305	(2)
In-Depth Reporting	COM	307	(4)
Bus. & Industrial Journalism	COM	311	(4)
Magazine Publishing	COM	312	(3)
Public Relations Theory	COM	313	(4)
P. R. Case Studies	COM	414	(4)

Specialized Communication

Reporting	COM	102	(4)
Communications Law	COM	304	(4)
Specialized Report Writing	COM	319	(4)
Language in Govt. & Industry	COM	320	(4)
Comm Problem Analysis	COM	321	(4)
Communications Ethics	COM	401	(4)
Upper Division Courses — Advisor Approval			(16)

Speech Communication

Interpersonal Communication	SP	103	(4)
Advocacy and Argument	SP	204	(4)
Human Communication Theory	SP	301	(4)
Group Discussion	SP	307	(4)
Small Group Communication	SP	309	(4)
Process of Social Influence	SP	403	(4)
Select 4 courses from the following:			
Speech Criticism	SP	308	(4)
American Public Address	SP	312	(4)
Classical Rhetorical Theory	SP	316	(4)
Modern Rhetorical Theory	SP	317	(4)
Modern Rhetorical Criticism	SP	408	(4)

SUPPORT & ELECTIVE COURSES

(Required in specific options)

Broadcast Communication

American Civilization	AMC	201*	(4)
American Civilization	AMC	202*	(4)
The Visual Arts	ART	110*	(4)
Reporting	COM	102	(4)
Photography	COM	131	(3)
Communications Law	COM	304	(4)
Communications Ethics	COM	401	(4)
Acting	DR	151	(4)
Freshman Composition	ENG	104*	(4)
Freshman Composition	ENG	105*	(4)
Lib Res & Biblio	LIB	103	(3)
Physical Education (3 100-level courses)*			(3)
Public Speaking	SP	100*	(4)
or Interpersonal Communication	SP	103	(4)
Group Discussion	SP	307	(4)
Select 4 courses from the following:			
Management Prin & Theory	BUS	307	(4)
Office Management	BUS	327	(4)
History of Mass Comm	COM	203	(4)
In-Depth Reporting	COM	307	(4)
Reporting Public Affairs	COM	309	(4)
Pub Opin, Prop, & Media	COM	413*	(4)
Marketing Communications	MKT	208	(4)
Principles of Marketing	MKT	305	(4)
Advertising	MKT	307	(4)
Courses to Complete General Education and Breadth Requirements			**(16-34)
Free Electives			(44-62)

Newspaper/Magazine Journalism

History of Mass Comm	COM	203	(4)
Pub Opin, Prop & Media	COM	413*	(4)
Principles of Economics	EC	201*	(4)
Principles of Economics	EC	202*	(4)
Freshman Composition	ENG	104*	(4)
Freshman Composition	ENG	105*	(4)
Advanced Expository Writing	ENG	303	(4)
United States History	HST	201*	(4)
United States History	HST	202*	(4)
Library Research & Biblio	LIB	103	(3)
Logic and Semantics	PHL	202*	(4)
or Language and Human Behavior	ENG	313	
Physical Education (3 100-level courses)			(3)
Amer Pol Syst	PLS	201*	(4)
General Psychology	PSY	201*	(4)
Principles of Sociology	SOC	201*	(4)
Public Speaking	SP	100*	(4)
Courses to Complete General Education and Breadth Requirements			**(12-23)
Free Electives			(59-70)

Public Relations

Business & Its Environment	BUS	103	(4)
History of Mass Comm	COM	203	(4)
Communications Ethics	COM	401	(4)
Pub Opin, Prop & Media	COM	413*	(4)
Freshman Composition	ENG	104*	(4)
Freshman Composition	ENG	105*	(4)
Advanced Expository Writing	ENG	303	(4)
United States History	HST	201*	(4)
United States History	HST	202*	(4)
Library Research & Biblio	LIB	103	(3)
Consumer Behavior	MKT	201	(4)
Advertising	MKT	307	(4)

Logic and Semantics	PHL	202*	(4)
or Language and Human Behavior	ENG	313	
General Psychology	PSY	201*	(4)
Physical Education (3 100-level courses)*			(3)
American Political System	PLS	201*	(4)
Public Speaking	SP	100*	(4)
or Interpersonal Comm	SP	103	
Courses to Complete General Education and Breadth Requirements			**(16-22)
Free Electives			(56-62)

Specialized Communication

Business & Its Environment	BUS	103	(4)
Report Writing	COM	216*	(3)
Business Communication	COM	218*	(3)
or Technical Writing	COM	219*	
Freshman Composition	ENG	104*	(4)
Freshman Composition	ENG	105*	(4)
United States History	HST	201*	(4)
United States History	HST	202*	(4)
Library Research & Biblio	LIB	103	(3)
Basic Mathematics	MAT	101*	(3)
Introduction to Statistics	MAT	107*	(3)
Consumer Behavior	MKT	201	(4)
Logic and Semantics	PHL	202*	(4)
Physical Education (3 100-level courses)*			(3)
American Political System	PLS	201*	(4)
Public Speaking	SP	100	(4)
or Interpersonal Comm	SP	103	(4)
Advocacy and Argument	SP	204	(4)
Courses to Complete General Education and Breadth Requirements			**(17-21)
Free Electives			(64-69)

Speech Communication

American Civilization	AMC	201*	(4)
or American Political System	PLS	201*	
American Civilization	AMC	202*	(4)
or United States History	HST	202*	
Freshman Composition	ENG	104*	(4)
Freshman Composition	ENG	105*	(4)
Lib Res & Biblio	LIB	103	(3)
Logic and Semantics	PHL	202*	(4)
Physical Education (3 100-level courses)*			(3)
General Psychology	PSY	201*	(4)
Public Speaking	SP	100*	(4)
Debate	SP	131	(2)
Forensics Practices	SP	231	(4)
and/or Forensics Practices	SP	331	
Courses to Complete General Education and Breadth Requirements			**(32)
Free Electives			(73)

*May be used for general education requirement. Select unspecified courses from general education list.

**Hours approximate; exact number depends on specific courses selected. Must include four courses from a minimum of two schools other than the School of Arts for fulfillment of the breadth requirement.

‡A maximum of 50 units prefixed COM, excluding COM courses on the general education list may be applied toward the 198 units required for graduation.

Course Descriptions

COM 101 Introduction to Mass Communications (4)

Survey of contemporary mass media; communications theory, structure and interrelationships of newspapers, magazines, radio, and television. Analyses of major media content. 4 lectures.

COM 102 Reporting (4)

News gathering and writing principles; use of news sources and documents; emphasis on basic news leads and story development, including speeches, meetings, and press conferences, and interviewing techniques. 2 lectures, 2 two-hour activities. Prerequisite: COM 101 and BUS 144 or permission of instructor.

COM 131 Photography (3)

Basic photography techniques, including taking, processing, and selecting good photos. For those with no or limited experience in photography. 1 lecture, 2 three-hour laboratories.

COM 200 Special Problems for Lower Division Students (1-2)

Individual or group investigation, research, studies, or surveys of selected problems. Total credit limited to 4 units, with a maximum of 2 units per quarter.

COM 201 Introduction to Communication Theory (4)

Study of contributions of rhetorical theory, linguistics, psychology, and sociology to the development of general communication theory. 4 lectures. Prerequisite: sophomore standing or permission of instructor.

COM 203 History of Mass Communications (4)

History, background, and responsibilities of the mass media. Emphasis on development of mass communication in the United States. 4 lectures.

COM 204 Broadcast Media (3)

History and development of the broadcast media with emphasis on the American system. A general introduction to broadcast development, requirements, and trends in the media. 3 lectures.

COM 206 Principles of Printing (4)

Printing processes and the adaptability and possibilities of each; preparation of material for printing. 4 lectures.

COM 216 Report Writing (3)

Report-writing techniques. Research, organization, and preparation of specialized and technical information. Regular written reports. 3 lecture-discussions. Prerequisite: ENG 104.

COM 218 Business Communication (3)

Writing effective business letters and memoranda with emphasis on clarity and on reaction-evoking techniques. Letters of application and resumes. 3 lecture-discussions. Prerequisite: ENG 104.

COM 219 Technical Writing (4)

The principles of technical writing with extensive practice in the preparation of technical materials in the various forms common to the engineering fields. 4 lecture-discussions. Prerequisite: ENG 104.

COM 231 Photojournalism (2)

Photography for publication and public relations. Photo editing, picture stories and illustrations, photo marketing. 1 lecture, 1 three-hour laboratory. Prerequisite: COM 131 or permission of instructor.

COM 241 Introduction to the Film (4)

The development of the motion picture as an art form and medium of mass communication. Critical appreciation and analysis of the film. 2 lectures, 2 two-hour activities.

COM 242 Introduction to Broadcast Techniques (4)

An introduction to broadcast studio techniques, broadcast equipment, types of programming, and performance skills. Production practice in graphics, interview, and demonstration formats. 3 lectures, 1 three-hour laboratory.

COM 251 Communications Practices (2)

Production course for beginning staff members of college communications media. Minimum of 6 hours of production activity a week. Prerequisite: COM 102 (may be taken concurrently) and permission of instructor. Total credit limited to 6 units.

COM 299 Special Topics for Lower Division Students (1-4)

Group study of a selected topic, the title to be specified in advance. Total credit limited to 8 units, with a maximum of 4 units per quarter. Prerequisite: permission of instructor.

COM 301 News and Special Events (5)

Gathering, writing, and editing of news and special events materials for the broadcast media. Production of a weekly program for community and campus distribution. Experience in performance and production of news programs. 5 lectures. Prerequisites: COM 102 and 242.

COM 302 Advertising Copywriting, Layout, and Production (4)

Examination of advertising appeals and application of product and market research to specific creative problems. Preparation of copy, planning of layout, and production of advertising. 2 lectures, 2 two-hour activities.

COM 304 Communications Law (4)

The fundamentals and applications of libel and right-of-privacy laws as they affect mass communication. 4 lectures. Prerequisite: COM 101 or permission of instructor.

COM 305 Editing Laboratory (2)

Copy editing, headline writing, layout, and makeup. 2 three-hour laboratories. Prerequisites: COM 101, 102, 131, 206, 304, 307.

COM 307 In-Depth Reporting (4)

In-depth reporting principles and development, including investigative, interpretive, series, and personality stories. 2 lectures, 2 two-hour activities. Prerequisite: COM 102.

COM 309 Reporting Public Affairs (4)

Gathering material and writing stories pertaining to business, labor, industry, government, and courts; emphasis on organization and procedure of government and courts. 2 lectures, 2 two-hour activities. Prerequisite: COM 307.

COM 310 Editorial Writing (2)

Writing editorials; emphasis on the use of editorial comment. 2 lectures. Prerequisite: COM 102.

COM 311 Business and Industrial Journalism (4)

The use of printed material in business and industry, including house organs, brochures, and pamphlets; operation of the news bureau and writing of publicity releases. 4 lectures. Prerequisite: COM 102.

COM 312 Magazine Publishing (3)

Editing and production of magazines, including content, layout, design, photography, and advertising; analysis of various types of magazines, such as house organs, trade and specialized publications; legal problems. 3 lectures. Prerequisites: COM 101, 102, 131, 206, 304, 305 and 307.

COM 313 Public Relations Theory (4)

The effects of organized information on public thinking; dissemination of ideas by commercial, industrial, social, and governmental organizations; the use of various publicity tools. 4 lectures. Prerequisite: ENG 105 or COM 216.

COM 319 Specialized Report Writing (4)

Principles and practices of specialized report writing and editing as employed in business, industry, and government. Preparation, publication, dissemination, and evaluation of complex messages in terms prescribed by organizational needs. 4 lecture-discussions. Prerequisite: COM 216 or 219.

COM 320 Language in Government and Industry (4)

Study of language and style in professional writing with a concentration on fundamental language components as they appear in written communications in government and industry. 4 lectures. Prerequisite: sophomore standing or permission of instructor.

COM 321 Communications Problem Analysis (4)

Analysis of breakdowns in communications systems; identification of barriers and constraints to effective message transmission. Emphasis on practical and creative problem solving. 4 lectures. Prerequisite: sophomore standing or permission of instructor.

COM 322 The Constitution and the Media (4)

Problems and practice of the media in such areas as freedom of the press, censorship, free press versus fair trial, contempt, media access to government information, newsman's freedom to travel, private access to the media. 4 lectures. Prerequisite: COM 304.

COM 331 Advanced Photographic Techniques (2)

Special photographic techniques for publication, illustration, and photo marketing. 1 lecture, 1 three-hour laboratory. Prerequisite: COM 131.

COM 332 Writing for Broadcast Media (4)

An introduction to the requirements of writing for the broadcast media. Practice in development of the treatment, rundown sheet, story board, and shooting script. Writing to film footage. 4 lectures. Prerequisites: ENG 104, COM 242.

COM 342 Intermediate Broadcast Techniques (4)

The technical principles of studio production. Utilization of production skills in nondramatic program formats. Directing, producing, and scripting of FCC program categories: teen, children, women, religious, and entertainment (game, musical, variety). 3 lectures, 1 three-hour laboratory. Prerequisite: COM 242.

COM 345 Educational TelevisionProduction (4)

The application of television production to instructional technology. Student practice in media consultation; the performance of studio operations necessary for the production of teaching materials. 1 lecture, 3 two-hour activities. Prerequisite: COM 342 or graduate status in the Master of Arts in Education Program.

COM 351 Advanced Communications Practices (2)

Production course for experienced staff members of college communications media. Minimum of 6 hours of production activity a week. Prerequisite: 6 units of COM 251 or permission of instructor and department chairman. Total credit limited to 6 units.

COM 400 Special Problems for Upper Division Students (1-2)

Individual or group investigation, research, studies, or surveys of selected problems. Total credit limited to 4 units, with a maximum of 2 units per quarter.

COM 401 Communications Ethics (4)

Responsibility of the mass media and the journalist in today's society. 4 lectures. Prerequisite: COM 304.

COM 403 Newspaper Operations (4)

The organization of the newspaper, including study of advertising and circulation problems and relations with the community. 4 lectures. Prerequisites: COM 101 or permission of instructor.

COM 405 School Publications (3)

Operations of secondary school publications — newspaper, yearbook, magazine — including staffing, financing, production, relationship of advisor. 3 lectures. Prerequisite: experience in student publications.

COM 411 TV and Radio News Analysis (4)

Survey of principles and practices of interpretive reporting and commentary in electronic media; organization, writing, delivery of news analyses; production of commentary programs on news, leading to their use on radio and television stations. 2 lectures, 2 two-hour activities. Prerequisites: COM 102, 242, 301.

COM 413 Public Opinion, Propaganda, and the Mass Media (4)

Critical study and evaluation of the techniques of psychopolitical persuasion; mass media and public opinion in America; developments in international propaganda. 4 lectures.

COM 414 Public Relations Case Studies (4)

Examination and analysis of current public relations practices and campaigns used by organizations, businesses, and institutions; development of public relations campaigns for specific situations. 4 lectures. Prerequisite: COM 313.

COM 431 The Documentary Film (4)

Principles and techniques of the documentary film in mass communications. 2 lectures, 2 two-hour activities.

COM 432 Documentary Film Production (4)

The fundamentals of film and sound in the super 8mm format. Scripting, producing, directing, and editing individual films. Camera and recorders supplied, but not film and processing. 1 lecture, 2 three-hour activities. Prerequisites: COM 242, 431; or permission of instructor.

COM 433 16mm Television Production (4)

Group development of a treatment and shooting script. Individual responsibility for research, gathering sound, filming, and editing segments of a single color-sound film in 16mm format. Offered when grants are available. 1 lecture, 2 three-hour laboratories. Prerequisites: COM 332, 432; or permission of instructor.

COM 434 Television Directing (4)

Principles and practices of complex studio operations. Directing performers on television productions. Working with full scripts, sets, and makeup. The coordination of all factors in the full production of programs. 1 lecture, 3 two-hour activities. Prerequisites: DR 151, COM 342.

COM 442 Remote Broadcast Production (4)

The principles of remote broadcast utilizing a self-contained mobile van to program local and campus events and news. Directing the unpredictable, ad-libbing, and extensive video tape editing experience. Emphasis on a professional product to be distributed to campus and community. 1 lecture, 2 three-hour activities. Prerequisite: COM 342.

COM 448 Broadcast Media Criticism (4)

Analysis and criticism of the broadcasting media. Examination of popular literature on the media and the study of selected programming to determine the state of the art. Writing critical analysis of current programs. 4 lectures. Prerequisite: permission of instructor.

COM 451 Editorial Practices (2)

Production course for students in editorial and management positions on college communications media or newsbureau. Minimum of 6 hours of production activity a week. Prerequisite: 6 units of COM 351 and permission of department. Total credit limited to 6 units.

COM 463 Applied Communication (2-6)

An intensive communications internship or other individual/group study of the communications process as specified by each option. Total credit required 6 units, with 2-6 units per quarter. Maximum of 6 units.

COM 499 Special Topics for Upper Division Students (1-4)

Group study of a selected topic, the title to be specified in advance. Total credit limited to 8 units, with a maximum of 4 units per quarter. Prerequisite: permission of instructor.

Speech Communication

SP 100 Public Speaking (4)

Theory and practice of speech organization, composition, and delivery. Use of research materials. 4 lecture-discussions.

SP 103 Interpersonal Communication (4)

An introduction to the variables determining communication behavior. Development of understanding through involvement in a variety of structured face-to-face interactions with other students. 4 lecture-discussions.

SP 131 Debate (2)

Introduction to reasoning and argument through formal debate. Selection and phrasing of a proposition, formal structure of a debate, gathering and testing of evidence, construction of cases, and skills of refutation which are developed by debating. 2 lecture-discussions.

SP 203 Oral Interpretation (4)

Theory, methods, and practice in oral communication of literature, technical reports, criticism, and other written materials. Analysis of literary style as applied to oral communication. 4 lecture-discussions.

SP 204 Advocacy and Argument (4)

An investigation into logical methods of proof and different modes of advocacy. Argument as measured by formal validity and rhetorical effectiveness. Principles of argumentation with application to contemporary forms of public advocacy. 4 lecture-discussions. Prerequisite: SP 100 or permission of instructor.

SP 231 Forensics Practices (2)

Intercollegiate and intramural competition in debate, persuasive speaking, oral interpretation, and other competition events. Independent projects in specialized fields. 4 hours activity. May be repeated for up to 6 units in combination with SP 331.

SP 301 Human Communication Theory (4)

An interdisciplinary, behaviorally oriented examination of the constituent processes of human communication. 4 lectures. Prerequisite: SP 100 or permission of instructor.

SP 307 Group Discussion (4)

Variables of communication within problem-solving groups; development of conference and discussion skills. Secondary emphasis on group psychology as it relates to problem-solving discussions. 4 lecture-discussions.

SP 308 Speech Criticism (4)

Critical approaches to the analysis and evaluation of contemporary speeches. Development of traditional evaluative standards and methods of criticism; emphasis on the internal aspects of speech criticism. 4 lecture-discussions. Prerequisite: permission of instructor.

SP 309 Small Group Communication (4)

The structure and process of small groups as related to forces at work in problem-solving interaction. The study of related theory and research. 4 lecture-discussions. Prerequisites: SP 307 or PSY 314.

SP 312 American Public Address (4)

Techniques and strategies of major speeches affecting significant political, social, and religious issues in the United States between 1750 and 1950. Important trends in public address and events. 4 lectures. Prerequisite: junior standing or permission of instructor.

SP 316 Classical Rhetorical Theory (4)

Major theories of rhetoric from Greece and Rome to the Renaissance; analysis of the philosophical issues of rhetoric as viewed through classical sources. 4 lectures. Prerequisite: SP 100.

SP 317 Modern Rhetorical Theory (4)

Major theories of rhetoric from Bacon to the modern. The application of theories to the modern understanding of rhetoric. 4 lectures. Prerequisite: SP 100.

SP 331 Forensics Practices (2)

Intercollegiate and intramural competition in debate, persuasive speaking, oral interpretation, and other competition events. Independent projects in specialized fields. 4 hours activity. May be repeated for up to 6 units in combination with SP 231.

SP 403 Process of Social Influence (4)

Analysis of persuasion in American society. The study of theory and research findings related to the process of social influence. 4 lecture-discussions. Prerequisite: SP 100 or permission of instructor.

SP 408 Modern Rhetorical Criticism (4)

Theoretical and critical approaches to the analysis, explanation, and evaluation of rhetorical acts and movements. 4 lecture-discussions. Prerequisite: SP 308.

DRAMA

Robert L. Gilbert, *Coordinator*

Ralph C. McCormic James L. Martin Michael Devine

The basis of the program leading to the bachelor of arts degree is the understanding of drama as a creative art through two media—active student participation in theatre productions aimed at a mastery of skills in all aspects of theatre, and a comprehensive study of drama.

To provide for the active participation of students, a wide range of student productions is presented. Students receive intensive training in the theory and skills of acting, directing, stagecraft, makeup, stage lighting, costume and scene design, and stage management.

Experimental workshops explore new trends in drama and its production. These workshops and the major productions involve students from a variety of academic disciplines, and contribute greatly to the cultural climate of the university and of the local communities.

Course work includes theatre history and criticism, playwriting, dramatic structure, and dramatic literature. The curriculum develops the academic background essential to intelligent and relevant integration of production skills of contemporary society with their antecedents in the great classic dramatic periods of the past.

After completing the drama program at Cal Poly, students are prepared to go into teaching in secondary schools; into graduate schools; or into specialized training for professional theatre, television, or motion pictures.

CORE COURSES FOR MAJOR

(Required of all students)

Technical Production	DR	131	(3)
Technical Production	DR	132	(3)
Technical Production	DR	133	(3)
Makeup	DR	143	(1)
Acting	DR	151	(4)
Vocal Techniques for Theatre	DR	252	(3)
Intermediate Acting	DR	253	(4)
History of the Theatre	DR	311	(4)
History of the Theatre	DR	312	(4)
History of the Theatre	DR	313	(4)
Stage Lighting	DR	332	(3)
Directing	DR	356	(4)
Seminar in Theatre History	DR	414	(2)
Senior Project	DR	461	(2)
Senior Project	DR	462	(2)
Undergraduate Seminar	DR	463	(2)
Electives chosen from the following courses with the approval of advisor:			(16)
Black Theatre	DR	302	(3)
Scene Design	DR	337	(4)
Improvisation for the Theatre	DR	355	(2)
Reader's Theatre	DR	358	(4)
Theatre Management	DR	361	(4)
Stage Costume Design and Construction	DR	381	(4)
Special Problems	DR	400	(2)
Playwriting	DR	401	(4)
Seminar in Theatre History	DR	414	(2)
Advanced Acting	DR	458	(4)
Creative Dramatics	DR	471	(4)
Advanced Creative Drama	DR	472	(4)
History of Costume	DR	481	(4)

SUPPORT AND ELECTIVE COURSES

(Required of all students)

American Civilization	AMC	201	*(4)
American Civilization	AMC	202	*(4)
Introduction to the Theatre	DR	203	*(3)
Play Production Activity	DR	244	(6)
Advanced Projects in Theatre	DR	441	(6)
Freshman Composition	ENG	104	*(4)
Freshman Composition	ENG	105	*(4)
Western Literary Heritage	ENG	111	*(4)
or Western Literary Heritage	ENG	112	*
Introduction to Shakespeare	ENG	203	*(4)
or Shakespeare	ENG	403	

History of Civilization	HST	101*	(4)
or History of Civilization	HST	102*	
or History of Civilization	HST	103*	
Physical Education (3 100-level courses)*			(3)
Music course			(4)
Art course			(4)
Philosophy course*			(4)
Natural Science 2 courses*			(8)
Courses to Complete General Education Requirements**			(9)
Free Electives			†(47)

*Courses approved for use in satisfying general education requirements.

Must include four courses from a minimum of two schools other than the School of Arts for fulfillment of the Breadth Requirement.

†The total curriculum must include 60 units of upper division courses.

Course Descriptions

DR 131 Technical Production (3)

Principles of backstage organization, scenery construction, and rigging. Crew work on current productions. 1 lecture, 2 three-hour laboratories.

DR 132 Technical Production (3)

Principles and techniques of stage lighting and sound. Crew work on current productions. 1 lecture, 2 three-hour laboratories.

DR 133 Technical Production (3)

Principles and techniques of elementary scene design, scenery painting, and property construction. Crew work on current productions. 1 lecture, 2 three-hour laboratories.

DR 143 Makeup (1)

Theory and practice in theatrical makeup, including materials, base and lining techniques, chiaroscuro, old age and character makeup, construction of life masks, construction and application of appliances. 1 three-hour laboratory.

DR 151 Acting (4)

Theory and practice of acting with special attention to basic approaches, including improvisation, motivation, concentration, and character development. 2 lectures, 2 three-hour laboratories.

DR 200 Special Problems for Lower Division Students (1-2)

Individual or group investigation, research, studies, or surveys of selected problems. Total credit limited to 4 units, with a maximum of 2 units per quarter.

DR 203 Introduction to the Theatre (3)

Theatre as a performing art. The study of representative plays as they illustrate questions of structure and interpretation as well as elements of theatre production and management. 3 lecture-discussions. Prerequisite: ENG 104 or permission of instructor.

DR 244 Play Production Activity (1-2)

Practical experience by participation in theatrical production. Technical crews, theatre management and acting. 1-2 three-hour laboratories. May be repeated for not more than 12 units.

DR 252 Vocal Techniques for the Theatre (3)

Principles of the actor's vocal techniques for theatre performance; analysis of dialogue, its phonetic elements, rhythms, and regional variations; application of phonetic principles to articulation and pronounciation of stage dialogue; exercises for public performance; invitational public performance. 2 lecture-discussions, 1 two-hour activity.

DR 253 Intermediate Acting (4)

Techniques of play and scene analysis through class exercises in improvisation, formal analytical methods, and rehearsal techniques. Creation of roles for class and/or public performance. 2 lecture-discussions, 2 three-hour laboratories. Prerequisite: DR 151.

DR 299 Special Topics for Lower Division Students (1-4)

Group study of a selected topic, the title to be specified in advance. Total credit limited to 8 units, with a maximum of 4 units per quarter. Prerequisite: permission of instructor.

DR 302 Black Theatre (3)

A survey of Black theatre history, beginning with its American origins. Emphasis on the Harlem Renaissance and the advent of Black revolutionary theatre. Performance techniques for workshop. 2 lecture-discussions, 1 two-hour activity.

DR 311 History of the Theatre (4)

Survey of dramatic art and production from the Greeks to 1640. Application of historic principles and styles to contemporary play production and criticism. 4 lecture-discussions. Prerequisite: junior standing or permission of instructor.

DR 312 History of the Theatre (4)

Dramatic art and theatre production from 1640 to 1870. Application of theories, principles, and styles to contemporary play production and criticism. 4 lecture-discussions. Prerequisite: junior standing or permission of instructor.

DR 313 History of the Theatre (4)

Survey of dramatic art and production from 1870 to the present. Application of historic principles and styles to contemporary play production and criticism. 4 lecture-discussions. Prerequisite: junior standing or permission of instructor.

DR 332 Stage Lighting (3)

Theory and practice in stage lighting. Composition, design, switchboard design, instrument selection and purchasing, production planning. Participation as crew members and supervisors for departmental productions. 2 lectures, 1 three-hour laboratory. Prerequisite: DR 132 or permission of instructor.

DR 337 Scene Design (4)

Theory and technique of scene design, including working drawings, perspectives, painter's elevations, and ground plans. Techniques of scenery construction and painting. 2 lectures, 2 two-hour activities. Prerequisite: DR 133 or permission of instructor.

DR 355 Improvisation for the Theatre (2)

An approach to acting utilizing improvisational techniques to explore temporal, spatial, and sonoric relationships as well as scene-building methods. 2 three-hour laboratories. Prerequisite: DR 151. Offered in alternate years.

DR 356 Directing (4)

Theory and practice of play selection, analysis and direction, composition, movement, coaching, and ground plans. 2 lecture-discussions, 2 three-hour laboratories. Prerequisite: DR 253.

DR 358 Reader's Theatre (4)

Theory and directed practice in group presentation of dramatic and choral readings for public performance. Adaptation for group presentation of selected genres of literature including prose, verse, and drama. 2 lecture-discussions, 2 three-hour laboratories.

DR 361 Theatre Management (4)

Principles of organization and management of the performing arts production program, including choice of season, audience analysis, promotion and publicity, box office procedures, budgeting and finance, and crew organization and supervision. 3 lecture-discussions, 1 three-hour laboratory. Prerequisites: DR 131, 133, or permission of instructor.

DR 381 Stage Costume Design and Construction (4)

Design and construction of stage costumes including sketches, material selection, pattern drafting, cutting, fitting, sewing. 2 lectures, 2 two-hour activities.

DR 400 Special Problems for Upper Division Students (1-2)

Individual or group investigation, research, studies or surveys of selected problems. Total credit limited to 4 units, with a maximum of 2 units per quarter.

DR 401 Playwriting and Dramatic Structure (4)

Intensive study of dramatic structure as applied to theatre practice. Theory and practice in playwriting and criticism. 4 lecture-discussions.

DR 414 Seminar in Theatre History (2)

Studies in a limited aspect of theatre history. Significant periods, modes, and contributors to the mainstream of theatrical arts. Subject matter to be announced each quarter that the course is offered. May be repeated for a total of 6 units. 2 lecture-discussions. Prerequisite: junior standing.

DR 441 Advanced Projects in Theatre (1-2)

Advanced problems and independent projects in acting, directing, stage design, stage lighting, costuming and staging, including participation in major productions and independent production of experimental student plays. 1-2 three-hour laboratories. May be repeated for not more than 12 units.

DR 458 Advanced Acting (4)

Intensive study in styles and forms of acting, with special attention to mastery of technique and comparative study of theories of acting. 2 lectures, 2 three-hour laboratories. Prerequisites: DR 151, 253.

DR 461, 462 Senior Project (2) (2)

Selection and completion of a project under faculty supervision. Projects typical of problems the graduate will meet in his chosen field of employment. Results presented in a formal written report. Minimum of 120 hours total time.

DR 463 Undergraduate Seminar (2)

Reports of senior projects, discussions of professional articles of an appropriate level. 2 lecture-discussions.

DR 471 Creative Dramatics (4)

Theory and practice of improvisational drama, dramatization of children's stories, and techniques of story telling, with emphasis on participation, leadership, and development of original materials for classroom and recreational use. 2 lectures, 2 two-hour activities.

DR 472 Advanced Creative Dramatics (4)

Classroom demonstration, instruction, theory, and practice in advanced creative dramatic techniques and special projects in local schools. Instruction in building drama sessions, preparing complex scenes, flexibility and alternative modes of presentation; exploration of many media as core material for sessions. 2 lectures, 2 two-hour activities.

DR 481 History of Costume (4)

The dress of civilized man as applied to theatre costuming from early recorded history to the present, as seen through the contemporary art and written description, with emphasis on art history and social institutions. 4 lectures.

DR 499 Special Topics for Upper Division Students (1-4)

Group study of a selected topic, the title to be specified in advance. Total credit limited to 8 units, with a maximum of 4 units per quarter. Prerequisite: permission of instructor.

ECONOMICS

Gertrude C. Boland, *Chairman*

Taha Al-Sabea
Sidney M. Blumner
Robert T. Bray
George T. Galbreath
Franklin Y. H. Ho
Ralph B. Hutchinson
David G. Jaques
David J. Park
Milton M. Shapiro
John T. Shieh
Dale G. Stallings
James E. Sutton

The department serves all schools of the university by providing courses that contribute to the general education of all students and develop vocational proficiencies to meet the needs of the undergraduate economics majors. A curriculum leading to the master of science degree in economics is also offered in the department. Requirements for this degree may be found in the graduate listings.

The curriculum in economics, while offering a broad background of general education and traditional undergraduate courses, lends itself to considerable flexibility. Students consult with a faculty advisor to select courses suitable for a program relevant to personal goals. Five possible areas of concentration are: quantitative economic analysis; economic history and comparative systems; theory of market pricing; public sector economics; and industrial relations.

The undergraduate major in economics has three objectives: first, to prepare economic analysts for positions in business, industry, agriculture, and government; second, to prepare students for research or management trainee positions in fields such as public administration, labor unions, industry, finance, and insurance; third, to furnish undergraduate preparation for students who may wish to pursue graduate work in the field of economics.

The department also offers an economics option for the social sciences major. For a further description of this option refer to that department.

The economics department offers minors for students seeking elementary and secondary teaching credentials.

CORE COURSES FOR MAJOR

(Required of all students)

Principles of Economics	EC	201	(4)
Principles of Economics	EC	202	(4)
Money & Banking	EC	308	(4)
Price & Income Analysis	EC	311	(4)
Price & Income Analysis	EC	312	(4)
Price & Income Analysis	EC	313	(4)
Economic Statistics	EC	321	(4)
Economic Statistics	EC	322	(4)
Senior Seminar	EC	462	(4)
Senior Seminar	EC	463	(4)
Adv Econ and/or Math Electives			(28)

SUPPORT & ELECTIVE COURSES

(Required of all students)

Principles of Accounting	ACC	124*	(4)
Principles of Accounting	ACC	125*	(4)
American Civilization	AMC	201*	(4)
American Civilization	AMC	202*	(4)
Report Writing	COM	216*	(3)

Freshman Composition	ENG	104*	(4)
Freshman Composition	ENG	105*	(4)
Physical Education (3 100-level courses)*			(3)
Public Speaking	SP	100*	(4)
Courses to complete General Education Requirements			**(34)
Free Electives			(62)

*May be used for general education requirements. Select unspecified courses from the general education list.

**Must include four courses from a minimum of two schools other than the School of Arts for fulfillment of the breadth requirement.

Course Descriptions

EC 200 Special Problems for Lower Division Students (1-2)

Individual or group investigation, research, studies, or surveys of selected problems. Total credit limited to 4 units, with a maximum of 2 units per quarter.

EC 201, 202 Principles of Economics (4) (4)

Principles of choice among alternative allocations and utilizations of resources and distributions of output. Determinants of income, output, employment, and prices. Application of economic analysis to domestic and international problems. To be taken in sequence. 4 lecture-discussions.

EC 205 Consumer Economics (4)

Principles of personal finance. The basic economics of personal money management, including budgeting, borrowing, spending, saving, unvesting, and insuring. 4 lecture-discussions. Prerequisite: EC 202.

EC 213 Economic Problems (4)

Specific current economic problems selected with reference to the needs of the students. 4 seminar-discussions. Prerequisite: EC 202.

EC 299 Special Topics for Lower Division Students (1-4)

Group study of a selected topic, the title to be specified in advance. Total credit limited to 8 units, with a maximum of 4 units per quarter. Prerequisite: permission of instructor.

EC 301 Public Finance (4)

Principles of government financing and its various economic and social effects; collecting, spending, and administration of public funds. 4 lecture-discussions. Prerequisite: EC 202.

EC 308 Money and Banking (4)

Relation of money and banking to the general economy; interrelationships between money and banking, production and distribution. 4 lecture-discussions. Prerequisite: EC 202.

EC 311, 312, 313 Price and Income Analysis (4) (4) (4)

Role of prices in final output markets; principles of production; types of competition under various types of market conditions. Distribution theory and response of wages, rent, profits, and interest under alternative market conditions. National income determination; economic growth and stability. 4 lecture, problem-solving sessions. To be taken in sequence. Prerequisites: EC 201, and 202.

EC 321, 322 Economic Statistics (4) (4)

Statistical methods and techniques in economic analysis. Analysis of time series, index number construction, regression and correlation analysis, probability and other statistical distributions; related economic topics. 4 problem-solving sessions. Prerequisite: MAT 107 or an equivalent MAT course.

EC 400 Special Problems for Upper Division Students (1-2)

Individual or group investigation, research, studies, or surveys of selected problems. Total credit limited to 4 units, with a maximum of 2 units per quarter.

EC 402 Economic Development (4)

Preconditions and processes of economic growth and development of nations. Analysis in terms of economic theory. History and experience of societies relevant to problems of today's developing nations. 4 lecture-discussions. Prerequisite: EC 202.

EC 403 Comparative Economic Systems (4)

Examination of alternative economic organizations, ranging from free enterprise to fully planned economies. 4 lecture-discussions. Prerequisite: EC 202.

EC 404 International Trade Theory and Policy (4)

Topics in the theory of international trade and values. Theory of tariffs and quotas. 4 lecture-discussions. Prerequisite: EC 202.

EC 405 International Finance (4)

Topics in international liquidity and finance theory. Problems of the international monetary system. 4 lecture-discussions. Prerequisite: EC 404.

EC 407 Development of Economic Doctrine (4)

The development of economic ideas and doctrines from the early Greek writers through the classical and neoclassical schools to the present. 4 lecture-discussions. Prerequisite: EC 202.

EC 408 Economic History of Europe (4)

Economic development of Europe from the fall of the Roman Empire to the formation of the Common Market; growth of economic institutions antecedent to those of modern Europe. Bearing of European economic development upon that of the United States. 4 lecture-discussions. Prerequisite: EC 202.

EC 409 Economic History of the U.S. (4)

Analysis of growth and economic well-being of the U.S. economy in historical perspective. Interplay of economic forces and historical conditions. 4 lecture-discussions. Prerequisite: EC 202.

EC 413 Managerial Economics (4)

Use of quantitative economic analysis in formulating business policies; analysis of the social impact of management's role in the economy; integrated application of economic and operations analysis to practical managerial problems. 4 lecture-discussions. Prerequisite: EC 202.

EC 414 Labor Economics (4)

The structure of labor markets. The influence of unionism on income distribution. Effects of collective bargaining on economic welfare and efficiency. Government policy's role in the labor market. Job and union security under changing economic institutions. 4 lecture-discussions. Prerequisite: EC 202.

EC 415 Labor Problems and Practices (4)

Nature, instrumentalities, and structure of collective bargaining emphasizing three critical areas: labor management laws, grievance and arbitration procedures, and trends in collective bargaining. 4 seminar-discussions. Prerequisite: EC 414.

EC 416 Manpower Economics (4)

Analysis of wage-price stabilization programs. Integration of traditional labor approach with macro-model constraints. Econo Economics of health and education in human resources approaches. Manpower planning techniques and limitations. Labor mobility and Phillips curve analysis. 4 lecture-discussions. Prerequisites: EC 201, 202.

EC 419 Land Economics (4)

Economic principles underlying utilization and conservation of land resources. Economics of urban land uses, forces of demand for urban land and factors affecting economic supply of urban land, factors affecting the locations of industries and other enterprises; patterns of urban and regional growth. Problems of rural and urban land use and development. More efficient uses of land and land-use planning. 4 lecture-discussions. Prerequisite: EC 202.

EC 421 Econometrics (4)

Introduction to quantitative model building, estimation, verification, and prediction of economic variables. 4 lectures, problem-solving sessions. Prerequisites: EC 321, 322, or equivalent.

EC 422 Economic Programming (4)

Optimization analysis and programming techniques, including various methods of programming: linear, integer, quadratic, and dynamic, 4 problem-solving sessions. Prerequisites: EC 202 and permission of instructor.

EC 423 Economic Conditions Analysis (4)

Techniques and procedures of statistical analysis of macroeconomic and microeconomic conditions. 4 problem-solving sessions. Prerequisite: EC 421.

EC 426 Economic Planning (4)

Theory and practice of economic planning ranging from national and regional economics to individual sectors, projects or enterprises; from the economies of market systems to comprehensive, all encompassing plans. 4 lecture-discussions.

EC 430 State and Local Government Finance (4)

Theory and practice of state and local government finance. Examination of the impact of state and local government finance upon various sectors of state and local economy, and problems of fiscal federalism. 4 lecture-discussions. Prerequisite: EC 301.

EC 431 Regional Economic Analysis (4)

Theories and techniques of regional analysis: population estimation, income and social accounting, location theories, economic-base theory, input-output analysis, industrial complex analysis, inter-regional linear programming. 4 lecture-discussions. Prerequisite: EC 202.

EC 432 Urban Economics (4)

Analysis of the level, distribution, and stability of local income; analysis of economic development of Southern California cities facing physical distribution and urban transportation problems; central business districts and urban renewal. 4 lecture-discussions. Prerequisite: EC 202.

EC 433 Economics of Transportation (4)

The economic characteristics of transport; the functions of the differing transportation agencies; transportation pricing; problems of state and federal regulation; coordination of facilities; current transport problems. 4 lecture-discussions. Prerequisite: EC 202.

EC 434 Economics of Public Utilities (4)

Economics of public service corporations. Problems of rate determination and other regulations. State and national problems arising from the development of public utilities. 4 lecture-discussions. Prerequisite: EC 202.

EC 435 Environmental and Resource Economics (4)

Price system and efficiency in the use and conservation of natural resources; private and social costs; concept of waste; cost allocation among uses; analysis of policies for petroleum, coal, timber, fisheries, natural gas, and minerals. 4 lecture-discussions. Prerequisite: EC 202.

EC 436 Economics of Population (4)

The dynamics of population change and trends in population growth, its composition and distribution. Interaction of population change with levels of business activity and rates of economic development. 4 lecture-discussions. Prerequisite: EC 202.

EC 437 Economics of Social Welfare (4)

Economic security and social welfare. Sources, changes in, and attempts at alleviation of economic insecurity. Economics of Social Security, public assistance, and poverty programs. 4 lecture-discussions. Prerequisite: EC 202.

EC 440 Business and Government (4)

Economic significance of controls placed by government upon business; divergent issues arising from present relations of government to business. 4 lecture-discussions. Prerequisite: EC 202.

EC 441 American Industry (4)

Examination of number and size distribution of sellers in selected American industries. Conduct and performance of firms in the context of the industry structure. Examination of actual and optimal government policy in each industry. 4 lecture-discussions. Prerequisite: EC 202.

EC 450 Economics of Capital Markets (4)

The economic foundations of money and capital market transactions. Institutional and economic factors influencing the prices, uses, and sources of the flow of funds in equity and debt markets. 4 lecture-discussions. Prerequisites: EC 202, 308.

EC 462, 463 Senior Seminar (4) (4)

Intensive study of the pragmatic applications of the various techniques of economic analysis across various intra-economics subject areas. 4 seminar-discussions. Prerequisite: permission of instructor.

EC 478 Planning-Programming-Budgeting System (4)

Economic analysis for decision-making in resource allocation in the absence of the market mechanism. 4 lecture-discussions. Prerequisite: EC 312.

EC 497 Economics of Minority Groups (4)

Economic analysis of the problems of minorities in the urban communities. Distribution and stability of minority income. Economic effects of discrimination. Federal, state, and local programs. Alternative solutions to present problems. 4 lecture-discussions. Prerequisite: EC 202.

EC 499 Special Topics for Upper Division Students (1-4)

Group study of a selected topic, the title to be specified in advance. Total credit limited to 8 units, with a maximum of 4 units per quarter. Prerequisite: permission of instructor.

Graduate courses are listed in the graduate section of the catalog. See p. 379.

ENGLISH AND MODERN LANGUAGES

Robert E. Morsberger, *Chairman*

Virginia H. Adair
Samuel I. Bellman
Leo W. Berg
S. Ralph Bobb
John R. Butterworth
Alexander H. Chorney
Stanley J. Cook
Thomas J. Elliott
Joseph R. Farrell
Milton L. French
John F. Fulbeck
Barbara I. Gill
Ruth M. Harmer
C. Edwin Harwood
Susana Hernandez-Araico
Carol R. Holder
Theodore C. Humphrey
Carola M. Kaplan
Harold P. Levitt
William L. McAdams
Caryl McNees
Ahmed M. Metwalli
Victor N. Okada
Larry K. Robinson
Sidney Shrager
Ben Siegel
George Stavros
Joseph H. Stodder
Richard W. Suter
Halsey P. Taylor
Frank I. Torres
James M. Ware
Theodore N. Weissbuch
Stephen V. Whaley
Lillian Wilds
Rudolf Zrimc

The major in English, which leads to the bachelor of arts degree, offers intensive study in the language and literature of both Britain and the United States. It encourages the student not only to improve his verbal skills, but to develop a fuller understanding of himself and his culture. Graduates are prepared to enter a fifth-year program for a teaching credential or degree work in English, American studies, or related areas. Additional opportunities exist in law, business management, journalism, and other fields welcoming those with a liberal education.

The curriculum for the English major is patterned as follows: in the freshman year courses in the methods of reading literature and in the literature of Western antiquity; in the sophomore year a broad survey of English and American literature; in the junior year a narrower consideration of the principal genres; and in the senior year relatively intensive work in individual authors and pairs or small groups of authors.

In addition, the department lists elementary and intermediate sequences in French, German, and Spanish language and culture. Courses in English composition and literature serve the general university community. These include study in English as a second language and in the literature-language aspects of Black, Chicano, and American Indian Studies.

The humanities major and the graduate program in English are listed separately.

CORE COURSES FOR MAJOR

(Required of all students)

Methods of Literary Study	ENG	108	(4)
Western Literary Heritage	ENG	111	(4)
Survey of British Literature	ENG	207	(4)
Survey of British Literature	ENG	208	(4)
Survey of American Literature	ENG	211	(4)
Survey of American Literature	ENG	212	(4)
Adv Expository Writing	ENG	303	(4)
Novel in English to 1880	ENG	305	(4)
English Drama to 1890	ENG	307	(4)
The English Poem	ENG	309	(4)
Language and Human Behavior	ENG	313	(4)
Structure of Language	ENG	320	(4)
Grammars of English	ENG	321	(4)
Chaucer	ENG	401	(4)
Milton	ENG	402	(4)
Shakespeare	ENG	403	(4)
Shakespeare	ENG	404	(4)
Literary Criticism	ENG	405	(4)

SUPPORT & ELECTIVE COURSES

(Required of all students)

American Civilization	AMC	201*	(4)
American Civilization	AMC	202*	(4)
The Visual Arts	ART	110*	(4)
or Found of Mod Art	ART	312*	
+Freshman Composition	ENG	104*	(4)
Freshman Composition	ENG	105*	(4)
French	FR	201*	(4)
or	FR	202*	
or	FR	203*	
or German	GER	201*	
or	GER	202*	
or	GER	203*	
or Spanish	SPN	201*	
	SPN	202*	
	SPN	203*	
History of Civilization	HST	101*	(4)
or Hist of Civ	HST	102*	
or Hist of Civ	HST	103*	
History of Great Britain to 1640	HST	330	(4)
or History of Great Britain after 1640	HST	331	
Survey of Music Lit	MU	104*	(4)
Physical Education (3 100-level courses)		*	(3)
General Psychology	PSY	201*	(4)
Public Speaking	SP	100*	(4)
Courses to complete General Education requirements			**(21)
Free Electives			‡(46)

*May be used for the general education requirement. Select appropriate courses from the general education list.

†All foreign students and students with permanent resident status must take ENG 102 and/or 103 in lieu of ENG 104.

**Must include four courses from a minimum of two schools other than the School of Arts for fulfillment of the breadth requirement.

‡The total curriculum must include 60 units of upper division courses.

Course Descriptions

ENG 102 English as a Second Language (4)

English composition for foreign students. Frequent exercises in reading and composition. Drill in selected problems in structure. 4 lecture-discussions. May be substituted for ENG 104. Prerequisite: satisfactory score on placement examination.

ENG 103 English as a Second Language (4)

English composition for foreign students. Introduction to forms of exposition and logic. Technique of the term paper. Readings and compositions. Drill in selected problems in structure. 4 lecture-discussions. Prerequisite: ENG 102.

ENG 104 Freshman Composition (4)

The fundamentals of English usage. Frequent papers, chiefly expository. Readings. 4 lecture-discussions. ENG 102 or ENG 106-107 may be substituted for this course.

ENG 105 Freshman Composition (4)

Frequent expository writing with stress on organization. Technique of the term paper. Readings. 4 lecture-discussions. Prerequisite: ENG 104 or equivalent.

ENG 106 Basic Communication Skills (1-4)

A communication skills program for the student who needs audio-visual and programmed clinic experiences not offered in ENG 104. Analysis of students' reading and writing, lectures, arrangement of self-tutorial programs. Variable credit. Course to be repeated, if necessary, for full credit. ENG 106 (4) and ENG 107 (4) together may be substituted for ENG 104. 5 hours discussion, 5 hours activity.

ENG 107 Basic Communication Skills (1-4)

Continuation of ENG 106 work in communication skills. Variable credit. Course to be repeated, if necessary, for full credit. ENG 106 (4) and ENG 107 (4) together may be substituted for ENG 104. 5 hours discussion, 5 hours activity. Prerequisite: 4 units of ENG 106.

ENG 108 Methods of Literary Study (4)

For English majors and other recommended students. Readings in fiction, drama, and poetry. Types of criticism. Frequent papers. 4 lectures. Prerequisite: ENG 105.

ENG 110 The Bible as Literature (4)

Old and New Testament narrative, poetry, and wisdom literature in the King James Version. 4 lectures. Prerequisite: ENG 104 or equivalent.

ENG 111 Western Literary Heritage (4)

Readings in literature of the ancient world from the beginning to the 6th century after Christ, with emphasis on the history of ideas. 4 lectures. Prerequisite: ENG 104 or equivalent.

ENG 112 Western Literary Heritage (4)

Readings in medieval and Renaissance literature from the 6th through the 16th centuries, with emphasis on the history of ideas. 4 lectures. Prerequisite: ENG 104 or equivalent.

ENG 200 Special Problems for Lower Division Students (1-2)

Individual or group investigation, research, studies, or surveys of selected problems. Total credit limited to 4 units, with a maximum of 2 units per quarter.

ENG 201 Introduction to Modern Fiction (4)

Readings chiefly in the 20th-century short story and novel, with emphasis on man's search for knowledge, self-understanding, and values. May not be elected by English majors. 4 lectures. Prerequisite: ENG 104 or equivalent.

ENG 202 Introduction to Poetry and Modern Drama (4)

Readings chiefly in poetry and 20th-century drama, with emphasis on man's search for knowledge, self-understanding, and values. May not be elected by English majors. 4 lectures. Prerequisite: ENG 104 or equivalent.

ENG 203 Introduction to Shakespeare (4)

Selected plays from the works of Shakespeare. May not be elected by English majors. 4 lectures. Prerequisite: ENG 104 or equivalent.

ENG 204 American Indian Folktales (4)

Form, content, function in oral tradition of trickster-, cosmogony and creation-, journey-, animal-, hero-, shamanic-tales; European influence. 4 lecture-discussions. Prerequisite: ENG 104 or equivalent.

ENG 205 The Black Writer in America (4)

Analysis and evaluation of the works of major Black writers in America—from Phillis Wheatley to the present—in the light of cultural, political and social history. 4 lectures. Prerequisite: ENG 104 or equivalent.

ENG 206 Contemporary Literature (4)

Writings that reflect significant social, religious, and political issues of our time. 4 lectures. Prerequisite: ENG 104 or equivalent.

ENG 207, 208 Survey of British Literature (4) (4)

British literature, as exemplifying the history of ideas, from its beginning to the present, with emphasis on the major works. 4 lectures. Prerequisite: 4 units of literature.

ENG 211, 212 Survey of American Literature (4) (4)

Philosophical, religious, political, and literary ideas in American writing from Colonial times to the present. 4 lectures. Prerequisite: 4 units of literature.

ENG 215 Ethnic Minorities in American Literature (4)

Attitudes toward, and stereotyped images of, the American Indian, Mexican-American, and Black American in works of authors outside the ethnic group. 4 lectures. Prerequisite: ENG 104 or equivalent.

ENG 222 The Literature of Science Fiction (4)

Science fiction as a literary genre. The history of science fiction. Seminal works (novels and short stories); major writers. The significance of science fiction in contemporary life and thought. 4 lecture-discussions. Prerequisite: ENG 104 or equivalent.

ENG 299 Special Topics for Lower Division Students (1-4)

Group study of a selected topic, the title to be specified in advance. Total credit limited to 8 units, with a maximum of 4 units per quarter. Prerequisite: permission of instructor.

ENG 301 Advanced Professional Writing (4)

Short, formal communications: the memo, abstract, review, explication; brief professional report and recommendation; the committee paper. 4 lecture-discussions. Prerequisite: ENG 104 or equivalent.

ENG 302 Advanced Composition—Fiction (3)

The fundamentals of short story writing. Exercises in plotting, characterization, dialog, description, narration, and point of view. Readings; analysis of stories and exercises. 3 lecture-discussions. Prerequisites: a 200-level literature course and permission of instructor.

ENG 303 Advanced Expository Writing (4)

Current practices in such forms as the essay, commentary, magazine article. 4 lecture-discussions. Prerequisite: ENG 105 or equivalent.

ENG 304 The Development of the Short Story (3)

Critical analysis; history and evaluation of form. 3 lectures. Prerequisite: a 200-level literature course.

ENG 305 The Novel in English to 1880 (4)

Development of the novel in England and America to the rise of Naturalism; Devoe to Hardy. 4 lectures. Prerequisite: a 200-level literature course.

ENG 306 The Modern Novel (4)

Realism and its variants in the 19th and 20th centuries, from French and Russian beginnings. 4 lectures. Prerequisite: a 200-level literature course.

ENG 307 The English Drama to 1890 (4)

From tropes to Shaw. 4 lectures. Prerequisite: a 200-level literature course.

ENG 308 The Modern Drama (4)

Continental, British, and American dramatic trends from the rise of Naturalism. 4 lectures. Prerequisite: a 200-level literature course.

ENG 309 The English Poem (4)

Critical analysis and evaluation of genres and single works, other than dramatic. 4 lectures. Prerequisite: a 200-level literature course.

ENG 310 Modern British and American Poetry (3)

Advanced analysis of language and forms of poetry, chiefly from the 20th century. 3 lectures. Prerequisite: a 200-level literature course.

ENG 313 Language and Human Behavior (4)

Semantics; the symbolic process of English. Relationship of words and phrasings to their referents. Effects of this relationship upon human thought, interpretation, and behavior. 3 lectures. Prerequisite: a 200-level literature course.

ENG 320 Structure of Language (4)

A study of the basic structures of language — phonology, morphology, and syntax; an examination of the methods employed by linguists in analyzing these forms and their interrelationships. 4 lectures. Prerequisite: junior standing.

ENG 321 Grammars of English (4)

The syntactic structure of modern English. Traditional, structural, and transformational grammars. 4 lectures. Prerequisite: ENG 320.

ENG 322 Development of Modern English (3)

Principles of change in language as an aid to understanding present-day pronunciation, spelling, word formation, grammar, and usage. Emphasis on word derivation and semantic change. 3 lectures. Prerequisite: ENG 320.

ENG 400 Special Problems for Upper Division Students (1-2)

Individual or group investigation, research, studies, or surveys of selected problems. Total credit limited to 4 units, with a maximum of 2 units per quarter.

ENG 401 Chaucer (4)

Chaucer's principal works, with special emphasis on *The Canterbury Tales* and *Troilus and Criseyde*. Cultural background. 4 lectures. Prerequisite: a 300-level literature course.

ENG 402 Milton and His Contemporaries (4)

Paradise Lost, Samson Agonistes. Prose and minor poems. Selected works by such contemporaries of Milton as Andrew Marvell. Historical background. 4 lectures. Prerequisite: a 300-level literature course.

ENG 403 Shakespeare (4)

Selected plays through *Hamlet*. 4 lectures. Prerequisite: a 300-level literature course.

ENG 404 Shakespeare (4)

Selected plays after *Hamlet*. 4 lectures. Prerequisite: ENG 403.

ENG 405 Literary Criticism (4)

Analysis of the works of selected major critics, with emphasis on the moderns. Application of principles in original critical essays. 4 lectures. Prerequisite: a 300-level literature course.

ENG 406 Major American Writers (3)

Intensive reading in such writers as Melville, Robinson, O'Neill, and Hemingway. 3 lectures. Prerequisite: a 300-level literature course or permission of instructor.

ENG 416 Children's Literature (4)

Readings in myth and folklore and in children's classics from the 18th century to the present. 4 lectures. Prerequisite: a 200-level literature course.

ENG 417 Adolescent Literature (4)

Selected readings in literature for the adolescent. Discussion of the nature and reading stages of the adolescent, criteria and sources for selecting adolescent literature, and effective methods of classroom presentation. 4 lectures. Prerequisite: a 200-level literature course.

ENG 461, 462 Senior Paper (2) (2)

First quarter: research on a subject in literature or language, under the direction of a faculty tutor. Second quarter: completion of a paper. Especially recommended for prospective graduate students.

ENG 463 Senior Seminar (2)

Study and discussion of specially selected topics. 2 lectures.

ENG 471 Major English Poets 1500-1660 (3)

Relatively intensive work in two or three poets such as Spenser, Sidney, Greville, Jonson, Donne, Herbert. 3 lectures. Prerequisite: a 300-level literature course.

ENG 472 Major English Poets of the Restoration and 18th Century (3)

Relatively intensive work in two or three poets such as Dryden, Pope, Blake, Burns. 3 lectures. Prerequisite: a 300-level literature course.

ENG 473 Major English and American Poets of the 19th Century (3)

Relatively intensive work in two or three poets such as Wordsworth, Keats, Tennyson, Browning, Whitman, Dickinson. 3 lectures. Prerequisite: a 300-level literature course.

ENG 476 Major Novelists of the 19th Century (3)

Relatively intensive work in two or three writers such as Balzac, Dickens, Melville, Flaubert, Dostoevsky, Tolstoy. 3 lectures. Prerequisite: 300-level literature course.

ENG 478 Major Prose Writers of the 18th Century (3)

Relatively intensive work in two or three writers such as Swift, Voltaire, Johnson, Rousseau, Burke, Lessing, Gibbon. 3 lectures. Prerequisite: a 300-level literature course.

ENG 479 Major Prose Writers of the 19th Century (3)

Relatively intensive work in two or three writers such as Newman, Emerson, Ruskin, Arnold, Henry Adams. 3 lectures. Prerequisite: a 300-level literature course.

ENG 483 Studies in 20th Century American Literature (3)

Relatively intensive work in two or three writers such as Faulkner, Fitzgerald, Bellow, Styron, Lowell, Stevens, Frost, Pound, O'Neill, Miller. 3 lectures. Prerequisite: a 300-level literature course or permission of instructor.

ENG 499 Special Topics for Upper Division Students (1-4)

Group study of a selected topic, the title to be specified in advance. Total credit limited to 8 units, with a maximum of 4 units per quarter. Prerequisite: permission of instructor.

Graduate courses are listed in the graduate section of the catalog. See p. 402.

French

FR 101 Elementary French (4)

Essentials of the spoken and written language for the beginner. Fundamentals of pronunciation, intonation and grammar. 4 lecture-discussions.

FR 102 Elementary French (4)

Extension of fundamentals of pronunciation and grammar for the continuing student. 4 lecture-discussions. Prerequisite: FR 101 or equivalent.

FR 103 Elementary French (4)

Advanced grammatical patterns and pronunciation for the continuing student. 4 lecture-discussions. Prerequisite: FR 102 or equivalent.

FR 201 Intermediate French Grammar (4)

Review of grammar. Additional elements of French structure. Readings. 4 lecture-discussions. Prerequisite: FR 103 or equivalent.

FR 202 Intermediate French Reading (4)

Reading of varied short texts; establishing a steadily increasing vocabulary. Introduction to literary texts. Recommended for prospective graduate students. 4 lecture-discussions. Prerequisite: FR 103 or equivalent.

FR 203 Intermediate French Composition and Conversation (4)

French composition, both oral and written. Frequent original presentations. 4 lecture-discussions. Prerequisite: FR 103 or equivalent.

FR 207 French Civilization (4)

Survey of French culture and social customs to the 20th century. Conducted in French and English. 4 lecture-discussions. Prerequisite: FR 103 or equivalent.

FR 208 Contemporary France (4)

Culture of 20th century France, including art, music, history, literature, social customs, and the systems of government and education. Conducted in French and English. 4 lecture-discussions. Prerequisite: French 103 or equivalent.

German

GER 101 Elementary German (4)

Essentials of the spoken and written language for the beginner. Fundamentals of pronunciation, intonation, and grammar. 4 lecture-discussions.

GER 102 Elementary German (4)

Extension of fundamentals of pronunciation and grammar for the continuing student. 4 lecture-discussions. Prerequisite: GER 101 or equivalent.

GER 103 Elementary German (4)

Advanced grammatical patterns and pronunciation for the continuing student. 4 lecture-discussions. Prerequisite: GER 102 or equivalent.

GER 104 Conversational German for Beginners (4)

Essentials of the spoken language for the beginner. Emphasis on everyday vocabulary and useful phrases for the traveler. Course includes fundamentals of reading and writing German but not of grammar. 4 lecture-discussions.

GER 201 Intermediate German Grammar (4)

Intensive review of grammar; consideration of advanced points of grammar; readings in original German. 4 lecture-discussions. Prerequisite: GER 103 or equivalent.

GER 202 Intermediate German Reading (4)

Development of reading proficiency in German; analysis and discussion of texts; some translation. Recommended for prospective graduate students. 4 lecture-discussions. Prerequisite: GER 103 or equivalent.

GER 203 Intermediate German Composition and Conversation (4)

Fundamentals of German composition; intensive practice in conversation; idiomatic German; vocabulary building. Frequent oral and written original presentations. 4 lecture-discussions. Prerequisite: GER 103 or equivalent.

GER 207 German Civilization (4)

Survey of German culture and social customs. Conducted in German and English. 4 lectures. Prerequisite: GER 103 or equivalent.

Spanish

SPN 101 Elementary Spanish (4)

Essentials of the spoken and written language for the beginner. Fundamentals of pronunciation, intonation, and grammar. 4 lecture-discussions.

SPN 102 Elementary Spanish (4)

Extension of fundamentals of pronunciation and grammar for the continuing student. 4 lecture-discussions. Prerequisite: SPN 101 or equivalent.

SPN 103 Elementary Spanish (4)

Advanced grammatical patterns and pronunciations for the continuing student. 4 lecture-discussions. Prerequisite: SPN 102 or equivalent.

SPN 201 Intermediate Spanish Grammar (4)

Intensive review of advanced points of grammar; emphasis on verbs and clauses. 4 lecture-discussions. Prerequisite: SPN 103 or equivalent.

SPN 202 Intermediate Spanish Reading (4)

Development of reading proficiency in Spanish: analysis and discussion of texts; some translation. Recommended for prospective graduate students. 4 lecture-discussions. Prerequisite: SPN 103 or equivalent.

SPN 203 Intermediate Spanish Composition and Conversation (4)

Fundamentals of Spanish composition; intensive practice in conversation; idiomatic Spanish; vocabulary building. Frequent oral and written original presentations. 4 lecture-discussions. Prerequisite: SPN 103 or equivalent.

SPN 207 Spanish Civilization (4)

Culture of Spain, including art, music, history, social customs, and world outlook. Conducted in Spanish and English. 4 lectures. Prerequisite: SPN 103 or equivalent.

SPN 208 Latin American Civilization (4)

Culture of Latin America; pre-Columbian civilizations, colonial and early national periods. Conducted in Spanish and English. 4 lectures. Prerequisite: SPN 103 or equivalent.

SPN 209 Contemporary Latin American Civilization (4)

Culture of present-day Latin America, including art, music, history, and social customs. Relations with the United States. Conducted in Spanish and English. 4 lectures. Prerequisite: SPN 103 or equivalent.

SPN 211 Contemporary Literature of the Chicano (4)

Survey of contemporary Chicano literature focusing on the development of *vato* Spanish as a literary language through critical evaluation of current novels, essays, short stories, and poetry. 4 lectures. Prerequisite: SPN 201 or permission of instructor.

SPN 215 Hispanic and American Indian Folklore of the Southwest (3-4)

Survey of Southwest folklore; emphasis on tales, legends, *corridos*, and the evolution of modern folkloric genres. Variable credit depending on whether the student chooses to do field work. 3 lectures, optional fieldwork. Prerequisite: SPN 203 or equivalent.

SPN 304 Literature of Mexico (4)

Survey of literary movements in Mexico with detailed study of literary forms and styles, focus on novel and short story. 4 lectures. Prerequisite: SPN 203 or permission of instructor.

ETHNIC STUDIES DEPARTMENT

Charles C. Irby, *Chairman*

John Hatfield James Kamusikiri Mario Suarez

Patricia Hernandez-Ho'o

The purpose of ethnic studies is to act as an agent of change within the University and to produce a well-rounded student capable of meeting changing career requirements in the society at large. To this end, the ethnic studies department provides students with relevant instruction appropriate to the American Indian, Black, and Chicano experiences.

As the department defines its discipline and moves toward its goal of reorganization, it will introduce appropriate courses and options.

American Indian Studies

John T. Hatfield, *Acting Coordinator*

The American Indian studies component coordinates activities and courses in American Indian studies for students and faculty. The component serves Indian students by promoting their interests and concerns from an academic, social, political, and economic standpoint for the purpose of helping Indian people to live meaningfully and effectively in the modern world. It serves non-Indian students by providing counseling and courses, and sponsoring programs dealing with American Indians.

An inter-disciplinary option is offered in American Indian studies for all majors. The option provides an area focus for students whose majors and career interests may include American Indians.

American Indian Studies Option

A minimum of 32 units must be taken to complete the option:

American Indian Thought and Religion	PHL	306	(4)
American Indian Thought and Religion	PHL	307	(4)
Indians of North America	ANT	321	(4)
History of the American Indians	HST	337	(4)

Minimum of 4 units from the following:

Ethnic Relations in America	SOC	320	(4)
Culture and Personality	ANT	355	(4)
Contemporary American Scene	SSC	401	(4)
History of Minorities in American Life	HST	412	(4)

Minimum of 16 units from the following:

Contemporary issues	SSC	112	(3)
American Indian Folktales	ENG	204	(4)
Ethnic Minorities in American Literature	ENG	215	(4)
Hispanic and American Indian Folklore of the Southwest	SPN	215	(3-4)
Race Relations and the Law	PLS	207	(4)

American Indian Thought and Religion	PHL	306	(4)
American Indian Thought and Religion	PHL	307	(4)
Contemporary American Indian Thought	PHL	308	(4)
Philosophy of Justice	PHL	310	(4)
Art of Mexico and the Southwest	ART	319	(4)
Indians of California	ANT	320	(4)
Ethnic Relations in America	SOC	320	(4)
Indians of North America	ANT	321	(4)
Psychology of Identity	PSY	321	(4)
History of the American Indians	HST	337	(4)
Culture and Personality	ANT	355	(4)
Minority Community Political Dynamics	PLS	383	(4)
Urban Sociology	SOC	401	(4)
Contemporary American Scene	SSC	401	(4)
Teaching Minority Group Children	TEP	401	(4)
History of Minorities in American Life	HST	412	(4)
Economics of Minority Groups	EC	497	(4)

Black Studies

Stanley Wilson, *Coordinator*

The Black studies option coordinates the on-campus and community related activities and curricular program for students and faculty interested in Black studies. A student may select courses to meet his particular needs and interests. The curriculum is interdisciplinary in nature and may be taken by both minority and non-minority students. The option is a meaningful program for students of all majors and in particular for students who are preparing for a career in teaching or community affairs.

Black Studies Option

A minimum of 32 units must be taken to complete the option.

(a) Basic academic subjects: Minimum of 8 units from the following courses:

Culture and Personality	ANT	355	(4)
History of Minorities in American Life	HST	412	(4)
Survey of Black Thought	PHL	100	(4)
Ethnic Relations in America	SOC	320	(4)
Urban Sociology	SOC	401	(4)

(b) Minimum of 20 units from the following courses:

History of Tribal Arts	ART	410	(4)
Peoples and Culture of Africa	ANT	324	(4)
Economic Problems	EC	213	(4)
Economics of Social Welfare	EC	437	(4)
Economics of Minority Groups	EC	497	(4)
The Black Writer in America	ENG	205	(4)
Ethnic Minorities in American Literature	ENG	215	(4)
Geography of Sub-Saharan Africa	GEO	358	(4)
The Black Man in America	HST	210	(4)
The Black Man in America	HST	211	(4)
The Black Man in America	HST	336	(4)
Pre-Colonial Africa	HST	422	(4)
Colonial Africa	HST	422	(4)
African Nationalism and Decolonization	HST	423	(4)
Ethnomusicology Performance	MU	199	(2)
History of Jazz	MU	310	(3)
Philosophy of Justice	PHL	415	(4)
Race Relations and the Law	PLS	207	(4)
Sociology of Poverty	SOC	322	(4)
Sociology of Minority Communities	SOC	323	(4)
Teaching Minority Group Children	TEP	401	(4)

Chicano Studies

Patricia Hernandez Ho'o, *Coordinator*

Benjamin Hernandez

Mario Suarez

The Chicano studies component of the ethnic studies department offers specialized training and education aimed at enhancing understanding and appreciation of the historic,

socio-political and cultural life of the Chicano in the United States. The program attempts to respond to recognition within higher education of the pluralistic nature of the society and the need to develop specialists knowledgeable in the past, present and future status of the Chicano.

The Chicano studies option offers a curriculum designed to prepare students for careers in which knowledge about the Chicano is required. This curriculum attempts to draw broadly from inter-disciplinary programs. Such careers include teaching, social service, social science, behavioral science, environmental design, physical education and any other area where the ever-present contributions of Chicanos are felt.

The importance of Chicano studies is receiving greater recognition as the large concentration of the Chicano population in all of the Southwest is acknowledged. The impact of such a high concentration of Chicanos is especially felt in the university service area.

CHICANO STUDIES OPTION

A minimum of 32 units must be taken to complete the option as follows:

12 units from the following courses:

History of the Chicano in the United States	HST	212	- (4)
History of the Chicano in the United States	HST	213	- (4)
Hispanic & American Indian Folklore of the Southwest	SPN	215	(4)
Contemporary Literature of the Chicano	SPN	211	(4)
Ethnic Minorities in the United States	ENG	215	(4)

12 units from the following courses:

Chicano Thought	PHL	101	(4)
Sociology of the Barrio	SOC	308	(4)
Twentieth Century History of the Chicano	HST	435	(4)

8 units from the following courses:

The Chicano in the American Political System	PLS	322	(4)
The Chicano in the American Political System	PLS	323	(4)
Teaching Minority Group Children	TEP	401	(4)

Course Descriptions

EST 101 The University: Methods and Values (3)

Methods of education practiced in the university and their relevance to the the student, the value of education with regard to career choices, personal goals, and self-development; curricular and administrative structure of the university. 3 lecture-discussions.

EST 102 The University: Multi-Cultural Perspectives (3)

The role of the university in the local community and the nation; relevance of a university education to multi-cultural concerns and to ethnic communities and values; alternative approaches to higher education; and politics. 3 lecture-discussions.

EST 103 The University: World Perspectives (3)

History and role of the university in Western culture; higher education in other cultures; the possibility of the multi-cultural man. 3 lecture-discussions.

EST 201 Introduction to Ethnic Studies (4)

Survey of scholarship appropriate to ethnic studies; analyses of the changing social and cultural characteristics of American Indians, Blacks, and Chicanos in the society of the United States. 4 lecture-discussions.

EST 205, Multi-Cultural Identity (4)

Survey of various aspects of Chicano identity formation and the Chicano perspective; effects of the family, peer group, social class, education, and racism on identity formation. 4 lecture-discussions.

EST 211, The American Indian (4)

Indian experience in America from the Indian perspective. Indian views of U.S. history; cultural, political, and artistic achievements of Indians; the meaning and relevance of being Indian in the modern world. 4 lecture-discussions.

EST 213/SPN 215 Hispanic and American Indian Folklore of the Southwest (3-4)

Survey of Southwest folklore; emphasis on tales, legends, corridos, and the evolution of modern folkloric genres. Variable credit depending on whether the student chooses to do field work. 3 lecture-discussions.

EST 215/ENG 215 Chicano Literature (4)

A survey of Chicano literature starting with Maya and Aztec writing, through the times of Cortez and the American conquest to the present. 4 lecture-discussions.

EST 255 The Afro-American Ancestral Homeland (4)

The basic ecology, population, social organization, and survival culture of West Africa before, during, and after European colonialism. Survival patterns of institutions (society, kinship, and cultural forms). 4 lecture-discussions.

EST 304 Minority Women (4)

The exploration of issues concerning minority women through the study of causes and effects of sexism and ethnocentrism. The exploration of alternatives for human growth and development of all women and men. 4 lecture-discussions.

EST 310 MASA Tutorial (2)

One-to-one tutorial work and inter-personal growth with elementary and secondary students. Academic studies through innovative, experiential activities and social relationships. May be repeated for 6 units.

EST 315 Contemporary Asian-American Issues (4)

Examination and analysis of yellow power, "relocation" and Tagalog in the nationalistic movements of Chinese, Japanese, and Filipino communities; cultural continuity through traditional institutions and the eroding effects of educational, economic, and political institutions. 4 lecture-discussions.

EST 450 The Chicano: Contemporary Issues (4)

The impact of the Chicano movement on cultural continuity and socio-political, issues at the local and national levels. The eroding effects of educational, economic, and political institutions. Legislation affecting Chicanos in the fields of immigration, employment, health, welfare and education. 4 lecture-discussions.

EST 458 Chicano Children's Literature (4)

Survey of Chicano children's literature suitable for an educational program; techniques of selection and presentation. The development of desirable attitudes towards reading. 4 lecture-discussions.

EST 475 Ethnic Studies for Teachers (4)

The history, culture, philosophy, and current problems of Afro-Americans, American Indians, Asian-Americans, and Mexican-Americans. 4 lecture-discussions.

EST 482 American Indian Education (4)

Traditional forms of education and the effects of colonial educational practices; government schools and their philosophies; contemporary state, private, and federal educational practices and policies; self-determination and education. 4 lecture-discussions.

HISTORY

Werner H. Marti, *Chairman*

Anthony L. Brundage
William M. Evans
Frederick B. Heath
David L. Levering
Gloria R. Lothrop
Donald H. Pflueger
Ralph E. Shaffer
David R. Smith
William A. Smith
George H. C. Wong

The history curriculum provides broad, basic offerings for general education as well as the opportunity for major specialization leading to the Bachelor of Arts degree. Courses are designed to encourage students to seek out relevant relationships to contemporary social, political, and cultural issues, and to provide historical perspective on materials studied in other departments of the university.

The major provides a foundation for students seeking a standard secondary teaching credential and qualified graduates for a variety of civil service and other occupational opportunities. It also serves as pre-professional training for law and graduate work leading to college teaching.

History majors may select from two curriculum tracks. The first, printed below, reflects the judgment of the department as to what represents a well-balanced history major. The second provides the opportunity for the student, in conjunction with his adviser, to structure his curriculum in accord with his intellectual interests and vocational objectives. In addition, the department is uniquely equipped to provide a specialization in the history of Southern California.

CORE COURSES FOR MAJOR

(Required of all students)

History of Civilization	HST	101	(4)
History of Civilization	HST	102	(4)
History of Civilization	HST	103	(4)
United States History	HST	201	(4)
History Methods	HST	300	(4)
Senior Project	HST	461	(2)
Senior Project	HST	462	(2)
Undergraduate Seminar	HST	463	(2)
History (300-400 level)			(4)
†Area Studies			(12)
§American History Series			(12)
‡European History Series			(12)

SUPPORT AND ELECTIVE COURSES*

(Required of all students)

Intro to Phy Anthro	ANT	101*	(4)
and Intro to Cult Anthro	ANT	102*	(4)
or Prin of Sociology	SOC	201*	
and Prin of Sociology	SOC	202*	
Prin of Economics	EC	201*	(4)
Prin of Economics	EC	202*	(4)
Freshman Composition	ENG	104*	(4)
Freshman Composition	ENG	105*	(4)
United States History	HST	202*	(4)
Physical Education (3 100-level courses)*			(3)
American Political System	PLS	201*	(4)
General Psychology	PSY	201*	(4)
General Psychology	PSY	202*	(4)
Public Speaking	SP	100*	(4)
Courses to complete General Education Requirement			**(21)
Electives			***(52)

† Select 12 units of history area studies with the approval of adviser from HST 301, 302, 303, 304, 305, 307,312, 313, 421, 422, 423, 432, 433, 434, 450.

§Select 12 units of American history series with the approval of adviser from HST 336, 337, 340, 341, 342, 401, 402, 403, 404, 405, 406, 407, 410, 411, 412, 413, 435.

‡Select 12 units of European history series with the approval of adviser from HST 319, 320, 321, 322, 323, 324, 325, 330, 331, 332, 418, 419, 420, 430.

*May be used for the general education requirement. Select appropriate courses from general education list.

**Must include four courses from a minimum of two schools other than the School of Arts for fulfillment of the breadth requirement.

***The total curriculum must include 60 units of upper division courses.

Course Descriptions

HST 101, 102, 103 History of Civilization (4) (4) (4)

Development of civilization from earliest times to the present. Political, economic, social, intellectual, and religious contributions of the various peoples to contemporary life. 4 lecture-discussions.

HST 200 Special Problems for Lower Division Students (1-2)

Individual or group investigation, research, studies, or surveys of selected problems. Total credit limited to 4 units, with a maximum of 2 units per quarter.

HST 201, 202 United States History (4) (4)

A survey of the history of the United States from earliest exploration to the present with emphasis on the political, social, and economic trends and episodes which have molded the modern American nation. 4 lecture-discussions.

HST 210 The Black Man in America (4)

The diaspora of the Blacks to the New World and their subsequent cultural contributions. The slave trade. Slavery in North and South America and its effect upon Afro-American culture. 4 lecture-discussions.

HST 211 The Black Man in America (4)

Black history from the Civil War to World War I. Impact of the Reconstruction era upon the Black man's quest for self-identity and full participation in American life. 4 lecture-discussions.

HST 212, 213 The Chicanos in America to 1900 (4) (4)

Survey of Chicano cultural, economic, social, and political contributions to the development of the United States from the Spanish conquest to 1900. Emphasis on the Southwest and California. 4 lecture-discussions.

HST 299 Special Topics for Lower Division Students (1-4)

Group study of a selected topic, the title to be specified in advance. Total credit limited to 8 units, with a maximum of 4 units per quarter. Prerequisite: permission of instructor.

HST 300 History Methods (4)

Introduction to the methods of historical research; bibliography; textual analysis, source criticism, writing. 4 lecture-discussions.

HST 301, 302, 303 Far Eastern History (4) (4) (4)

China, Japan, and Korea from the ancient period to the 20th century. Cultural foundations of the Asian peoples; achievements in art, religion, literature, and philosophy in historical context. 4 lecture-discussions. Prerequisite: junior standing or permission of instructor.

HST 304, 305 History of Latin America (4) (4)

Latin America from the 15th century to the present. Emphasis on the economic, cultural, and historical development of the area. 4 lecture-discussions. Prerequisite: junior standing or permission of instructor.

HST 307 Latin American Problems of the 20th Century (4)

Current problems of Latin America such as land tenure and use; the power elite and their role in society; the Latin American university. Foreign interests in Latin America and their effect on economic and political development. 4 lecture-discussions. Prerequisite: junior standing or permission of instructor.

HST 312 History of South and Southeast Asia (4)

History of South and Southeast Asia to the present; political, social and cultural developments, 4 lecture-discussions. Prerequisite: junior standing or permission of instructor.

HST 313 History of Southwest Asia and North Africa (4)

From the rise of the Ottoman Empire to the present. Cultural developments of the region; political, social, and economic problems of the 20th century. 4 lecture-discussions. Prerequisite: junior standing or permission of instructor.

HST 319 History of Greece (4)

From the Bronze Age to the Hellenistic Period; political institutions, philosophy, fine arts. Greek historians in translation. 4 lecture-discussions. Prerequisite: junior standing or permission of instructor.

HST 320 History of Rome (4)

From 500 B.C. to A.D. 300. Political institutions, historiography, religion, fine arts. 4 lecture-discussions. Prerequisite: junior standing or permission of instructor.

HST 321 Medieval History (4)

Cultural, social, intellectual, political, and economic history of Western Europe from A.D. 300 to 1500. 4 lecture-discussions. Prerequisite: junior standing or permission of instructor.

HST 322 Early Modern Europe 1450 to 1713 (4)

The political, social, cultural, and economic history of Europe, especially the Renaissance and Reformation. 4 lecture-discussions. Prerequisite: junior standing or permission of instructor.

HST 323 Age of Enlightenment and Revolution (4)

European political, intellectual, social, and cultural developments from the beginning of the 18th century through Napoleon, including the Encyclopedists, Deism, the impact of the American Revolution, enlightened despotism, and 18th-century colonial developments. 4 lecture-discussions. Prerequisite: junior standing or permission of instructor.

HST 324 Europe in the 19th Century (4)

European political, social, cultural, and economic developments from Waterloo to the beginning of World War I. Emphasis on the Age of Metternich, conservatism, liberalism, nationalism, and materialism. 4 lecture-discussions. Prerequisite: Junior standing or permission of instructor.

HST 325 Europe in the 20th Century (4)

The political, economic, and social forces which have influenced the great European powers in the 20th century. The development of 20th-century ideologies. 4 lecture-discussions. Prerequisite: junior standing or permission of instructor.

HST 330 History of Great Britain to 1640 (4)

History of Britain and the British Empire from the Roman occupation to 1640. Social, economic, and constitutional development. Comparisons with the experience of other nations and peoples. 4 lecture-discussions. Prerequisite: junior standing or permission of instructor.

HST 331 History of Great Britain after 1640 (4)

Political, social, economic, and cultural history of modern Britain (1640 to present). Emphasis on social and political movements related to British democracy and the imperial tradition. 4 lecture-discussions. Prerequisite: junior standing or permission of instructor.

HST 332 Great Britain in the Industrial Revolution (4)

Transformation of the economy, social structure, political and intellectual life, 1783-1914. Effects of industrialization and urbanization; development of democracy, parties, and centralized bureaucracy; social and educational reforms; emergence of socialism and imperialism. 4 lecture-discussions. Prerequisite: junior standing or permission of instructor.

HST 336 The Black Man in America (4)

From World War I to the present. The Pan-African movement and its influence upon American Black nationalist movements, civil rights, and other current Black movements. 4 lecture-discussions. Prerequisite: junior standing or permission of instructor.

HST 337 History of the American Indians (4)

Culture of the native Americans; political and social organization; contacts with Europeans; wars of attrition against them; their contribution to American culture; their present conditions. 4 lecture-discussions.

HST 340 Diplomatic History of the United States (4)

Development, policies, methods, traditions, and organizational structure involved in United States foreign relations from independence to the present era. Relationship of foreign policy to American domestic problems. Role of public opinion. 4 lecture-discussions. Prerequisite: junior standing or permission of instructor.

HST 341 History of the American West (4)

Impact of frontier conditions upon the social, economic, political, and intellectual life of the United States. Place of the West in the arena of international politics. 4 lecture-discussions. Prerequisite: junior standing or permission of instructor.

HST 342 History of California (4)

From Spanish beginnings to the present; relationship of major state historical movements to the world and national scenes; cultural and intellectual developments; political, social, and economic trends. 4 lecture-discussions. Prerequisite: junior standing or permission of instructor.

HST 343 Regional History of Southern California (4)

History of Southern California as a distinctive geographical, economic, cultural, social, and political entity. Interrelation of the region with the state, nation, and world. 4 lecture-discussions. Prerequisite: HST 342 or permission of instructor.

HST 344 Local History of Southern California (4)

Roots of cities, their populations, institutions, and relationship to the overall development of the region. Impact of industrialism and urbanism on the growth and character of cities. 4 lecture-discussions. Prerequisite: HST 342 or permission of instructor.

HST 345 Social History of Southern California (4)

Roots and growth of cultism and radicalism in the political, social, and cultural life of Southern California; individuals and movements which reflect these phenomena. 4 lecture-discussions. Prerequisite: HST 342 or permission of instructor.

HST 400 Special Problems for Upper Division Students (1-2)

Individual or group investigation, research, studies, or surveys of selected problems. Total credit limited to 4 units, with a maximum of 2 units per quarter.

HST 401 American Colonial History (4)

Political, social and economic study of the Anglo-Colonial world. Qualities of colonial life as contributory reasons for revolt. Colonial cultural debt to the Old World. 4 lecture-discussions. Prerequisite: junior standing or permission of instructor.

HST 402 The Federal Union (4)

The American Revolution and Constitutional Era, the evolution of the nation to the age of Jackson, with attention to political, economic and social problems. 4 lecture-discussions. Prerequisite: HST 202 or permission of instructor.

HST 403 The Age of Jackson (4)

Rise of the common man, development of the political party system, increasing political influence of the West and Manifest Destiny from 1820 to 1850. 4 lecture-discussions. Prerequisite: junior standing or permission of instructor.

HST 404 Civil War and Reconstruction (4)

Internal development and expansion of the American people and the rise of sectional conflict, culminating in the Civil War and Reconstruction. 4 lecture-discussions. Prerequisite: HST 202 or permission of instructor.

HST 405 The Gilded Age and the Progressive Era 1865-1914 (4)

Major cultural changes wrought by industrialization in the United States and the resultant changes in American attitudes needed to accommodate the business civilization. 4 lecture-discussions. Prerequisite: HST 202 or AMC 202.

HST 406 The United States 1914-1945 (4)

Political, social, economic, and diplomatic history of the United States from the origin of World War I to the conclusion of World War II; domestic problems of the twenties and thirties, and international developments between the two wars. 4 lecture-discussions. Prerequisite: HST 202 or AMC 202.

HST 407 United States since World War II (4)

National developments in the critical years since 1945. Major social, intellectual, and economic forces as they shape the contemporary American scene. 4 lecture-discussions. Prerequisite: junior standing or permission of instructor.

HST 410 Rise of the City in American Life (4)

Major facets of American life emerging in the city; urban thought from the 17th century to the present. 4 lecture-discussions. Prerequisite: junior standing or permission of instructor.

HST 411 Social Reform Movements in U.S. 1800-1860 (4)

American social reform movements. Penal reform, land reform, women's rights, and peace movements; economic reforms in the 19th century. 4 lecture-discussions. Prerequisite: junior standing or permission of instructor.

HST 412 History of Minorities in American Life (4)

Ethnic and racial minorities; their role and contributions to the political, economic, social, and cultural life. Problems of assimilation and the myth of the "melting pot." 4 lecture-discussions. Prerequisite: HST 202 or AMC 202.

HST 413 History of the South (4)

Unique forces which have shaped Northern culture; environmental factors which have affected Southern citizens, white and black. 4 lecture-discussions. Prerequisite: junior standing or permission of instructor.

HST 418 History of Eastern Europe (4)

Eastern Europe exclusive of the Soviet Union with an emphasis on the unique and often crucial role played in European history by states or areas such as Poland, Hungary, Yugoslavia, and Rumania. 4 lecture-discussions. Prerequisite: junior standing or permission of instructor.

HST 419 Russia from the Ancient Period to 1917 (4)

The political, social, and cultural history of Russia from the pre-Christian era until the Bolshevik Revolution. Emphasis on the rise of Muscovy and the interplay between various ethnic groups. 4 lecture-discussions. Prerequisite: junior standing or permission of instructor.

HST 420 The Soviet Union since 1917 (4)

Bolshevik Revolution, Soviet constitution, development of political institutions, major economic and diplomatic developments since 1917. 4 lecture-discussions. Prerequisite: junior standing or permission of instructor.

HST 421 Pre-Colonial Africa (4)

Indigenous cultural, political, and economic institutions of African societies. Rise and fall of various ancient African kingdoms; their characteristic cultures, contributions, and problems, from the earliest times to the advent of the colonial episode. 4 lecture-discussions. Prerequisite: junior standing or permission of instructor.

HST 422 Colonial Africa (4)

From earliest contact between Africans and Europeans to dawn of African nationalism. Atlantic slave trade; diaspora to New World; 1884-1885 Berlin Conference and partition of Africa; European colonial policies and African response. 4 lecture-discussions. Prerequisite: junior standing or permission of instructor.

HST 423 African Nationalism and Decolonization (4)

Period of trusteeship; emergence of contemporary African nationalist movements; decline of European colonization; African independence; social, political, and economic aspects of contemporary African nations. 4 lecture-discussions. Prerequisite: junior standing or permission of instructor.

HST 430 History of Spain and Portugal (4)

Survey of Iberian development from the collapse of the Moorish Kingdoms to the present. Emphasis on Spain and Portugal in European evolution. Rise and fall of Iberian overseas empires, dynastic problems, socio-political developments, cultural movements. 4 lecture-discussions. Prerequisite: junior standing or permission of instructor.

HST 432 History of Brazil (4)

Survey of political, social, and economic growth. Focus on the demographic and social movements that created modern Brazil. 4 lecture-discussions. Prerequisite: junior standing or permission of instructor.

HST 433, 434 History of Mexico (4) (4)

Origins and development of modern Mexico; its Indian and Hispanic heritage, Mexican-United States relations, and Mexico's impact on the Unitef States. 4 lecture-discussions. Prerequisite: junior standing or permission of instructor.

HST 435 The American Southwest in the 20th Century (4)

The history of the Southwest from 1900, especially the Anglo impact on the multi-cultural inhabitants of the region. Economic influences on patterns of life and political behavior; the contemporary struggle for identity of Chicanos. 4 lecture-discussions. Prerequisite: upper division standing or permission of instructor.

HST 450 History of Chinese Communism (4)

The Chinese Communist movement from 1921 to the present. Emphasis on major political, economic, social, ideological, and international developments. 4 lecture-discussions. Prerequisite: junior standing or permission of instructor.

HST 461, 462 Senior Project (2) (2)

Selection and completion of a project under faculty supervision. Projects typical of problems which graduates must solve in their fields of employment. Formal report required. Prerequisite: senior standing. Required minimum of 120 hours.

HST 463 Undergraduate Seminar (2)

Study and discussion by students of recent developments in the students' major fields. 2 lectures. Prerequisite: senior standing.

HST 470 History and Historians (4)

Critical and analytical treatment of the various interpretations of history in an effort to determine their validity and relevance for the present. 4 lecture-discussions. Prerequisite: junior standing or permission of instructor.

HST 499 Special Topics for Upper Division Students (1-4)

Group study of a selected topic, the title to be specified in advance. Total credit limited to 8 units, with a maximum of 4 units per quarter. Prerequisite: permission of instructor.

HST 610 History of American Business (4)

American business from colonial beginnings to present. Economic, social and political forces influencing the structure and status of business in American life. Consequences of the Industrial Revolution and the prevailing social ideologies upon the organization and ethical values of the business community. Effect of technology, wars, industrialization, and welfare state upon business and its role in society. Lecture-discussion, 4 hours. *Dr. Heath*

HUMANITIES

The humanities major, which is housed in the Department of English and Modern Languages, is designed for the student whose main goal as an undergraduate is the acquisition of a liberal education. Enough elective freedom is provided so that he can also prepare for a career in law, medicine, business, or other fields. The student is expected to choose electives in concert with his advisors, who will help him keep abreast of specific requirements for entry into a business training program, graduate school, or professional school.

CORE COURSES FOR MAJOR

(Required of all students)

Introduction to Cultural Anthropology	ANT	102	(4)
Indians of North America	ANT	321	(4)
or Peoples & Cultures of Mesoamerica	ANT	322	
or Cultures of South America	ANT	323	
or Peoples and Cultures of Africa	ANT	324	
Western Literary Heritage	ENG	111	(4)
Western Literary Heritage	ENG	112	(4)
or Survey of British Literature	ENG	207	
Introduction to Shakespeare	ENG	203	(4)
Survey of British Literature	ENG	208	(4)
Survey of American Literature	ENG	211	(4)
Advanced Professional Writing	ENG	301	(4)
or Advanced Composition-Fiction	ENG	302	
or Advanced Expository Writing	ENG	303	
The English Poem	ENG	309	(4)
Language and Human Behavior	ENG	313	(4)
Structure of Language	ENG	320	(4)
or one sophomore level foreign language course			
Major American Writers	ENG	406	(3)
History of Ancient Philosophy	PHL	211	(4)
or History of Medieval Philosophy	PHL	212	
or History of Modern Philosophy	PHL	213	
World Religions: Oriental	PHL	304	(4)
or World Religions: The Mediterranean World	PHL	305	

SUPPORT AND ELECTIVE COURSES

(Required of all students)

American Civilization	AMC	201*	(4)
American Civilization	AMC	202*	(4)
History of Western Art	ART	212*	(4)
History of Western Art	ART	213*	(4)
Freshman Composition	ENG	104*	(4)
Freshman Composition	ENG	105*	(4)
Role of Engineering in Society	EGR	201	(3)
History of Civilization	HST	101*	(4)
History of Civilization	HST	102*	(4)
History of Civilization	HST	103*	(4)
Survey of Music Literature	MU	104*	(4)
Physical Education (3 100-level courses)*			(3)
Courses to complete general education requirements			**(20)
Free Electives			†(65)

Note: A minimum of 30 units of unrestricted elective credit must represent work in upper division courses. In addition, the elective courses chosen should be in areas relevant to the student's career goal.

*May be used for general education requirement. Select appropriate courses from general education list.

**Must include four courses from a minimum of two schools other than the School of Arts for fulfillment of the breadth requirement.

†The total curriculum must include 60 units of upper division courses.

LIBERAL STUDIES

Harold F. Simmons, *Chairman*

The liberal studies degree program has as its main objective the qualification of elementary teachers of multiple subjects. The major meets the requirements of the new Teacher Preparation and Licensing Law of 1970 (Ryan Act) which requires that teachers in self-contained classrooms must have a diverse academic background in order to teach their subjects effectively. This interdisciplinary program includes four areas of liberal studies: English and speech; mathematics, physical and life sciences; social science; and humanities and fine arts. This central core is supported by a broad background of basic and general studies.

The bachelor of arts with a major in liberal studies provides a full liberal education without the conventional specialization in particular subjects.

CORE COURSES FOR MAJOR

(Required of all students)

ENGLISH AND SPEECH			
300 level literature			(3)
Adv. Prof. Writing	ENG	301	(4)
Struc. Language	ENG	320	(4)
Grammars of English	ENG	321	(4)
Children's Literature	ENG	416	(4)
MATH OR SCIENCE			
Physical Science	SCI	212	(4)
Approved upper division elective in math or science			(3)
Approved elective in math or science			(4)
SOCIAL SCIENCE			
Geography of Calif.	GEO	351	(4)
History of Calif.	HST	342	(4)
Minority Communities	SOC	323	(4)
or Contemporary American Scene	SSC	401	
Urban Soc.	SOC	401	(4)
or Soc. Anthro.	ANT	358	
HUMANITIES AND FINE ARTS			
Art Skills			(3)
Creative Dramatics	DR	471	(4)
Approved electives in foreign languages, art or music			(10)
School & Community Health	PE	306	(2)

SUPPORT AND ELECTIVE COURSES

(Required of all students)

ENGLISH AND SPEECH			
Freshman Comp.	ENG	104*	(4)
Freshman Comp.	ENG	105*	(4)
200 level literature			(4)
Public Speaking	SP	100*	(4)
or Oral Interp.	SP	203	
MATH AND SCIENCE			
Basic Biology	BIO	115*	(5)
Concepts Elementary Math	MAT	205	(4)
Concepts Elementary Math	MAT	206	(3)
Concepts Elementary Math	MAT	207	(3)
Physical Science	SCI	210*	(4)
Physical Science	SCI	211	(4)
Special Problems	PHY	400	(1)
SOCIAL SCIENCE			
American Civ.	AMC	201*	(4)
American Civ.	AMC	202*	(4)
Cult. Anthro.	ANT	102*	(4)
or Princ of Soc	SOC	201	
Gen Psych	PSY	201*	(4)
HUMANITIES AND FINE ARTS			
History of Civilization	HST	101*	(4)
History of Civilization	HST	102*	(4)
History of Civilization	HST	103*	(4)
Music Fundamentals	MU	100*	(4)
Introduction to Philosophy	PHL	201*	(3)
OTHER REQUIREMENTS			
100-level P.E.		*	(3)
or Devel Move. for Children	PE	328	
Breadth Requirement			†(2)

ELECTIVES

Upper division electives	(16)
Electives	(26)

*General education requirement.

†Select one course from any school other than arts or sciences.

MUSIC

Philip R. Browne, *Chairman*

William G. Carter
Charles A. Coulter
John DeFoor
Stanley Gibb
Eugene Gratovich
Charles E. Lindsley
James E. Mooney
Kathreen R. Prout
Robert Simon
Lowell K. Weeks

The major in music is designed to provide the academic foundation and the aesthetic understanding necessary for students planning professional careers in music or instruction at various levels in educational institutions. The program leads to a bachelor of arts degree.

The program emphasizes practical experience, requiring applied music in the student's area of emphasis, and performance in ensemble organizations. In addition, the student may select an emphasis in one of the following areas: instrumental, vocal, composition, jazz, or ethnomusicology. Prospective music majors must have theory proficiency equivalent to MU 100. All music majors must take MU 105, Concert Attendance, each quarter in residence.

Courses are also offered for the general university student in a wide variety of instrumental, vocal, and theoretical subjects. Performance groups are open to all university students.

CORE COURSES FOR MAJOR

(Required of all students)

Applied Music (MU 170 series)			(12)
Structure of Music	MU	201	(4)
Structure of Music	MU	202	(4)
Structure of Music	MU	203	(4)
String Fundamentals	MU	231	(1)
Brass Fundamentals	MU	232	(1)
Woodwind Fundamentals	MU	233	(1)
Percussion Fundamentals	MU	234	(1)
Voice Fundamentals	MU	237	(1)
Structure of Music	MU	301	(4)
Structure of Music	MU	302	(4)
Structure of Music	MU	303	(4)
Arranging and Scoring	MU	306	(4)
Instrumental Conducting and Literature	MU	307	(4)
or Choral Conducting and Literature	MU	308	
Applied Music (MU 370 series)			(6)
Renaissance and Baroque	MU	404	(4)
Classic and Romantic	MU	405	(4)
20th Century Music	MU	406	(4)
Senior Recital	MU	462	(4)
The student will select 12 units from major performance courses (in consultation with advisor)			(12)

SUPPORT AND ELECTIVE COURSES

(Required of all students)

American Civilization	AMC	201*	(4)
American Civilization	AMC	202*	(4)
Freshman Composition	ENG	104*	(4)
Survey of Music	MU	104*	(4)
Class Piano	MU	111	(1)
	MU	112	(1)
	MU	113	(1)
	MU	211	(1)
	MU	212	(1)
	MU	213	(1)
World Music Cultures	MU	215	(4)
History of Jazz	MU	310*	(3)
Physical Education (3 100-level courses)			*(3)
Courses to complete general education requirement			(32)
Free Electives			†(39)

*May be used for the general education requirement. Select appropriate courses from general education list.

**Must include four courses from a minimum of two schools other than the School of Arts for fulfillment of the breadth requirement.

†The total curriculum must include 60 units of upper division courses.

Course Descriptions

MU 100 Music Fundamentals (4)

Introduction to music theory for the general university student. Notation, rhythm, melody, scales, keyboard work. No previous experience required. 4 lectures.

MU 104 Survey of Music (4)

Introduction to the great composers in Western civilization and their music. Basic forms, styles, and aesthetics of music. Records, films. 4 lectures. No previous experience required.

MU 105 Concert Attendance (1)

Attendance and reporting of all music department concerts, music hours, recitals and musicals. Required of all music majors each quarter in residence. Open to the general university student. May be repeated for a total of 12 units.

MU 111, 112, 113 Class Piano (1) (1) (1)

Beginning class piano instruction. Development of ability to play chords in all keys and to harmonize melodies using these chords. Transposition of melodies. Technical studies. Prerequisite: MU 100 or equivalent. 2 hours activity.

MU 141, 341 Jazz Band (1) (1)

Study of jazz, blues, rock, and related styles of music—traditional, contemporary, and avant-garde. Leadership and/or solo abilities required for advanced credit. 3 hours laboratory. Total credit limited to 12 units. Prerequisite: permission of instructor.

MU 142 Jazz Improvisation (1)

Traditional, contemporary, and avant-garde techniques of improvisation. Chords, key, scales, melodic and rhythmic application, stylistic devices and procedures necessary to the development of spontaneous and creative soloistic invention in the jazz idiom. 2 hours activity. Prerequisites: MU 100, 141, or equivalent.

MU 150 Varsity Band (1)

Performance designed primarily for rallies, sports events, and university activities. Previous experience and permission of instructor required. 2 hours activity. Total credit limited to 8 units.

MU 151, 351 Marching Band (1) (1)

Marching and playing for athletic events and parades. Previous experience required. Demonstrated instrumental proficiency and leadership qualities required for advanced credit. 3 hours laboratory. Total credit limited to 8 units.

MU 152, 352 Concert Band (1) (1)

Training and experience in wind band repertoire, traditional and contemporary. Previous band experience and permission of instructor required. Demonstrated instrumental proficiency and leadership qualities required for advanced credit. 3 hours laboratory. Total credit limited to 12 units.

MU 153, 353 Symphony Orchestra (1) (1)

Training and experience in the performance of music from all periods. Previous orchestral experience required. Open to all string players; wind players by permission of instructor only. Demonstrated leadership and solo ability required for advanced credit. 3 hours laboratory. Total credit limited to 12 units.

MU 161, 361 Concert Choir (1) (1)

Rehearsal and performance of choral literature for mixed voices, from all musical periods. Membership by audition only. Demonstrated vocal proficiency and leadership qualities required for advanced credit. 3 hours laboratory. Total credit limited to 12 units.

MU 170, 370 Applied Music (2) (2)

A series of specialized individual instruction for music majors in their primary performing media as listed below. 10 one-hour lessons per quarter plus 1 hour seminar per week for 2 units of credit. Proficiency jury required before entering upper division. Must be repeated by majors for a total of 18 units.

171, 371 Applied Strings

172, 372 Applied Brass

173, 373 Applied Woodwinds

174, 374 Applied Percussion

175, 375 Applied Piano

176, 376 Applied Guitar

177, 377 Applied Voice

178, 378 Applied Organ

MU 199 Ethnomusicology Performance (2)

Rehearsal and performance of small vocal or instrumental ensembles of music from various world cultures. 4 hours activity. Prerequisite: permission of instructor. May be repeated for a total of 12 units.

MU 200 Special Problems for Lower Division Students (1-2)

Individual or group investigation, research, studies, or surveys of selected problems. Total credit limited to 4 units, with a maximum of 2 units per quarter.

MU 201 Structure of Music (4)

The properties of tone; rhythm, notation, and scales. The study of acoustics and elementary musicianship. Analysis of scores and records. 4 lectures. Prerequisites: MU 100, 113, or equivalent.

MU 202 Structure of Music (4)

The characteristics of melody; motive and the phrase. Two voice counterpoint. Intermediate musicianship. Analysis of scores and records. 4 lectures. Prerequisite: MU 201.

MU 203 Structure of Music (4)

Three voice counterpoint. Basic chord structure and homophonic textures of 4 voices. Binary and ternary forms. Advanced musicianship. Analysis of scores and records. 4 lectures. Prerequisite: MU 202.

MU 211, 212, 213 Class Piano (1) (1) (1)

Second year of class piano. Continued development of music reading skills and transposing; music for recreation. 2 hours activity. Prerequisite: MU 113.

MU 215 World Music Cultures (4)

Study of music from the major culture areas of the world utilizing the methods and approach of ethnomusicology. An introduction to the music of non-Western culture and folk traditions. Films and live performances. 4 lectures.

MU 231 String Fundamentals (1)

Fundamentals of playing string instruments; emphasis on the violin, but including viola, violoncello, bass. No previous experience required. 2 hours activity. Prerequisite: MU 100 or equivalent. May be repeated for a total of 3 units.

MU 232 Brass Fundamentals (1)

Fundamentals of playing brass instruments; emphasis on the trumpet, but including trombone, baritone, French horn, and tuba. No previous experience required. 2 hours activity. Prerequisite: MU 100 or equivalent. May be repeated for a total of 3 units.

MU 233 Woodwind Fundamentals (1)

Fundamentals of playing woodwind instruments; emphasis on the clarinet, but including flute, oboe, bassoon, saxophone, and related instruments. No previous experience required. 2 hours activity. Prerequisite: MU 100 or equivalent. May be repeated for a total of 3 units.

MU 234 Percussion Fundamentals (1)

Fundamentals of playing percussion instruments. Stick and mallet technique including membrane, metal, pitched, and non-pitched instruments. No previous experience required. 2 hours activity. Prerequisite: MU 100 or equivalent.

MU 237 Voice Fundamentals (1)

Fundamental techniques of singing. Problems of tone production, breathing, diction, repertoire, and song interpretations. 2 hours activity. May be repeated for a total of 3 units. Prerequisite: MU 100 or equivalent.

MU 299 Special Topics for Lower Division Students (1-4)

Group study of a selected topic, the title to be specified in advance. Total credit limited to 8 units, with a maximum of 4 units per quarter. Prerequisite: permission of instructor.

MU 301 Structure of Music (4)

Tonal form in Baroque. Rondo form, variation form, and fugue. Diatonic seventh chords. Analysis of scores and records. 4 lectures. Prerequisite: MU 203.

MU 302 Structure of Music (4)

Classical sonata-allegro form. Ninth, eleventh, and thirteenth chords. Impressionism. Basic orchestration. Analysis of scores and records. 4 lectures. Prerequisite: MU 301.

MU 303 Structure of Music (4)

Twentieth-century techniques. Bitonality, polytonality, atonality, and serial schemes. Advanced orchestration. Analysis of scores and records. 4 lectures. Prerequisite: MU 302.

MU 306 Arranging and Scoring (4)

Techniques of arranging for instrumental and vocal groups. Orchestration for instrumental and vocal combinations. 4 lectures. Prerequisites: MU 203, 231, 232, 233, 237.

MU 307 Instrumental Conducting and Literature (4)

Techniques of conducting instrumental ensembles. Analysis and study of instrumental literature of all periods and for all combinations. Lectures, listening, student projects, and practical experience. 4 lecture-discussions. Prerequisite: MU 203.

MU 308 Choral Conducting and Literature (4)

Techniques of conducting choral ensembles. Analysis and study of choral literature of all periods and for all combinations of voices. Lectures, listening, student projects, and practical experience. 4 lecture-discussions. Prerequisite: MU 203.

MU 309 Jazz Arranging (3)

Elements of jazz styles; traditional, contemporary, and avant-garde techniques of arranging. Chords, key, scales, melodic and rhythmic application, stylistic devices, and procedures necesary to the development of creative facility in the jazz idiom. 3 lectures. Prerequisites: MU 141, 303.

MU 310 History of Jazz (3)

A survey of jazz music; the assimilation of music resources and the development and evolution of the jazz idiom in the 20th century. Emphasis on the innovators who rejuvenated the idiom and inspired others in each era. Records, demonstrations, and films. 3 lectures.

MU 311 Music of Mexico (4)

Survey of music and dance of Mexico focusing on folk instruments and music patterns, cultural crossover between Hispanic and Indian music heritages. 4 lectures.

MU 312 Music of Black Americans (4)

An ethnomusicological study of musical forms and techniques of the Black man in the Western hemisphere. Cultural values and their resultant musical manifestations. 4 lectures.

MU 313 Music of India (4)

Survey of the important North and South Indian styles, forms and genres of music, and their functions in Indian culture. Musical studies related to philosophical aspects of the culture. 4 lectures.

MU 341 Music of the Far East (4)

The musics of China, Korea, and Japan as discrete entities reflecting indigenous traditions, and comparatively, displaying common influences. Study of general cultural considerations emphasizing the place of music in each. 4 lectures.

MU 340 Instrumental Ensembles (1)

Rehearsal and performance of small instrumental ensemble groups. Open to advanced performers. 2 hours activity. May be repeated for a total of 8 units. Additional courses as follows:

342 Brass Ensemble

343 Woodwind Ensemble

344 Percussion Ensemble

345 String Ensemble

346 Musical Show Ensemble

MU 360 Vocal Ensembles (1)

Rehearsal and performance of small vocal ensemble groups. Open to advanced performers. 2 hours activity. May be repeated for a total of 8 units. Additional courses as follows:

362 Men's Chorus

363 Women's Chorus

365 Poly Pop Singers

366 Opera Workshop

MU 364 Chamber Singers (1)

Rehearsal and performance of literature for small choral ensembles of mixed voices from all musical periods. Membership by audition only. 2 hours activity. May be repeated for a total of 8 units.

MU 400 Special Problems for Upper Division Students (1-2)

Individual or group investigation, research, studies, or surveys of selected problems. Total credit limited to 4 units, with a maximum of 2 units per quarter.

MU 401 Music Literature for Children (4)

Designed to acquaint students with elementary music texts, records, and instruments used primarily in the classroom. Songs, autoharp, bells, and rhythm instruments. 4 lectures. Prerequisites: MU 100, senior or graduate status, and acceptance in TEP program.

MU 403 Composition Seminar (4)

Composition and analysis of all forms in 20th-century style. Individual projects in original composition. 4 lecture-discussions. Prerequisites: MU 303, 306. May be repeated for a total of 12 units.

MU 404 Renaissance and Baroque Music (4)

The growth of Western musical cultures from the Middle Ages through 1750. Research, listening experiences, and analysis of scores. 4 lectures. Prerequisite: MU 104 or equivalent.

MU 405 Classic and Romantic Music (4)

The growth of Western musical cultures from 1750 to 1900. Research, listening experiences, and analysis of scores. 4 lectures. Prerequisite: MU 104 or equivalent.

MU 406 Twentieth-Century Music (4)

Form, style, and idiom in Western music from 1900 to the present. Impressionism, neoclassicism, atonality, 12-tone music; music of America. Research, listening experiences, and analysis of scores. 4 lectures. Prerequisite: MU 405.

MU 412 Ethnomusicology Seminar (4)

Objective methods for analyzing and describing music of specified world cultures and American sub-cultures. 4 lecture-discussions. Prerequisite: MU 215.

MU 462 Senior Recital (4)

Selection and completion of a project under faculty supervision, culminating in a public recital of the student's emphasis area. Prerequisites: senior standing, 9 units of MU 170, 370.

MU 463 Undergraduate Seminar (2)

An open forum of senior students in which the latest developments in music education and professional music practices are discussed. 2 lectures.

MU 499 Special Topics for Upper Division Students (1-4)

Group study of a selected topic, the title to be specified in advance. Total credit limited to 8 units, with a maximum of 4 units per quarter. Prerequisite: permission of instructor.

PHILOSOPHY

Cynthia Anderson,

Charles W. Ackley Richard C. Richards Floyd H. Ross

Margaret M. Kinzel

The degree program is designed to provide the student with specific skills in concerned and logical thinking as the basis for rational and responsible living in a democratic society and the contemporary world. To this end all courses stress the importance of persistent critical inquiry and dialogue as central to the development of the philisophic attitude.

Courses in philosophy strengthen and enhance the value of other majors, and double majors are encouraged with other disciplines. Philosophy is a recognized field of preparation for those planning advanced degrees in college teaching, law, government, the ministry, counseling, social service, and business. The philosophy major is designed to engage the student in the core concerns of philosophy while allowing for a wide diversity of interests. Students therefore should early and often counsel with their advisors to determine their specific objectives among the wide range of possible programs of study. The student intending to pursue a higher degree in philosophy is strongly encouraged to acquire proficiency in a foreign language.

CORE COURSES FOR MAJOR

(Required of all students) -

Logic & Semantics	PHL	202	(4)
or Language and Human Behavior	ENG	313	
History of Ancient Philosophy	PHL	211	(4)
History of Medieval Philosophy	PHL	212	(4)
History of Modern Philosophy	PHL	213	(4)
World Religions: Oriental	PHL	304	(4)
or World Religions: Mediterranean	PHL	305	
Upper division Philosophy courses (chosen in consultation with advisor)			(34)

SUPPORT & ELECTIVE COURSES

(Required of all students)

American Civilization	AMC	201*	(4)
American Civilization	AMC	202*	(4)
Introduction to Physical Anthropology	ANT	101*	(4)
or Principles of Sociology	SOC	201*	
Freshman Composition	ENG	104*	(4)
Freshman Composition	ENG	105*	
or Public Speaking	SP	100*	(4)
Physical Education (3 100-level courses)*			(3)
Courses to complete General Education Requirements			**(33)
Free Electives			†(76)

*May be used for the general education requirement. Select appropriate courses from the general education list.

**Must include four courses from a minimum of two schools other than the School of Arts for fulfillment of the breadth requirement.

†The total curriculum must include 60 units of upper division courses.

Course Descriptions

PHL 100 Survey of Black Thought (4)

Survey of Black thought from the earliest times, including Ethiopian-Egyptian-Coptic sources, medieval Muslim Africa, and the modern Western slave and liberation periods; major figures. 4 lecture-discussions.

PHL 101 Chicano Thought (4)

Contemporary philosophical thought of the Chicano in the United States. Influence of pre-Columbian, European, and 20th-century Mexican philosophical development on the Chicano movement. 4 lecture-discussions. Prerequisites: PHL 201, 204; or permission of instructor.

PHL 200 Special Problems for Lower Division Students (1-2)

Individual or group investigation, research, studies, or surveys of selected problems. Total credit limited to 4 units, with a maximum of 2 units per quarter.

PHL 201 Introduction to Philosophy (3)

Issues traditional to Western philosophy; their relevance to contemporary man. Purposes and meaning of philosophy for intelligent living. 3 lecture-discussions.

PHL 202 Logic and Semantics (4)

Inductive and deductive processes in reasoning; the effects of semantic considerations on reasoning and communication, with examples from contemporary society. Emphasis on detection and avoidance of logical and semantic errors. 4 lecture-discussions.

PHL 204 Ethics (4)

The implications of ethics and ethical systems. The meaning of right and wrong, good and bad, obligation. Sanctions and sources of morality. Inquiry into the principles of the morality of human actions. Ethical foundations of personal and social relations. 4 lecture-discussions.

PHL 211 History of Ancient Philosophy (4)

Examination of the philosophical ideas of the Greek, Roman, and early medieval worlds, from the pre-Socratic philosophers to St. Augustine. 4 lecture-discussions.

PHL 212 History of Medieval Philosophy (4)

Examination of the philosophical ideas of the medieval and Renaissance worlds, from St. Augustine to Descartes. 4 lecture-discussions.

PHL 213 History of Modern Philosophy (4)

Great philosophical ideas and thinkers from Descartes to the 20th century; Continental and British schools. 4 lecture-discussions.

PHL 214 Contemporary Philosophy (4)

Philosophical movements of the 20th century, including modern idealism, positivism, pragmatism, existentialism, dialectical materialism, phenomenology, and ordinary language analysis. 4 lecture-discussions.

PHL 299 Special Topics for Lower Division Students (1-4)

Group study of a selected topic, the title to be specified in advance. Total credit limited to 8 units, with a maximum of 4 units per quarter. Prerequisite: permission of instructor.

PHL 301 Philosophy of the Arts (4)

Investigation of the nature of art, aesthetic experience, beauty, and the standards upon which aesthetic judgments are based. Concepts common to the various artistic disciplines; problems in specific areas in architecture, the graphic arts, music, and literature. 4 lecture-discussions.

PHL 302 Philosophy of Science (4)

Structures of modern science, the nature of its laws and methods, and the relation of science and the scientific method to values and human and moral progress. 4 lecture-discussions.

PHL 303 Philosophy of Religion (4)

Nature and grounds of religious experience, both Oriental and Occidental; such problems as man's concept of himself, his gods, his anxiety, evil; the relation of religious faith to science and human behavior. 4 lecture-discussions.

PHL 304 World Religions: Oriental (4)

Living religions of India, China, and Japan; man, movements, and ideas and their relevance to modern man, including developments in the 20th century. 4 lecture-discussions.

PHL 305 World Religions: The Mediterranean World (4)

Living religions of the Mediterranean world: Zoroastrianism, the Hebrew-Jewish religion, Christianity, Islam; men, movements, and ideas, including developments in the 20th century. 4 lecture-discussions.

PHL 306 American Indian Thought and Religion (4)

Philosophical and religious beliefs and practices of the Indians of Canada and the Eastern woodlands, including the Great Basin and the Pueblos. Their history; views of man, nature, and the universe; ceremonies and rituals; contributions to our cultural heritage. 4 lecture-discussions.

PHL 307 American Indian Thought and Religion (4)

Philosophical and religious beliefs and practices of the tribes of the Pacific coast, the Southwest, and the plains. Their history; views of man, nature, and the universe; ceremonies and rituals; contributions to our cultural heritage. 4 lecture-discussions.

PHL 308 Contemporary American Indian Thought (4)

Ideals and beliefs of modern American Indians; relationships with the dominant culture. Cultural identity and accommodation; tradition and modernization; pan-Indian movements; education; religious practices and beliefs; self-determination. 4 lecture-discussions.

PHL 311 The Military and the Social Conscience (4)

The modern military, war, and "militarism" in American society; historical roots. Ethical and moral self-examination in the light of world conscience and nuclear realities." 4-lecture-discussions.

PHL 320 American Philosophy (4)

The lively and varied growth of American thought, from the Puritans through the personalists to the pragmatists: Edwards, Peirce, James, Royce, Santayana, Dewey, Whitehead. 4 lecture-discussions.

PHL 359 Epistemology (4)

Nature, kinds, and degrees of certitude, truth, freedom. How knowledge is acquired: nature of opinion; methods of philosophy and science; kinds of evidence. From the viewpoints of skepticism, realism, existentialism, and empiricism. 4 lecture-discussions.

PHL 400 Special Problems for Upper Division Students (1-2)

Individual or group investigation, research, studies, or surveys of selected problems. Total credit limited to 4 units, with a maximum of 2 units per quarter.

PHL 401 Philosophy and Religion of Japan (4)

Traditional ways of thought in Japan. Modifications in Shinto from its beginnings through the impacts of Buddhism and Confucianism; its reemergence in the 19th century. Twentieth-century developments and the emergence of the "new religions." 4 lecture-discussions.

PHL 402 Philosophy and Religion of China (4)

Development of religious and philosophical thought in China with special reference to Confucianist, Taoist, and Buddhist schools of thought. 4 lecture-discussions.

PHL 403 Philosophy and Religion of India (4)

The diversity of the philosophy and religion of India from Rig Vedic times to the 20th century. Development of the Upanishads, Yoga systems, the great epics, the bhakti movements; emergence of Jainism, Buddhism, Sikhism, Indian Islam. 4 lecture-discussions.

PHL 405 Contemporary Ethical Problems (4)

Critical application of ethical norms to current social problems such as the threat of nuclear warfare, the civil rights revolution, drugs, crime and punishment, pornography, abortion, birth control, business practices, ecology. Empirical investigation by small groups. 4 lecture-discussions.

PHL 410 Philosophy of Freedom and Order (4)

Traditional and contemporary views of concepts of freedom and order in the making and preservation of the state; from Plato and the classicists to Marx and modern revolutionaries. 4 lecture-discussions. Prerequisites: PHL 211 or 212 or 213; PLS 431 or 432; or permission of instructor.

PHL 415 Philosophy of Justice (4)

An examination of the meanings of justice — biblical, Greco-Roman, medieval, and modern — with particular attention to the rise of law and its institutions, the role of dissent and the right of revolution in the processes of change, and the justification and limits of violence. 4 lecture-discussions. Prerequisite: PHL 410 or permission of instructor.

PHL 420 Modern Religious Trends (4)

Men and movements of this century, including Bultmann, Barth, Heidegger, Bonhoeffer, Niebuhr, Tillich, and the death-of-God theologians; ecumenism; the revolution in art, architecture, and methodology; the impact of Eastern religions and Marxism. 4 lecture-discussions.

PHL 461, 462 Senior Project (2) (2)

Selection and completion of a project under faculty supervision. Projects typical of problems which graduates must solve in their field of employment. Formal report required. Minimum 120 hours total time.

PHL 463 Undergraduate Seminar (2)

An open forum of senior students in which the latest developments, practices, and procedures are discussed. Development and presentation by students of topics in their chosen fields. 2 lectures.

PHL 469 Existentialism (4)

Basic ideas of existentialist philosophers of the 19th and 20th centuries; a comparison of theistic and atheistic existentialism; existentialist ideas of anxiety, freedom, and responsibility. 4 lecture-discussions.

PHL 470 Myth, Symbol, and Ritual (4)

Major mythic themes in both Eastern and Western cultures. Ritual practices and symbolic transformation as part of man's search for orientation. Contemporary relevance of mythic and symbolic factors. Offered in odd-numbered years. 4 lecture-discussions.

PHL 480 Philosophy of Society (4)

Morality of human acts in their social setting. The essential and existential nature of the true society. Causes and functions of society as rooted in and developed from the causes and functions of the human person. Offered in even-numbered years. 4 lecture-discussions.

PHL 499 Special Topics for Upper Division Students (1-4)

Group study of a selected topic, the title to be specified in advance. Total credit limited to 8 units, with a maximum of 4 units per quarter. Prerequisite: permission of instructor.

PHYSICAL EDUCATION

Leo H. Teghtmeyer, *Chairman*

Donald E. Warhurst, *Athletic Director*

Herb Adams
Barbara Anderson
V. Barney Anooshian
Stanley L. Bassin
Bruce Coulter
Raymond C. Daugherty
Roy C. Easley
Lynne Emery
Barbara H. Ford
Jack B. Frost
Diana M. Gallardo
Otto F. W. Gasser
Donald L. Halderman
Robert F. Hand
Thomas Hoffman
Don Hogan
Leon S. Jackson
Fred T. Jones
Jessie I. Klinger
Frank D. Lansford
Gregory H. Marks
William J. Michaelis
Mary Jo Oliver
Arthur Ridgway
John H. Scolinos
James Skipper
Mike Steinhour
Robert B. Stull
Magnus Syverson
Leo H. Teghtmeyer
Allen Van Winkle
Andrew L. Vinci
Erik Widmark

The department offers a uniquely balanced program for students majoring in physical education. A set of required core courses stressing general professional preparation followed by optional areas of specialized professional education allows students to select groups of courses aimed at meeting their individual vocational needs. This approach allows the department to prepare qualified students for secondary teaching experiences in physical education, health, dance, and such specialized fields as safety and driver education. The department also offers a curriculum leading to a Master of Science degree in Physical Education. Requirements for this program will be found in the graduate listings.

The department curriculum also provides required and elective courses in physical education and health to meet the general education needs of all students, operates an intramural sports program, and offers a widely varied program of intercollegiate athletics.

Courses for the Recreation Administration major are listed under that heading.

CORE COURSES FOR MAJOR

(Required of all students)

Introduction to P.E.	PE	201	(4)
History of P.E.	PE	210	(3-4)
or Philosophy of P.E.	PE	310	
Basketball & Field Hockey Theory (W)	PE	212	
or Weight Training, Soccer & Wrestling Theory (M)	PE	213	(3)
Tumbling, Apparatus & Volleyball Theory	PE	214	(3)
Badminton, Golf & Tennis Theory	PE	215	(3)
Kinesiology	PE	302	(4)
Physiology of Exercise	PE	303	(4)
Physical & Psychological Dev	PE	312	(4)
Adaptive P.E.	PE	406	(4)
Tests and Measurements	PE	425	(4)
Motor Learning	PE	430	(4)
Senior Seminar	PE	463	(4)
Designated PE Area Electives (PE Area List)			(23)

SUPPORT AND ELECTIVE COURSES

(Required of all students)

American Civilization	AMC	201*	(4)
American Civilization	AMC	202*	(4)
Intro Phys Anthropology	ANT	101*	(4)
or Intro Cultural Anthropology	ANT	102*	
Basic Biology	BIO	115*	(5)
Fundamentals of Chemistry	CHM	103*	(4)
Freshman Composition	ENG	104*	(4)
Freshman Composition	ENG	105*	(4)
or Report Writing	COM	216*	
Nutrition and Physical Activity	FN	205	(3)
Nutrition of the Life Cycle	FN	236	(3)
or Athletic Turfgrass Management	PA	332	
Physical Education (3 100-level courses)*	PE		(3)
Health Education	PE	207	(3)
Introduction to Philosophy	PHL	201*	(3)
Fundamentals of Physics	PHY	102*	(4)
General Psychology	PSY	201*	(4)
Principles of Sociology	SOC	201*	(4)
Public Speaking	SP	100*	(4)
Human Anatomy	ZOO	234*	(4)
Human Physiology	ZOO	235*	(4)
Humanities Electives			(4)
Free Electives			(58-59)

*May be used for General Education requirement. Select appropriate courses from the General Education list.

Course Descriptions

PE 100 Adaptive Activities (1)

Group and individual exercise designed to aid students with injury or posture, body mechanics, cardiac, pregnancy, or other medical conditions. May be taken upon recommendation of University physician. Fulfills general education requirements. 2 one-hour activities.

PE 100-179 Physical Education (1)

Activities involving physical fitness, aquatics, dance, and individual and team sports. Emphasis on lifetime sports attempting to develop an understanding of the interaction of the physical and social aspects of activity within the culture. Fulfills general education requirements. 2 one-hour activities.

101 Backpacking

102 Basketball (Men)

103 Basketball (Women)

104 Baseball

105 Bicycling

106 Bowling

107 Creative Games

108 Folk Dance

109 Mexican Dance

110 Square Dance

111 Social Dance

112 Fencing

113 Field Hockey

114 Figure Control

115 Flag Football (Coed)

116 Flag Football (Men)

117 Football Conditioning

118 Handball

119 Jogging

120 Pep Squad

121 Physical Fitness

122 Scuba Beach

123 Self-Defense

124 Ski Conditioning

125 Skin Diving

126 Soccer (Men)

127 Soccer/Speedball (Women)

128 Softball

129 Springboard Diving

130 Track and Field

131 Tumbling and Trampoline

132 Wrestling

133 Racquet Ball

134 Innertube Water Polo

135 Tai Chi Chuan

145 Beginning Archery

146 Advanced Archery

147 Beginning Badminton

148 Advanced Badminton

149 Beginning Ballet Dance

150 Advanced Ballet Dance

151 Beginning Jazz Dance

152 Advanced Jazz Dance

153 Beginning Modern Dance

154 Advanced Modern Dance

155 Beginning Tap Dance

156 Advanced Tap Dance

157 Beginning Golf

158 Advanced Golf

159 Beginning Gymnastics

160 Advanced Gymnastics

161 Beginning Swimming

162 Advanced Swimming

163 Beginning Volleyball

164 Advanced Volleyball

165 Beginning Weight Training

166 Advanced Weight Training

167 Beginning Tennis

168 Intermediate Tennis

169 Advanced Tennis

179 General Activity

PE 180 Dance Production Techniques (1)

Intermediate and advanced dance techniques. Emphasis on composition and production in such areas as dance, free exercise, and gymnastics. Fulfills general education requirements. 10 hours activity.

PE 181-199 Competitive Athletics (1)

May be taken by those students who compete on an intercollegiate athletic team. Fulfills general education requirements. 10 hours activity.

181 Intercollegiate Badminton

182 Intercollegiate Baseball

183 Intercollegiate Basketball (Women)

184 Intercollegiate Basketball (Men)

185 Intercollegiate Cross Country

186 Intercollegiate Football

187 Intercollegiate Gymnastics

188 Intercollegiate Softball

189 Intercollegiate Swimming

190 Intercollegiate Tennis

191 Intercollegiate Track & Field

192 Intercollegiate Volleyball

193 Intercollegiate Water Polo

194 Intercollegiate Wrestling

195 Intercollegiate Field Hockey

PE 200 Special Problems for Lower Division Students (1-2)

Individual or group investigation, research, studies, or surveys of selected problems. Total credit limited to 4 units, with a maximum of 2 units per quarter.

PE 201 Introduction to Physical Education (4)

Introduction and orientation to physical education as a profession. 3 lectures, 1 two-hour activity.

PE 202 Introduction to Dance (3)

A course designed to create an understanding of all dance activities through rhythmic participation, field trips, and audio-visual experiences. 1 lecture, 2 two-hour activities.

PE 203 Foundations of Physical Activity (3)

Examination of the values of physical activity for adults. Rationale for, development of, and participation in various types of adult exercise programs. Evaluation of health and fitness-related factors including obesity, muscular strength and endurance, flexibility, and circulorespiratory function. 2 lectures, 2 one-hour activities.

PE 204 Field Work for Prospective Physical Education Teachers (3)

Observation in elementary and secondary physical education programs in advance of student teaching experience. 1 lecture, 2 two-hour activities.

PE 205 First Aid (3)

A standard, advanced, and instructors' American Red Cross first aid course. Instruction and practice in the immediate and temporary care of injuries and sudden illness. 2 lectures, 1 two-hour activity.

PE 207 Health Education (3)

Investigation of concepts, theories, and principles, which may promote the development of attitudes, practices, and behaviors for optimum physical and mental well-being. 3 lectures.

PE 210 History of Physical Education (4)

Development of physical education from earliest times to the present. Concentration on political, religious, and social bases of societies and the effect of these beliefs on the physical activity of each culture. Emphasis on the United States. 4 lectures.

PE 212 Basketball and Field Hockey Theory (W) (3)

Techniques and skills of basketball and field hockey with application to professional needs. 6 hours activity. Prerequisites: PE 103, 113 with grade of A or B, or permission of instructor.

PE 213 Weight Training, Soccer, and Wrestling Theory (M) (3)

Techniques and skills of weight training, soccer, and wrestling with application to professional needs. 6 hours activity. Prerequisites: PE 126, 165 with grade of A or B, or permission of instructor.

PE 214 Tumbling, Apparatus, and Volleyball Theory (3)

Techniques and skills of tumbling, apparatus, and volley ball with application to professional needs. 6 hours activity. Prerequisites: PE 131, 163 with grade of A or B, or permission of instructor.

PE 215 Badminton, Golf and Tennis Theory (3)

Techniques and skills of badminton, golf, and tennis with application to professional needs. 6 hours activity. Prerequisites: PE 147, 157, 167 with grade of A or B, or permission of instructor.

PE 216 Archery and Softball Theory (3)

Analysis and strategy of archery and softball with application of principles. 1 lecture, 2 two-hour activities. Prerequisites: PE 128, 145 with grade of A or B, or permission of instructor.

PE 217 Soccer, Speedball, and Speed-a-Way Theory (3)

Analysis and strategy of soccer, speedball, and speed-a-way with application of principles. 1 lecture, 2 two-hour activities. Prerequisite: PE 127 with grade of A or B, or permission of instructor.

PE 221 Wrestling Theory (3)

Analysis of strategy and skill of wrestling with application of principles. 2 lectures, 1 two- hour activity.

PE 231 Skin and Scuba Diving (3)

Use of scuba apparatus and its application in the underwater environment. Leads to certification in scuba diving. 2 lectures, 1 two-hour activity. Prerequisite: permission of instructor.

PE 235 Analysis of Water Polo (M) (3)

Analysis, skill, and strategy of water polo with application of principles. 2 lectures, 1 two-hour activity.

PE 245 Advanced Swimming and Lifesaving (3)

Theory and analysis of lifesaving techniques and basic swimming skills. Includes American Red Cross water safety instructor qualifications. 1 lecture, 2 two-hour activities. Prerequisite: PE 161 or demonstration of basic proficiency.

PE 255 Regional Dances of Mexico (3)

An introduction to the cultural aspects and skills of the regional dances of Mexico, including rhythms analysis. Emphasis on the application of motor learning. 2 lectures, 1 two-hour activity.

PE 260 Dance Composition (4)

Analysis of preclassic sectional variation, developmental, free, and fugal dance forms, and rhythmic fundamentals. Development of simple dance patterns. 2 lectures, 2 two-hour activities.

PE 275 Gymnastics Theory (3)

Analysis of strategy and skill of gymnastics with application of principles. 2 lectures, 1 two-hour activity. Prerequisite: PE 159.

PE 299 Special Topics for Lower Division Students (1-4)

Group study of a selected topic, the title to be specified in advance. Total credit limited to 8 units, with a maximum of 4 units per quarter. Prerequisite: permission of instructor.

PE 300 Safety Education (3)

Principles and practices of safety as applied to home, industrial, school, community, fire, and traffic situations; accident prevention. 3 lectures.

PE 302 Kinesiology (4)

Interrelationships of the body segments and the action of the joints and muscles involved in human movement; application of the principles of movement for the analysis and evaluation of selected physical education activities. 3 lectures, 1 two-hour activity. Prerequisite: a course in human anatomy.

PE 303 Physiology of Exercise (4)

Effects of physical activity upon the circulatory, respiratory, and other physiological systems. Relationship of strength, coordination, flexibility, endurance, fatigue, conditioning, and related factors to human movement and athletic performance. 3 lectures, 1 two-hour activity. Prerequisite: ZOO 235.

PE 306 School and Community Health (2)

Methods, processes, and content in teaching health education in the schools. 2 lectures. Prerequisites: PE 207, PSY 201.

PE 307 The School and Sex Education (4)

Development and conduct of sex education in the public schools; factors in human growth and sexuality; decision making, family health problems, parenthood, and family planning. 4 lecture-discussions. Prerequisites: PE 207, ZOO 234, 235, PSY 201.

PE 308 Stimulants and Depressants (4)

Drugs in contemporary society; drug abuse; controlling factors; federal and state drug laws. 4 lecture-discussions. Prerequisites: PE 207, PSY 201.

PE 310 Philosophy of Physical Education (3)

The nature, significance, and development of sport and physical education and their place in human society as related to the major philosophical systems. 3 lectures.

PE 312 Physical and Psychological Development (4)

Theories of development with focus on changing motor abilities and behavior from childhood through adolescence to adulthood. 4 lectures. Prerequisites: SOC 201, PSY 201.

PE 313 School Health Program (4)

An analysis of the philosophy, organization, administration, and legal aspects of the school health program; teacher responsibilities. 4 lectures. Prerequisite: PE 207.

PE 320 Driver Education (3)

Recommended instructional techniques for classroom teaching of driver education. 3 lectures.

PE 321 Football Theory (M) (3)

Analysis of strategy and skill in football with application of principles. 2 lectures, 1 two-hour activity.

PE 323 Baseball Theory (M) (3)

Analysis of strategy and skill in baseball with application of principles. 2 lectures, 1 two-hour activity.

PE 325 Basketball Theory (M) (3)

Strategy and skill in basketball with application of principles. 2 lectures, 1 two-hour activity.

PE 328 Developmental Movement for Children (4)

Preparation to conduct physical education programs and activities at elementary school level. Analysis of basic skill movements used in rhythms, sports, gymnastics, and games; principles of exercise physiology, bio-mechanics, and motor development. 3 lectures, 1 two-hour activity.

PE 333 Track and Field Theory (3)

Analysis of strategy and skill in track and field with application of principles. 2 lectures, 1 two-hour activity.

PE 337 Officiating Men's Sports (4)

Analysis of principles and techniques of officiating sports offered in the school program. 2 lectures, 2 two-hour activities.

PE 338 Officiating Women's Basketball (2)

Techniques of officiating women's basketball; applying rules and practical knowledge toward obtaining a rating. 1 lecture, 2 one-hour activities. Prerequisite: permission of instructor.

PE 339 Officiating Women's Volleyball (2)

Techniques of officiating women's volleyball; applying rules and practical knowledge toward obtaining a rating. 1 lecture, 2 one-hour activities. Prerequisite: permission of instructor.

PE 341, 342, 343 Direction of Physical Education Activity (1) (1) (1)

Experience in the supervision of physical education classes under the direction of the faculty. 2 one-hour activities.

PE 347 Social, Folk, and Square Dance Theory (3)

Theory and analysis of social, folk, and square dance; their philosophy and place in our educational system. 2 lectures, 1 two-hour activity. Prerequisites: PE 108, 110, 111, 202.

PE 350 Intramural Sports (3)

Principles, policies, and procedures underlying the program of intramural sports in institutions of elementary, secondary, and higher education. 2 lectures, 1 two-hour activity.

PE 360 Water Sports Theory (3)

Theory and analysis of swimming pool activities; beginning and intermediate diving; water polo skills and strategy; orientation to pool equipment and maintenance; introduction to aquatic games and pool safety. 1 lecture, 2 two-hour activities. Prerequisite: PE 161 or permission of instructor.

PE 379 Advanced Scuba Techniques (3)

Advanced knowledge and skill in scuba diving. 2 lectures, 1 two-hour activity. Prerequisite: PE 231 or permission of instructor.

PE 400 Special Problems for Upper Division Students (1-2)

Individual or group investigation, research, studies, or surveys of selected problems. Total credit limited to 4 units, with a maximum of 2 units per quarter.

PE 406 Adaptive Physical Education (4)

An introduction to methods of adapting physical activity programs to meet the special needs of handicapped persons. 4 lectures. Prerequisite: PE 303.

PE 407 Environmental Health (4)

The nature and effect of environmental pollutants on the health, welfare, and survival of man. 4 lectures.

PE 408 Physical Education for the Learning Handicapped (4)

Analysis of physical activity programs as a tool in aiding the mentally retarded and educationally handicapped to develop in the affective, cognitive, and motor domains. Discussion of current programs and problems; emphasis on evaluative procedures. 4 lectures. Prerequisite: PE 406, or permission of instructor.

PE 411 Administration of Driver Instruction (3)

Principles and practices of administering secondary school driver instruction programs. Includes legal aspects of driver education and driver training. 3 lectures. Prerequisite: PE 320.

PE 420 Administration of Physical Education (4)

Underlying philosophy and principles of administrative theory and practice. Legal aspects on national, state, and local levels. Policies and procedures for the administration of sound programs of physical education in schools, colleges, and universities. 4 lectures.

PE 425 Tests and Measurements in Physical Education (4)

Techniques and principles in assessing the outcomes of instruction and participation in physical education. Emphasis on the selection, preparation, administration, and application of standardized evaluative instruments. 3 lectures, 1 two-hour activity. Prerequisite: upper-division standing.

PE 427 Advanced Analysis and Theory of Sports (4)

Advanced analysis of strategy and skills in basketball, football, baseball, or track and field. 3 lectures, 1 two-hour activity. Prerequisite: completion of the appropriate basic theory course, one year of intercollegiate athletic experience, or permission of instructor.

PE 428 Coaching Psychology in Athletics (4)

Analysis and evaluation of literature concerned with the training and motivation of secondary- and college-level athletic performers. Prerequisite: senior standing or previous secondary or college coaching experience. 4 lecture-discussions.

PE 430 Motor Learning and Human Performance (4)

Scientific analysis of the perceptual and sensory systems involved in physical activity. The role of kinesthesis, reaction time, and strength in neuro-motor coordination and motor learning; transfer factors affecting motor performance. 3 lectures, 1 two-hour activity. Prerequisites: PE 303, 425; or permission of instructor.

PE 432 Athletic Training (4)

Prevention, examination, and care of athletic injuries; methods of taping and bandaging; therapeutic exercises applied to athletic injuries. Diets, training room equipment, protective devices, and supplies. 3 lectures, 1 two-hour activity. Prerequisites: PE 406 and senior standing; or permission of instructor.

PE 440 The Physical Education Curriculum (4)

The construction and implementation of programs emphasizing current and future curriculum planning to facilitate student, school, and community needs. Unit planning, behavioral objectives, coeducational and interscholastic programs, curriculum models, and purpose-process curriculum framework. 4 lectures. Prerequisite: upper-division standing.

PE 446 Dance History (4)

The place of dance in various cultures throughout the world from paleolithic times through pre-classic forms to the non-literal dance of today. 4 lecture-discussions.

PE 449 Dance in Art and Education (4)

Human movement experiences through dance and its place in education and society; concepts of art exemplified in dance; elements of art criticism applied to dance production; the place of dance in education. 4 lectures.

PE 450 Role of Sport in Contemporary Society (4)

Contemporary sports and athletics as they affect man's socio-cultural development and value system; interrelationship with other aspects of American culture. 4 lectures. Prerequisites: SOC 201, PSY 202.

PE 461, 462 Senior Project (2) (2)

Research design and procedures; issues, practices and trends in the profession; other material relevant to graduating seniors. 4 lecture-discussions. Prerequisite: senior standing or permission of instructor.

PE 463 Senior Seminar (4)

Research design and procedures; issues, practices and trends in the profession; other material relevant to graduating seniors. 4 lecture-discussions. Prerequisite: senior standing or permission of instructor.

PE 499 Special Topics for Upper Division Students (1-4)

Group study of a selected topic, the title to be specified in advance. Total credit limited to 8 units, with a maximum of 4 units per quarter. Prerequisite: permission of instructor.

Graduate courses are listed in the graduate section of the catalog. See p. 414.

POLITICAL SCIENCE

John H. Esterline, *Chairman*

Mohammed A. Al-Saadi
John L. Korey
Charlotte M. Weber
Charles E. Clay
Ronald M. Peterson
Bruce E. Wilson
Shah Wali Khan
Jose M. Vadi

The department serves all segments of the university community. It provides courses which aim to develop mature and informed citizens; it gives training for those who wish to pursue a career in public service; it offers a foundation for those who plan to continue into graduate study.

The political science major and all courses offered by the department are designed to integrate the latest behavioral science knowledge about government and politics with a broad understanding of public policy and the role of government in society in both the domestic and international areas. The major prepares students for careers in which knowledge of politics and public affairs is required. Such careers include teaching, administrative and management positions in all areas of government, political staff positions, and public affairs staff positions in business and industry.

The importance of government in our society and economy grows with urbanization and industrialization. The unique location of the university in a rapidly growing population offers opportunities for close observation of, and experience with, problems of government and politics. The curriculum combines theoretical and methodological procedures with practical concern for vocational preparation and participation in the political system.

CORE COURSES FOR MAJOR

(Required of all students)

Comparative Political Systems	PLS	202	(4)
Intro to Political Science	PLS	204	(4)
Research Techniques in Political Science	PLS	205	(4)
Undergraduate Seminar	PLS	463	(6)
Political Science Courses			(40)

SUPPORT AND ELECTIVE COURSES

(Required of all students)

Freshman Composition	ENG	104*	(4)
Freshman Composition	ENG	105*	(4)
United States History	HST	201*	(4)
United States History	HST	202*	(4)
Physical Education (3 100-level courses)*			(3)
American Political System	PLS	201*	(4)
Courses to complete General Education Requirements			**(49)
Free Electives			†(56)

*May be used for general education requirements. Select appropriate courses from the general education list.

**Must include four courses from a minimum of two schools other than the School of Arts for fulfillment of the breadth requirement.

†The total curriculum must include 60 units of upper division courses.

Course Descriptions

PLS 200 Special Problems for Lower Division Students (1-2)

Individual or group investigation, research, studies, or surveys of selected problems. Total credit limited to 4 units, with a maximum of 2 units per quarter.

PLS 201 The American Political System (4)

The role and function of government in American society; nature and operation of the political process; American national government and California government. Meets state requirement for U. S. Constitution and California government. 4 lecture-discussions.

PLS 202 Comparative Political Systems (4)

Introductory comparative analysis of both Western and non-Western politics and government. Relevance of such concepts as political culture, political socialization, and political ideologies to the understanding of political systems. 4 lecture-discussions.

PLS 204 Introduction to Political Science (4)

Introduction to the discipline of political science through its principal conceptions, its approaches to analysis, and its sub-fields. Study of the changing significance of inquiry within the discipline. 4 lecture-discussions.

PLS 205 Research Techniques in Political Science (4)

Introduction to selected techniques employed in modern empirical political research. Research design; analysis of large-scale political data bases; application of statistical and data-processing techniques used frequently in the study of political behavior. 4 lecture-discussions. Prerequisites: PLS 201 or AMC 201; permission of instructor.

PLS 207 Race Relations and the Law (4)

Study of important U. S. Supreme Court cases concerning race relations. Political, social, and economic implications of judicially determined policy. 4 lecture-discussions.

PLS 299 Special Topics for Lower Division Students (1-4)

Group study of a selected topic, the title to be specified in advance. Total credit limited to 8 units, with a maximum of 4 units per quarter. Prerequisite: permission of instructor.

PLS 314 Public Administration (4)

Structures, functions, principles, and processes of American governmental administration. Attention to importance and growth of government administration and to the principles and processes of establishing, directing, and evaluating governmental programs. 4 lecture-discussions. Prerequisite: PLS 201 or AMC 201.

PLS 315 Public Policy Administration (4)

Substantive policies of government in relation to economic, social, and political programs; the examination of public policy in relation to democratic institutions and the general problem of making public policy responsive to democratic control. 4 lecture-discussions. Prerequisite: PLS 201 or AMC 201.

PLS 316 Bureaucracy and Administrative Behavior (4)

Characteristics of bureaucracies with special attention to the functioning of bureaucracy as a social and political institution. Concepts of administrative behavior such as decision-making, leadership, and control. 4 lecture-discussions. Prerequisite: PLS 201 or AMC 201.

PLS 322 The Chicano in the American Political System (4)

Socio-economic status, community organization and leadership; patterns of discrimination; farmworkers' movement; third-party efforts; political attitudes in Chicano communities; political representation, the administration of justice. 4 lecture-discussions. Prerequisite: PLS 201 or AMC 201.

PLS 323 The Chicano in the American Political System (4)

The problems of the Chicano analyzed from a comparative perspective focusing on Chicanos, Blacks, and other ethnic minorities within the American political system. 4 lecture-discussions. Prerequisite: PLS 201 or AMC 201.

PLS 324 Political Parties (4)

Nature and function of American political parties: party organization, political campaigns, and elections. 4 lecture-discussions. Prerequisite: PLS 201 or AMC 201.

PLS 325 Interest Group Politics (4)

The nature and function of organized interest groups and their impact on government activity and programs. 4 lecture-discussions. Prerequisite: PLS 201 or AMC 201.

PLS 341 European Governments and Politics (4)

Comparative analysis of the political institutions, governmental organizations, and social structures of some selected countries of Western Europe, with special reference to contemporary problems of post-industrialism. Regional economic and political organizations and their global impact. May be repeated once for credit. 4 lecture-discussions. Prerequisite: PLS 201 or AMC 201.

PLS 342 Politics of the Developing Nations (4)

Examination of the socio-economic and political problems of the developing and new nations in their quest for modernization and development. Relevance of Western and Soviet-Marxist models to the political experience of the new nations. May be repeated for credit in specialized area studies (Latin America, Middle East, Africa, Far East). 4 lecture-discussions. Prerequisite: PLS 201 or AMC 201.

PLS 343 Chinese Government and Politics (4)

The structure and operation of the contemporary Chinese political system with special reference to the policies, doctrines, and institutions of Chinese communism; political problems of contemporary China. 4 lecture-discussions. Prerequisite: PLS 201 or AMC 201.

PLS 345 Politics of the Pacific Basin (4)

Comparative analysis of political forms and processes in selected Pacific Basin nation-states with emphasis on their interrelationships and national efforts to meet challenges of modernization, communication, and security. 4 lecture-discussions. Prerequisite: PLS 201 or AMC 201.

PLS 347 Soviet Government and Politics (4)

Systematic analysis of the Soviet political system and culture; emphasis on issues of contemporary Communist ideology and its relevance to the Soviet experience. Relevance of Soviet model to Third World nations. 4 lecture-discussions. Prerequisite: PLS 201 or AMC 201.

PLS 381 American State Governments and Politics (4)

Comparison of the forms, structures, and functions of American state governments and politics. The importance of state governments in our system of government. 4 lecture-discussions. Prerequisite: PLS 201 or AMC 201.

PLS 382 Local and Metropolitan Politics (4)

Forms, structures, and functions of local and metropolitan government and politics. Modern urban problems and the role of local, state, and national governments in meeting these problems. 4 lecture-discussions. Prerequisite: PLS 201 or AMC 201.

PLS 383 Minority Community Political Dynamics (4)

Problems of ethnic minorities from the perspective of the community organizer: the sources of powerlessness, impediments to effective community organizations, power structure studies, and the building of political coalitions to advance group interests. 4 lecture-discussions. Prerequisite: PLS 201 or AMC 201.

PLS 400 Special Problems for Upper Division Students (1-2)

Individual or group investigation, research, studies, or surveys of selected problems. Total credit limited to 4 units, with a maximum of 2 units per quarter.

PLS 401 Constitutional Law (4)

Influence of U. S. Constitutional law on the structure, powers, and relationships of American government. Supreme Court interpretations of taxing, commerce, and war powers; federalism; separation of powers; checks and balances; inter-governmental relations. 4 lecture-discussions. Prerequisite: PLS 201 or AMC 201.

PLS 402 Constitutional Law (4)

Influence of U. S. Constitutional law on civil liberties, civil rights. Relation of Constitution to personal liberty; procedural rights; freedom of religion, speech, press, assembly; due process; equal protection. 4 lecture-discussions. Prerequisite: PLS 201 or AMC 201.

PLS 414 Government Budget Administration (4)

Development of the concept of government budgeting. The role of the budget in determination of policy and in administrative control of governmental operations. Public revenues, expenditures, debt, and fund accounting. 4 lecture-discussions. Prerequisites: PLS 201 or AMC 201; PLS 314.

PLS 415 Government Personnel Administration (4)

History of American public personnel and civil service administration, including the role of the civil servant in society. Objectives, principles, and processes of administering the personnel function of government; recruiting, training, promotion, and control of government personnel. 4 lecture-discussions. Prerequisites: PLS 201 or AMC 201; PLS 314.

PLS 416 Comparative Public Administration (4)

Comparative study of the administrative processes in various institutional settings and in a number of political cultures. 4 lecture-discussions. Prerequisites: PLS 202, 314.

PLS 421 Legislative Process (4)

Legislatures as political subsystems; behavior, processes, functions of legislators and legislative bodies. Emphasis on U. S. Congress and its changing role within the American political system. 4 lecture-discussions. Prerequisite: PLS 201 or AMC 201.

PLS 422 Executive Process (4)

Executives as political subsystems: role and function of the executive in the development and implementation of public policies. The Presidency as institution and process in the American political system. 4 lecture-discussions. Prerequisite: PLS 201 or AMC 201.

PLS 423 Judicial Process (4)

Courts as political subsystems: jurisprudential considerations in a political context; judicial roles, actors, and behaviors. Comparative judicial systems. 4 lecture-discussions. Prerequisite: PLS 201 or AMC 201.

PLS 431 Ancient and Medieval Political Thought (4)

Major contributions of Plato and Aristotle to Western political philosophy; survey of the Middle Ages; Machiavelli. Emphasis on the timeliness of classical political conceptions. 4 lecture-discussions. Prerequisite: PLS 201 or AMC 201.

PLS 432 Modern Political Thought (4)

From Hobbes to the 19th century. Analysis of the break with the classical tradition. 4 lecture-discussions. Prerequisite: PLS 201 or AMC 201.

PLS 433 American Political Thought (4)

Major ideas and thinkers who have influenced American political and social life. 4 lecture-discussions. Prerequisite: PLS 201 or AMC 201.

PLS 435 Marxism (4)

Discussion of the roots of Marxism; analysis of the theory. Examination of 19th- and 20th-century criticism. 4 lecture-discussions. Prerequisite: PLS 201 or AMC 201.

PLS 436 Twentieth-Century Political Thought (4)

Selected theories of the 20th century, with emphasis on existentialism, Christian humanism, contemporary socialism, revolutionary theory, and representative conceptions of individualism. 4 lecture-discussions. Prerequisite: PLS 201 or AMC 201.

PLS 439 Empirical Theory (4)

Introduction to the philosophy of science and the methodology of contemporary political science. Emphasis on theory construction, conceptualization; the use of inference and induction; the process of generalization, confirmation; recent empirical theory in political science. 4 lecture-discussions. Prerequisites: PLS 201 or AMC 201; PLS 205.

PLS 452 International Relations (4)

Contemporary international affairs, including analysis of politics among nations. Bases of national foreign policies, sovereignty, nationalism, and diplomacy. Technology, public opinion, and war in international relations. 4 lecture-discussions. Prerequisite: PLS 201 or AMC 201.

PLS 453 International Organization (4)

The nature, function and process of international organization, particularly the League of Nations and the United Nations; regional organizations and specialized agencies. The United States' role in international organizations. 4 lecture-discussions. Prerequisite: PLS 201 or AMC 201.

PLS 454 Inter-American Relations (4)

Introduction to the problems and policies of the nations of Latin America with particular reference to their relations to the super-powers and their participation in international organizations. 4 lecture-discussions. Prerequisite: PLS 452 or permission of instructor.

PLS 455 Foreign Relations of the United States (4)

Survey of the United States foreign policy system with emphasis upon structural characteristics which influence decision-making. Examination of political, strategic and economic aspects of contemporary policy. 4 lecture-discussions. Prerequisite: PLS 201 or AMC 201.

PLS 456 International Law (4)

Nature, sources, function, and evolution of international law; principal lawmaking and adjudicatory agencies; diplomatic and consular intercourse; treaties and executive agreements; pacific settlement of disputes; war and neutrality; international law and its function in international relations. 4 lecture-discussions. Prerequisite: PLS 201 or AMC 201.

PLS 461, 462 Senior Project (2) (2)

Selection and completion of a thesis under faculty supervision. Thesis to be of substantial academic quality on a significant problem in the student's major area of interest within political science. Formal report required. Prerequisite: senior standing. Required minimum of 120 hours.

PLS 463 Undergraduate Seminar (2) (2) (2)

PLS Concentration in successive quarters on the several sub-areas of the discipline. Three seminars in two political science sub-areas required for completion of the major. Prerequisite: upper division standing or permission of instructor.

PLS 471, 472 Field Work in Government and Politics (4) (4)

Placement in government agencies or political organizations for practical applications of academic training. Written report and evaluation required. 1 lecture, 12 hours a week in agency assignment. Prerequisite: permission of instructor.

PLS 480 California Politics (4)

The political system in California with reference to its institutions, leaders, and electoral process; the state's political development and voting behavior. 4 lecture-discussions. Prerequisite: PLS 201 or AMC 201.

PLS 490 Political Inquiry (4)

The philosophical grounds of inquiry, including an introduction to the philosophy of the social sciences. 4 lecture-discussions. Prerequisites: PLS 201 or AMC 201; PLS 205; permission of instructor.

PLS 499 Special Topics for Upper Division Students (1-4)

Group study of a selected topic, the title to be specified in advance. Total credit limited to 8 units, with a maximum of 4 units per quarter. Prerequisite: permission of instructor.

PLS 550 Seminar in Political Science (1-4)

Topics in fields of Political Science offered according to interests and needs of students. Each seminar to have subtitle identifying the field. Seminar, 1-4 hours. Prerequisites: Graduate standing, instructor's approval. May be repeated for maximum of 12 units.

RECREATION ADMINISTRATION

Leo H. Teghtmeyer, *Chairman*

Jack Frost, *Coordinator* Frank Lansford Robert Stull

Barbara Ford William Michaelis

The recreation major, housed in the physical education department, offers a 4-year curriculum leading to the Bachelor of Science in Recreation Administration with specialization areas in (1) community, (2) outdoor, (3) therapeutic recreation and (4) recreation management. Study in these areas is intended to equip the student for professional-level entry into a variety of administrative positions within a broad range of leisure services: in government, education, industry, health services, churches, camps, and other organizations and agencies. Recreation administration graduates can normally choose among career opportunities as activity and program specialists, supervisors, planners, researchers, administrators, consultants, and others.

The core curriculum, emphasizing preparation for professional leadership in the management of leisure activities, combines theory with practice so as to provide both a body of knowledge and a set of personal skills. A minimum of required support courses allows the student considerable flexibility in designing, in consultation with faculty advisors, an individualized program of a multidisciplinary nature intended to strengthen his selected area of specialization.

A career leadership option for non-recreation majors is designed to develop direct, face-to-face leadership skills in recreation. The program will prepare students for summer or part-time para-professional entry level jobs in community recreation programs.

CORE COURSES FOR MAJOR

(Required of all students)

Introduction to Recreation	REC	126	(3)
History, Phil & Theory of Rec	REC	132	(3)
Programming & Leadership	REC	221	(3)
Special Services in Recreation	REC	224	(4)
Administration of Recreation	REC	321	(4)
Special Problems	REC	400	(2)
Recreation and the Leisure Age	REC	420	(4)
Program in Field Work/Seminar	REC	423	(6)
Administration in Field Work/Seminar	REC	424	(6)
Senior Project	REC	461	(2)
Senior Project	REC	462	(2)
Undergraduate Seminar	REC	463	(2)

SPECIALIZATION AREAS

Additional courses in choice of one of four specialization areas ..... (13-15)

SUPPORT AND DIRECTED ELECTIVES

(Required of all students)

Management Accounting	ABM	324*	(4)
Personnel Management	ABM	402*	(3)
American Civilization	AMC	201*	(4)
American Civilization	AMC	202*	(4)
Life Science	BIO	110*	(3)
Heredity and Man	BIO	300*	(3)
or Environmental Geology	ESC	250*	
Business Communications	COM	218*	(3)
Public Relations	COM	313	(4)
Freshman Composition	ENG	104*	(4)
Freshman Composition	ENG	105*	(4)

Intro to Cultural Anthropology	ANT	102*	(4)
Park Facility Management	PA	425*	(4)
Physical Education (3 100-level courses)			*(3)
Intramurals	PE	350	(3)
General Psychology	PSY	201*	(4)
Principles of Sociology	SOC	201*	(4)
Public Speaking	SP	100*	(4)
Humanities Electives			*(7)
Course from School of Bus., Science, Env. Des.			**(4)
Directed Electives (see advisor)			(39-41)

*May be used for the general education requirement.

**Must include four courses from a minimum of two schools other than the School of Arts for fulfillment of the breadth requirement.

Course Descriptions

REC 126 Introduction to Recreation (3)

Nature, scope, and significance of leisure and recreation in contemporary society. Agencies which provide recreation and leisure services; interrelationships of agencies; career opportunities. 3 lecture-discussions.

REC 127 Introduction to Outdoor Recreation (4)

Introduction to and participation in a variety of outdoor programs aimed at enhancing the student's knowledge and appreciation of the outdoors. 2 lectures, 4 hours activity.

REC 132 History, Philosophy, and Theory of Recreation (3)

A theoretical, historical and philosophical examination of recreation; play in ancient societies; the growth of the recreation movement in the U.S.; philosophical principles of play, recreation, and leisure; influence of socio-historical trends on the recreation profession. 3 lectures.

REC 200 Special Problems for Lower Division Students (1-2)

Individual or group investigation, research, studies, or surveys of selected problems. Total credit limited to 4 units, with a maximum of 2 units per quarter.

REC 221 Programming and Leadership in Recreation (3)

Introduction to programming and leadership in public recreation agencies; values, goals, objectives, and survey analysis of community needs. Observation, study, and evaluation of facilities; equipment; staffing; scheduling; in-service leadership training programs. 2 lecture-discussions, 2 hours activity. Prerequisites: REC 126, 132; or permission of instructor.

REC 222 Recreational Games and Sports (3)

Application of theory and leadership techniques to games/sports in tot lots, playgrounds, schools, etc. Emphasis on identification of needs, interests, and abilities of age groups; practical community projects in programming, supervision, and evaluation. 1 lecture-discussion, 4 hours activity. Prerequisites: REC 126, 132, 221, PE 350; or permission of instructor.

REC 223 Social Recreation (4)

Application of theory and leadership techniques to social recreation programming for teens through senior citizens. Emphasis on development of the social self; communication and feedback techniques; interaction skills. Practical experience with small and large groups. 2 lectures, 4 hours activity. Prerequisites: REC 126, 132, 221; or permission of instructor.

REC 224 Special Services in Recreation (4)

Hospital, employees', commercial, industrial recreation. Field trips, observation and evaluation of special recreation services, class projects. 2 lectures, 4 hours activity. Prerequisite: REC 126, 132, 221 or permission of instructor.

REC 225 Dance in Recreation (4)

Organization and supervision of dance programs in recreation; includes simple rhythmics, folk, square, international, round, and social dances. Emphasis on development of an appreciation of dance, rather than a mastery of performance skills. 2 lectures, 4 hours activity. Prerequisite: REC 126, 132, 221 or permission of instructor.

REC 299 Special Topics for Lower Division Students (1-4)

Group study of a selected topic, the title to be specified in advance. Total credit limited to 8 units, with a maximum of 4 units per quarter. Prerequisite: permission of instructor.

REC 306 Recreation Management in Urban Settings (4)

Urban ethnography and recreation; analysis of community settings, participant groups and recreation-related organizations and programs in urban areas; recreation, social class, and ethnic groups; recreation and city planning; special leadership, program and recruitment needs. 3 lectures, 2 hours activity. Prerequisite: REC 126, 132, 221 or permission of instructor.

REC 315 Organization and Administration of Camping (4)

Objectives and problems dealing with the organization and administration of resident camps, school camps, day camping. Exposure to practical camping situations. 2 lectures, 4 hours activity. Prerequisite: REC 127, junior standing.

REC 316 Outdoor Education (4)

Techniques in the development of leadership for recreational activities particularly as applied to outdoor camping. Social development and integration of individuals into group programs. 2 lectures, 4 hours activity. Prerequisite: REC 127, upper division standing.

REC 321 Administration Recreation (4)

Organization and administration of recreation with consideration to facilities, budget, equipment, maintenance, public relations, report writing, organizational theory and principles, and relationships with other agencies. 2 lectures, 4 hours activity. Prerequisites: REC 126, 132, 221, ABM 324, 402; or permission of instructor.

REC 400 Special Problems for Upper Division Students (1-2)

Individual or group investigation, research, studies, or surveys of selected problems. Total credit limited to 4 units, with a maximum of 2 units per quarter.

REC 415 Recreation for Exceptional Groups (3)

Analysis of the recreational needs and behaviors of exceptional groups: mentally retarded, physically disabled, mentally gifted, and other special groups. Recreation in various therapeutic, custodial, and correctional settings; relationship of recreation and rehabilitation. 2 lectures, 2 hours activity. Prerequisites: REC 126, 132, 221, 224; or permission of instructor.

REC 417 Trends and Problems in Outdoor Recreation (4)

Role of outdoor recreation in modern society; includes government and non-government functions and how they relate to current trends and problems. 3 lectures, 2 hours activity. Prerequisites: REC 127, 315; or permission of instructor.

REC 420 Recreation and the Leisure Age (4)

A critical examination of leisure and its role in and influence upon the American culture. An analysis of the changing attitudes toward leisure as well as the changes in the forms of leisure behavior. 2 lectures, 4 hours activity. Prerequisites: REC 132, 221, upper division standing, or permission of instructor.

REC 423 Program in Field Work/Seminar (6)

The first of two culminating pre-professional experiences. Supervised programming and leadership in public, private, and commercial recreation settings. 1 lecture, 12 hours field work. Prerequisites: REC 126, 132, 221, 321, senior standing, and departmental approval.

REC 424 Administration in Field Work/Seminar (6)

The second of two culminating pre-professional experiences. Supervised administrative experiences in public, private, and commerical recreation settings. 1 lecture, 12 hours field work. Prerequisites: REC 126, 132, 221, 321, 423, departmental approval.

REC 461, 462 Senior Project (2) (2)

Selection and completion of a project under faculty supervision. Projects typical of problems which graduates must solve in their fields of employment. Formal report required. Minimum of 120 hours total time.

REC 463 Undergraduate Seminar (2)

Presentation, analysis, and discussion of senior projects, and the value of these projects as they relate to new developments, current trends, problems, and practices in recreation. Development of students' professional file for job interviews. 2 lectures. Prerequisite: senior standing.

REC 499 Special Topics for Upper Division Students (1-4)

Group study of a selected topic, the title to be specified in advance. Total credit limited to 8 units, with a maximum of 4 units per quarter. Prerequisite: permission of instructor.

SOCIAL SCIENCES

Joan M. Greenway, *Chairman*

Charles W. Ackley
Cynthia Anderson
Thomas C. Blackburn
Cecil Brown
Walter Coombs
Richard Hyslop
Richard L. Johnson
Margaret Kinzel
David G. Lord
Forrest L. McElhoe
Crane S. Miller
John Moore
Richard C. Richards
Floyd H. Ross
Emilo Stanley

The social sciences are concerned with all aspects of human society, from the origins of man to the latest election returns. In keeping with that tradition, the department offers a flexible program leading to a bachelor of science degree with opportunities for each student to concentrate in one or more areas of the social science disciplines (anthropology, economics, geography, history, political science, psychology, sociology, and social science).

The department curriculum, multidisciplinary in nature, is especially suitable for students with a broad interest in human problems who believe that a liberal education is the best background for many types of careers. One of the aims of the department is to develop the student's understanding, appreciation, insights, and flexibility in order to do well in a broad spectrum of employment possibilities — secondary, teaching, government services, commerce, and industry — or to proceed into graduate studies.

The courses in American civilization are designed to help majors from all schools of the university understand the ideas and practices which have molded American character, shaped American government, including California state and local government, and influenced the role of the United States in world affairs.

CORE COURSES FOR MAJOR

(Required of all students)

Introduction to Physical Anthropology	ANT	101	(4)
Culture and Personality	ANT	355	(4)
or Social Anthropology	ANT	358	
Cultural Geography	GEO	102	(4)
Economic Geography	GEO	312	(4)
or Geography of Anglo-America	GEO	350	
History of Civilization	HST	101	(4)
History of Civilization	HST	102	(4)
Ethics	PHL	204	(4)
World Religions	PHL	304	(4)
or World Religions	PHL	305	
Introduction to Social Science	SSC	101	(4)
or Social Science Methodology	SSC	333	

OPTION COURSES FOR MAJOR

(Required in specific option)

SOCIAL SCIENCES

Each student will complete at least 6 upper division courses in 2 or more of the social sciences (anthropology, economics, geography, history, political science, psychology, sociology, social science) ..... (24)

ECONOMICS

Principles of Accounting	ACC	124	(4)
Money and Banking	EC	308	(4)
Price & Income Analysis	EC	311	(4)
Price & Income Analysis	EC	312	(4)
Comparative Economic Systems	EC	403	(4)
Devel of Econ Doctrine	EC	407	(4)

SUPPORT AND ELECTIVE COURSES

(Required of Social Sciences Option)

American Civilization	AMC	201*	(4)
American Civilization	AMC	202*	(4)
Introduction to Cultural Anthropology	ANT	102*	(4)
Principles of Economics	EC	201*	(4)
Freshman Composition	ENG	104*	(4)
Freshman Composition	ENG	105*	(4)
Physical Geography	GEO	101*	(4)
History of Civilization	HST	103*	(4)
Physical Education (3 100-level courses)*			(3)
Introduction to Philosophy	PHL	201*	(3)
or Logic and Semantics	PHL	202*	(4)
Political Systems	PLS	202	(4)
General Psychology	PSY	201*	(4)
Principles of Sociology	SOC	201*	(4)
Courses to complete general education requirements			**(13-14)
Free Electives			(73-74)

SUPPORT AND ELECTIVE COURSES

(Required of Economics Option)

American Civilization	AMC	201*	(4)
or American Political System	PLS	201*	
American Civilization	AMC	202*	(4)
or United States History	HST	202*	
Introduction to Cultural Anthropology	ANT	102*	(4)
Principles of Economics	EC	201*	(4)
Principles of Economics	EC	202*	(4)
Freshman Composition	ENG	104*	(4)
Freshman Composition	ENG	105*	(4)
Physical Geography	GEO	101*	(4)
History of Civilization	HST	103*	(4)
Physical Education (3 100-level courses)*			(3)
Introduction to Philosophy	PHL	201*	(3)
or Logic and Semantics	PHL	202*	(4)
General Psychology	PSY	201*	(4)
Principles of Sociology	SOC	201*	(4)
Courses to complete general education requirements			**(9-10)
Free Electives			(78-79)

*May be used for the general education requirement. Select appropriate courses from general education list.

**Must include four courses from a minimum of two schools other than the School of Arts for fulfillment of the breadth requirement.

Course Descriptions

American Civilization

AMC 201, 202 American Civilization (4) (4)

An analysis of American civilization with emphasis on the social, political, and economic ideas and practices which have molded the unique American character; American government, including California state and local government, American ideals and values, and the role of the United States in world affairs. 4 lecture-discussions.

Anthropology

ANT 101 Introduction to Physical Anthropology (4)

Man as a bio-cultural species; evolution of human behavior as an adaptive biological process; human nature as species-specific behavior; human variability viewed from both a diachronic and synchronic perspective. 4 lecture-discussions.

ANT 102 Introduction to Cultural Anthropology (4)

The nature of culture and cultural phenomena; comparative social organization; religion and value systems of non-literate and folk peoples; cultural and psychological processes in the development of personality. 4 lecture-discussions.

ANT 320 Indians of California (4)

Major ethnic groups of aboriginal California, with emphasis upon their social and linguistic diversity. Designed to provide a broad appreciation of the technological, social, and ideological life of the native peoples of California through the detailed study of representative societies. 4 lecture-discussions. Prerequisite: ANT 102 or permission of instructor.

ANT 321 Indians of North America (4)

Survey of aboriginal peoples of North America; analysis of various adaptations and cultural subsystems in original culture areas. Post-contact developments; the status and role of native Americans present and future. 4 lecture-discussions.

ANT 322 Peoples and Cultures of Mesoamerica (4)

Analysis of peoples, societies, and cultures in the area between the southern United States border and Colombia. Nature and consequences of colonial contact with aboriginal sociocultural systems; contemporary economic, social, political, and ideological systems; ethnic and regional similarities and differences. 4 lecture-discussions.

ANT 323 Peoples and Cultures of South America (4)

Survey of socio-cultural systems of South America. Nature and aftermath of colonial contact with indigenous peoples; contemporary economic, social, political, and ideological sub-systems; ethnic and regional similarities and differences. 4 lecture-discussions.

ANT 324 Peoples and Cultures of Africa (4)

Ethnology of bands, tribes, chiefdoms, and aboriginal states of Africa. Comparison and contrast of varying adaptations to similar and dissimilar environmental situations; nature and consequences of colonial contact; assimilation and/or acculturation. 4 lecture-discussions.

ANT 334 Peoples and Cultures of the Pacific (4)

Survey of peoples and cultures of Australia, New Guinea, Polynesia, and Micronesia both traditionally and in current modernization phases. 4 lecture-discussions. Prerequisite: ANT 102 or 358. Offered in odd-numbered years.

ANT 350 Environment, Technology and Culture (4)

Interrelationship of subsistence patterns and economic arrangements as they affect levels of socio-cultural development and are themselves constrained by the natural and social environment in which they occur. Tools and techniques whereby a given society exploits its surroundings. 4 lecture-discussions.

ANT 351 Peasant Societies (4)

Peasantry as a distinctive sociocultural entity; subsystems — economics, politics, ideology, social organization — in peasant society. In-depth examination of representative peasantry from selected areas, and current efforts at modernization. 4 lecture-discussions.

ANT 353 Economic Anthropology (4)

Economic institutions in a variety of social contexts. Operation of systems of production and distribution within non-Western societies; market and non-market economic systems; types of economic change; non-Western economies in the modern world. 4 lecture-discussions. Prerequisite: ANT 102. Offered in odd-numbered years.

ANT 354 Political Anthropology (4)

Organization of legal and governmental activities in traditional societies of varying degrees of complexity. Law and the maintenance of order; resolution of conflict; decision making; political bodies and their ideologies. Political institutions in relationship to other social institutions. 4 lecture-discussions. Prerequisite: ANT 102 or permission of instructor.

ANT 355 Culture and Personality (4)

Sociocultural examination of individual behavior and development; cross-cultural perspective related to "national character," "normalcy," and "abnormalcy," child rearing, and other personality factors. Prerequisite: ANT 102 or permission of instructor. 4 lecture-discussions.

ANT 358 Social Anthropology (4)

A comparative, functional approach to social organization and social structure in various societies: culture, society, and personality; family, kinship, and marriage; social role and social rank; law and politics; religious systems; social change. 4 lecture-discussions. Prerequisite: ANT 102.

ANT 390 The Anthropological Experience (4)

Theory and technique of ethnographic inquiry. Participant observation, directive and open interviewing, integration and interpretation of data; personal response to field commitment. 4 lecture-discussions. Prerequisite: ANT 102 or 358 or permission of instructor. Offered in odd-numbered years.

ANT 394 Field Archaeology (4)

Introduction to the strategy and techniques of archaeological excavation. Site surveying and mapping; sampling techniques; recording; photography. Excavation of actual archaeological site. 4 lecture-discussions.

ANT 405 Woman: An Anthropological View (4)

Intensive cross-cultural examination of woman, from simple hunting/gathering bands through full evolutionary development to post-industrial society. Includes physical anthropology of woman; role and status; culture and personality studies; affective and contractual bonding; future trends in relationships. 4 lecture-discussions. Prerequisite: permission of instructor.

Geography

GEO 101 Physical Geography (4)

Basic principles of physical geography. Significance of earth-related distribution patterns with reference to their effect on man's activities. 4 lecture-discussions.

GEO 102 Cultural Geography (4)

Basic principles of cultural geography. Significance of people-related distribution patterns with reference to their effect on man's activities. 4 lecture-discussions.

GEO 311 Cartography (4)

The preparation of maps and charts including a survey of source materials such as maps, aerial photographs, and census and other statistical data. The interpretation of maps and aerial photographs as a source of geographic patterns. 3 lectures, 1 three-hour laboratory.

GEO 312 Economic Geography (4)

Economic aspects of man's environment. Economic implications of the distribution or location of natural resources throughout the world. Economic significance of physical and cultural landscapes. 4 lecture-discussions.

GEO 313 Political Geography (4)

The role of factors such as location, size, shape, surface, climate, natural resources, economic aspects in the rise and fall of states. The advantages and disadvantages of nations in relation to natural and cultural conditions. Current problems in domestic and international affairs. 4 lecture-discussions.

GEO 315 Urban Geography (4)

Origin and evolution of cities; their size, functions, distribution patterns, supporting and tributary areas, and roles within the whole political, social, and economic structure of a region; suburbs; problems of metropolitan areas. 4 lecture-discussions.

GEO 340 Regional Geography (4)

A general survey of selected regions of the world that are of greatest importance in global affairs, stressing topics from political and economic geography and using one of the regional approaches. Major geographical problems and relationships; significant human activities in relation to the natural environment. 4 lecture-discussions.

GEO 350 Geography of Anglo-America (4)

An analysis of the physical, cultural, and regional patterns of the United States and Canada with emphasis on the economic geography of the area. 4 lecture-discussions.

GEO 351 Geography of California (4)

Location and description of California's natural resources. The influence of physical features upon the economic activities and sequence of occupation of California, with particular attention to the relationship of current California problems to their geographical causes. 4 lecture-discussions.

GEO 352 Geography of Latin America (4)

Physical, cultural, regional patterns of Mexico, Central America, South America, and the islands of the Caribbean. 4 lecture-discussions.

GEO 353 Geography of the Soviet Union (4)

An analysis of major current trends in Soviet social, cultural, economic, and political developments and the changing international role of the Soviet Union, as related to the natural environment and regional patterns of the USSR. 4 lecture-discussions.

GEO 357 Geography of Non-Soviet Asia (4)

Geographic analysis of non-Soviet Asia from the Middle East to Japan and southward to Indonesia. Emphasis on environmental, cultural, and political patterns and their relevance to current problems. 4 lecture-discussions.

GEO 358 Geography of Sub-Saharan Africa (4)

Physical, cultural, and regional patterns of the nations south of the Sahara Desert. Emphasis on development patterns of the new countries in Africa. 4 lecture-discussions.

GEO 359 Geography of Europe (4)

The natural environment and the cultural landscape of Europe. Major current trends in social, cultural, economic, and political developments in Western and Eastern Europe; historical and geographical regional diversity and the quest for new unity. 4 lecture-discussions.

GEO 361 Geography of Middle America (4)

Distribution of human and cultural features in relation to natural conditions in Mexico, Central America, and the West Indies. Reasons for the present distribution. Current geographical problems. 4 lecture-discussions.

GEO 362 Geography of South America (4)

Role of natural factors in human and cultural patterns. Effect of geographic and other factors in the distribution of crops and industries. Correlations between natural and human conditions. Current geographic problems.' 4 lecture-discussions.

GEO 367 Geography of Mexico (4)

The physical and cultural processes in action in Mexican society and environment. Emphasis on the developmental problems of Mexico in the modern world. 4 lecture-discussions.

Social Sciences

SSC 101 Introduction to Social Sciences (4)

An analysis of each of the many disciplines comprising the social sciences with particular emphasis on their interrelationships. A study of source materials and library techniques as well as methods employed by social scientists. 4 lecture-discussions.

SSC 110, 111, 112 Contemporary Issues (3) (3) (3)

The systematic analysis of the assumptions and values which the student has developed about himself and his environment in relation to a career choice or future goals; alternative methods for achievement of career choices; self-development. 3 lecture-discussions.

SSC 200 Special Problems for Lower Division Students (1-2)

Individual or group investigation, research, studies, or surveys of selected problems. Total credit limited to 4 units, with a maximum of 2 units per quarter.

SSC 251 Laboratory in Group Activities (1)

Skills and techniques of solving problems in large and small groups; conducting and reporting meetings; analyses of leadership dynamics in campus organizations. 1 two-hour activity.

SSC 299 Special Topics for Lower Division Students (1-4)

Group study of a selected topic, the title to be specified in advance. Total credit limited to 8 units, with a maximum of 4 units per quarter. Prerequisite: permission of instructor.

SSC 301 Asian-American Experience in the United States (4)

The experience of the Asian-American in the United States; Chinese-Americans and Japanese-Americans on the West Coast from 1849 to the present. Effects of the media on the Asian-American, community and foreign politics, cultural traditions, race relations. 4 lecture-discussions.

SSC 333 Social Sciences Methodology (4)

A survey of contemporary social science methods and techniques, including library research, field work, interviewing, questionnaires, models, quantification and computer analysis, cartography, remote sensing, and experimentation. 3 lecture-discussions, 2 hours activity.

SSC 400 Special Problems for Upper Division Students (1-2)

Individual or group investigation, research, studies, or surveys of selected problems. Total credit limited to 4 units, with a maximum of 2 units per quarter.

SSC 401 Contemporary American Scene (4)

Domestic problems and issues confronting the American people today. Alternative proposals pointing toward solutions of these problems. 4 lecture-discussions.

SSC 410 The Study of Peace (4)

Interdisciplinary analysis of peace, examining intergroup conflict at international, national, and local levels, including labor-management relations and university disturbances. Uses concepts and methodologies of several social sciences. 4 lecture-discussions.

SSC 461, 462 Senior Project (2) (2)

Selection and completion of a project under faculty supervision. Projects typical of problems which graduates must solve in their fields of employment. Formal report required. Minimum of 120 hours total time.

SSC 463 Undergraduate Seminar (2)

Intensive study of selected social problems with application of various techniques for analysis. 2 meetings. Prerequisite: completion of senior project.

SSC 499 Special Topics for Upper Division Students (1-4)

Group study of a selected topic, the title to be specified in advance. Total credit limited to 8 units, with a maximum of 4 units per quarter. Prerequisite: permission of instructor.

SSC 550 Seminar in the Social Sciences (1-3)

Special problems in selected areas of the social sciences. Each seminar will have a subtitle describing its nature and content. Seminar, 1 to 3 hours. May be repeated for a maximum of 9 units.

SOCIAL SERVICES

Signe Starnes, *Chairman*

Victor Coppin George B. Jenkins E. Leo Juarez

Nancy Humphreys

The department offers courses leading to the bachelor of science degree in social services. The program offered in the major is approved by the Council on Social Work Education as appropriate preparation for beginning professional social work practice.

The primary career-related goal is the preparation of students for employment in such agencies as public welfare, probation and parole, youth and family service centers, and hospital settings, which offer direct services and require a bachelor's degree as the minimum requirement. The program, therefore, provides education of sufficient scope and depth to enable graduates to function effectively as first-line social workers who deal directly with client groups. A second career-related goal is the provision of the foundation for and the impetus toward graduate social work education.

For all students in the program, majors who will move into social service careers or who enter other careers, and non-majors taking social service courses, the program is designed to develop an understanding of the historical development of social welfare institutions, an awareness of contemporary social issues and a sensitivity to human feelings, all within the context of a set of professional values emphasizing human dignity and social change. An interdisciplinary approach is basic to the development of the educational objectives of the program.

Admission to Field Instruction Program:

The series SSV 321, 322, and 323, Social Welfare Practice, is a prerequisite to SSV 421, 422, and 423, Advanced Social Welfare Practice, and must be taken in sequence beginning in the fall quarter. *Admission is by written application and interview only.* Application forms are available in the social services office, and must be filed in that office by March 1.

CORE COURSES FOR MAJOR

General Psychology	PSY	201	(4)
Principles of Sociology	SOC	201	(4)
Principles of Sociology	SOC	202	(4)
Introduction to Social Services	SSV	201	(4)
The Life Cycle in Social Work	SSV	220	(4)
The Life Cycle in Social Work	SSV	221	(4)
Social Service Methods: Casework	SSV	300	(4)
Social Service Methods: Group Work	SSV	301	(4)
Social Service Methods: Community Organization	SSV	302	(4)
Social Welfare Practice	SSV	321	(4)
Social Welfare Practice	SSV	322	(4)
Social Welfare Practice	SSV	323	(4)
Advanced Social Welfare Practice.	SSV	421	(4)
Advanced Social Welfare Practice.	SSV	422	(4)
Advanced Social Welfare Practice.	SSV	423	(4)
Social Welfare Policy and Issues	SSV	431	(4)
Seminar in Social Welfare Research	SSV	461	(2)
Seminar in Social Welfare Research	SSV	462	(2)
Seminar in Social Welfare Research	SSV	463	(2)
Ethnic Studies Electives			(8)

SUPPORT & ELECTIVE COURSES

(Required of all students)

American Civilization	AMC	201*	(4)
or American Political System	PLS	201*	
American Civilization	AMC	202*	(4)
or United States History	HST	202*	
Introduction to Cultural Anthropology	ANT	102*	(4)
Principles of Economics	EC	201*	(4)
Principles of Economics	EC	202*	(4)
Economics of Social Welfare	EC	437	(4)
or Economics of Minority Groups	EC	497	
Freshman Composition	ENG	104*	(4)
Physical Education (3 100-level courses)*			(3)
Public Administration	PLS	314*	(4)
Abnormal Psychology	PSY	415*	(4)
Public Speaking	SP	100*	(4)
Principles of Urban Planning	UP	301*	(4)
Psychology or Sociology electives (PSY 310, 311, 314, 315, 401; SOC 301, 310, 321, 322, 401)			(12)
Natural Sciences (2 courses on General Education List)*			(6)
Courses to complete General Education Requirements			**(24)
Free Electives			(39)

*May be used for the general education requirement.
**Must include four courses from a minimum of two schools other than the School of Arts for fulfillment of the breadth requirement.

Course Descriptions

SSV 200 Special Problems for Lower Division Students (1-2)

Individual or group investigation, research, studies, or surveys of selected problems. Total credit limited to 4 units, with a maximum of 2 units per quarter.

SSV 201 Introduction to Social Services (4)

A survey of the historical development of social service. Emphasis on a survey of social welfare philosophies and trends. 4 lectures.

SSV 218 Contemporary Treatment of Offenders (4)

Current correctional practices in probation and parole. An overview of the history of the treatment of the offender and characteristics of the offender. 4 lectures.

SSV 220 The Life Cycle in Social Work (4)

Physical, psychological, social, and cultural factors of growth and development; emphasis on their implications for social work practice. Infancy, childhood, adolescence; normal and pathological development and behavior. 4 lecture-discussions.

SSV 221 The Life Cycle in Social Work (4)

Psycho-social development from young adulthood to old age. Related adaptive behavior. Application to social work practice. Growth and development, emphasizing ego psychology, social role disengagement, and activity theories related to individual development throughout adult years. 4 lecture-discussions. Prerequisite: SSV 220 or PSY 201.

SSV 299 Special Topics for Lower Division Students (1-4)

Group study of a selected topic, the title to be specified in advance. Total credit limited to 8 units, with a maximum of 4 units per quarter. Prerequisite: permission of instructor.

SSV 300 Social Service Methods: Casework (4)

Analysis of human behavior theories as related to the practice of social casework. Application of the casework method in simulated practice activity. 3 lectures, 1 two-hour activity. Prerequisite: SSV 201.

SSV 301 Social Service Methods: Group Work (4)

Survey and evaluation of the theory and application of group work methods employed by social workers. 3 lectures, 1 two-hour activity; agency visits. Prerequisites: SSV 201, PSY 314; or permission of instructor.

SSV 302 Social Service Methods: Community Organization (4)

Survey and evaluation of community organization methods and techniques employed by social workers; relevant human behavior theory. Evaluation through classroom activity and actual activities in the field. 3 lectures, 1 two-hour activity; agency visits. Prerequisites: SSV 201, PSY 314; or permission of instructor.

SSV 310 Child Welfare Problems and Services (4)

Services for dependent, delinquent, neglected, physically-handicapped, and mentally-handicapped children. Hospital, institutional, and foster-home care. 4 lecture-discussions.

SSV 321, 322, 323 Social Welfare Practice (4) (4) (4)

The first-year internship program introducing practical aspects of social service. Weekly 8-hour activities in a social agency plus 2-hour seminar. Prerequisites: SSV 201, 300, and permission of instructor. Admission only by prior application (due March 1 each year).

SSV 400 Special Problems for Upper Division Students (1-2)

Individual or group investigation, research, studies, or surveys of selected problems. Total credit limited to 4 units, with a maximum of 2 units per quarter.

SSV 421, 422, 423 Advanced Social Welfare Practice (4) (4) (4)

The second-year internship program involving application of contemporary social work methods to social welfare problems. Weekly 8-hour activities in social agency plus 2-hour seminar. Prerequisites: SSV 321, 322, 323, and permission of instructor.

SSV 431 Social Welfare Policy and Issues (4)

Evaluation of current policy proposals, issues, and priorities concerning alterations in economic and social values and systems, particularly as these developments relate to social welfare policy development and decision-making. 4 lecture-discussions.

SSV 432 New Trends in Social and Community Services (4)

The philosophy, organization, and treatment methods of various of the newer crisis-oriented agencies and facilities. 4 lecture-discussions.

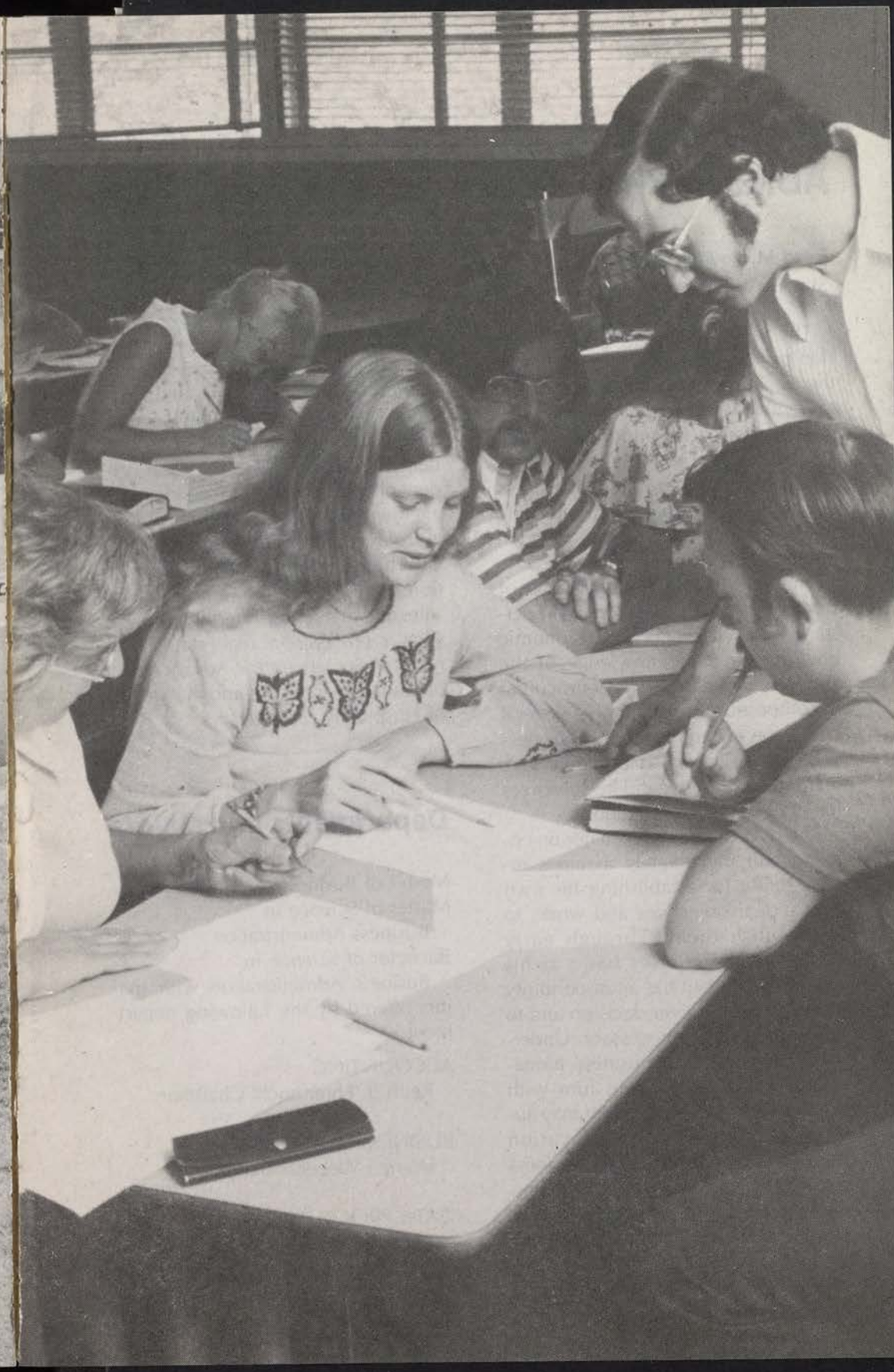
SSV 461, 462, 463 Seminar in Social Welfare Research (2) (2) (2)

Explanation of research methods and studies in a particular social service field including corrections, health, family and children, and drugs and alcoholism. Completion of selected research process, review of the literature, proposal writing and study design. Must be taken concurrently with SSV 421, 422, 423.

SSV 499 Special Topics for Upper Division Students (1-4)

Group study of a selected topic, the title to be specified in advance. Total credit limited to 8 units, with a maximum of 4 units per quarter. Prerequisite: permission of instructor.


CAL POLY



SCHOOL OF BUSINESS ADMINISTRATION

Reed M. Powell, *Dean*
Stanley B. Smith, *Associate Dean*

The School of Business Administration provides six curricula leading to the bachelor of science degree, and curricula leading to the master of business administration and master of science degrees. The master of science curriculum offers an option in business education. Information concerning the masters curricula may be found in the graduate listings.

The undergraduate programs of study aim to give the student an understanding of the social and economic environment and knowledge of the structure of business. The curriculum is composed of four parts — general education material; a core of business subjects common to all majors; a major field of study; and free electives for subject experimentation.

The student selects his major on entering and immediately assumes responsibility for establishing his own educational objectives and works to accomplish them. Through early studies in the courses basic to his major, the student has an opportunity to evaluate his career decision and to adjust his goals, if necessary. Undergraduate courses in business fundamentals and skills equip him with saleable abilities. The student may augment his on-campus education through job experiences in business work-study and internship programs. General education courses are integrated throughout each four-year program. Each student concludes his program with a senior project. Co-curricular opportunities related to his course of study include the Accountants Club; the Chicano Business Students; the Data Processing Club, student chapter of Data Processing Management Association; Delta Sigma Pi, a professional business fraternity; Phi Chi Theta, Business Women's Association; Pi Sigma Epsilon, a professional sales and marketing fraternity; Rho Epsilon, a professional real estate fraternity; the Society for the Advancement of Management Club; and the Society of Hospitality Managers.

Departments and Majors

Master of Business Administration
Master of Science in
Business Administration
Bachelor of Science in
Business Administration with majors offered by the following departments:

ACCOUNTING
Keith B. Ehrenreich, Chairman

BUSINESS MANAGEMENT
Warren Weber, Chairman

DATA PROCESSING
Ronald W. Eaves, Chairman

FINANCE, INSURANCE, AND REAL ESTATE

_____, Chairman

MARKETING MANAGEMENT

James R. Hill, Acting Chairman

BACHELOR OF SCIENCE DEGREE IN HOTEL AND RESTAURANT MANAGEMENT

Donald E. Lundberg, Chairman

Graduate courses are listed in the graduate section of the catalog. See p. 367.

ACCOUNTING

Keith B. Ehrenreich, *Chairman*

Willie D. Adamson
Paul M. Banos
George E. Carlberg
John K. Cheever
Alan H. Falcon
Vinay Gupta
Clarence H. Jackman
Barry A. Knight
Bonnie L. Lambert
Jewel M. Riddle
Alan R. Senn
William B. Theisman
Frederick M. Weis

The accounting department provides an education for students who wish to enter the field of business with a thorough knowledge of the essential principles of accounting and a strong background for students desiring professional employment in public, private, or government accounting. The student majoring in accounting may select courses which will prepare him specifically for one of these fields.

The accounting courses are taught in the framework of modern business complexity so that the student becomes aware of the many factors in the decision-making process and of the contribution of the accountant and his skills to administrative services.

CORE COURSES FOR MAJOR

(Required of all students)

Principles of Accounting	ACC	124	(4)
Introduction to Managerial Accounting	ACC	125	(4)
Accounting Practice	ACC	145	(1)
Cost Accounting	ACC	211	(4)
Intermediate Accounting	ACC	301	(5)
Intermediate Accounting	ACC	302	(5)
Federal Tax	ACC	331	(4)
Auditing Principles, Practices and Procedures	ACC	419	(4)
Federal Tax	ACC	431	(5)
Senior Project	ACC	461	(2)
Senior Project	ACC	462	(2)
Undergraduate Seminar	ACC	463	(2)
Business Law	BUS	301	(4)
Business Law	BUS	302	(4)
Introduction to Computing	DP	110	(4)
Computer Programming Principles	DP	224	(4)
†Directed Electives			(12)

SUPPORT AND ELECTIVE COURSES

(Required of all students)

Advanced Auditing	ACC	420	(4)
or Internship in Auditing	ACC	443	
American Civilization	AMC	201*	(4)
American Civilization	AMC	202*	(4)
Business Computations	BUS	152	(2)
Management Principles and Theory	BUS	307	(4)
Business Statistics	BUS	314	(4)
Quantitative Analysis in Business	BUS	315	(4)
Communications for Management	BUS	324	(4)
Management Policies and Systems	BUS	410	(4)
Systems Analysis	DP	225	(4)
Principles of Economics	EC	201*	(4)
Principles of Economics	EC	202*	(4)
Money and Banking	EC	308	(4)
Freshman Composition	ENG	104*	(4)
Freshman Composition	ENG	105*	(4)
Introduction to Financial Management	FIR	304	(4)
Management Finance	FIR	305	(4)
Introduction to Statistics	MAT	107*	(3)
Introduction to Math Analysis	MAT	108*	(3)
Introduction to Math Analysis	MAT	109*	(3)
Principles of Marketing Management	MKT	305	(4)
Principles of Marketing Management	MKT	306	(4)
Physical Education	PE	141*	(3)
General Psychology	PSY	201*	(4)
Public Speaking	SP	100*	(4)
Humanities			*(6)
Natural Sciences			*(6)
Electives			(29)

*May be used for the general education requirement. Select unspecified courses from the general education list. For general education breadth requirements, select four courses from a minimum of two schools other than the School of Business Administration.

†Select from ACC 400, 401, 402, 403, 413, 414, 415, 424, 432, 441, 442, DP 244, ETI 276, IE 111, 224, 225, PLS 314.

Course Descriptions

ACC 124 Principles of Accounting (4)

Principles and practices of fundamental financial accounting with primary emphasis on the responsibility of the modern corporation to do an adequate job of financial reporting to investors and others outside the corporate entity. 3 lectures, 2 one-hour activity periods.

ACC 125 Introduction to Managerial Accounting (4)

Introductory survey of uses of modern accounting such as costs, budgeting, statement analysis. Special attention is given to the needs of management for information in terms of control of the enterprise and formulating business policy decisions. 3 lectures, 2 one-hour activity periods.

ACC 145 Accounting Practice (1)

Practice, manual and EDP, in application of accounting principles to typical business situations. Concurrent: ACC 125.

ACC 200 Special Problems for Lower Division Students (1-2)

Individual or group investigation research, studies, or surveys of selected problems. Total credit limited to 4 units, with a maximum of 2 units per quarter.

ACC 211 Cost Accounting (4)

Cost accounting cycle; cost elements of a product; job order, process and standard cost systems; overhead allocation cost considerations; cost behavior, cost-volume profit relationships; analysis of overhead variances. 4 lectures. Prerequisite: ACC 125.

ACC 232 Income Taxes (3)

Federal income tax structure as related to individuals, including problems intended to provide an understanding of the principles. 3 lectures. (Not open to accounting majors.)

ACC 299 Special Topics for Lower Division Students (1-4)

Group study of a selected topic, the title to be specified in advance. Total credit limited to 8 units, with a maximum of 4 units per quarter. Prerequisite: Permission of instructor.

ACC 300 Accounting Concepts and Applications (5)

Accounting as an information system for reporting enterprise. Activities: interpretation and uses of financial statements; taxes and decision variables. Prerequisites: ACC 125 and consent of instructor. (Enrollment limited to non-accounting majors.)

ACC 301, 302 Intermediate Accounting (5) (5)

Analytical study and application of current accounting theories and techniques including literature of the American Institute of Certified Public Accountants and other authoritative accounting organizations. 5 lectures. Prerequisite: ACC 125 and consent of instructor. ACC 301 is prerequisite to ACC 302.

ACC 308 Institutional and Governmental Accounting (3)

Accounting for nonprofit institutions and governmental organizations. 3 lectures. Prerequisite: ACC 124 or consent of instructor. Not open to accounting majors.

ACC 331 Federal Tax (4)

Income, expense, exclusion, deductions and credits for individual tax returns. 4 lectures. Prerequisite: ACC 300 or ACC 301.

ACC 400 Special Problems for Upper Division Students (1-2)

Individual or group investigation, research, studies or surveys of selected problems. Total credit limited to 4 units, with a maximum of 2 units per quarter. Prerequisite: ACC 145 and BUS 152.

ACC 401 Advanced Accounting (4)

Partnerships, joint ventures, installment sales, consignments and actuarial science as related to accounting. 4 lectures. Prerequisite: ACC 302 or consent of instructor and ACC 145 and BUS 152.

ACC 402 Advanced Accounting (4)

Governmental and institutional accounting and accounting for fiduciaries. 4 lectures. Prerequisite: ACC 302, ACC 145 and BUS 152 or consent of instructor.

ACC 403 Advanced Accounting (4)

Consolidations and home office and branch accounting. 4 lectures. Prerequisite: ACC 302, ACC 145 and BUS 152 or consent of instructor.

ACC 413 Case Studies in Controllership (4)

Analysis of accounting problems and business situations from the broad viewpoint of the controller. Studies of actual and simulated business cases. 4 lecture-discussions. Prerequisite: Senior standing ACC 145 and BUS 152.

ACC 414 Cost Accounting and Budgeting (4)

Advanced problems in cost finding and cost control; analysis of variances; budgets and budgetary control; cost-volume relationships; break-even point analysis. Current literature discussed. 5 lecture-discussions. Prerequisite: ACC 211, 302, ACC 145, BUS 152.

ACC 415 Advanced Costing Techniques (4)

Utilization of quantitative techniques introduced in other classes and their relationships to accounting and managerial accounting. Discussion and review of related current literature; discussion and review of CPA and CMA exam questions. 4 lectures. Prerequisite: ACC 414, BUS 314, 315.

ACC 419 Auditing Principles, Practices, and Procedures (4)

Theory of auditing and its objectives; procedures and techniques to carry out the objectives; types of opinions rendered by auditors and their responsibilities; ethics of the C.P.A. 4 lectures, Prerequisite: ACC 211 and ACC 300 or ACC 302 and senior standing (waive ACC 211 for Data Processing majors only). ACC 145 and BUS 152.

ACC 420 Advanced Auditing (4)

Extensive procedures and techniques in carrying out aduit objectives: working paper development and preparation; preparation of opinion and report rendered by auditors; application of EDP to auditing. Current literature. 4 lectures. Prerequisite: 419.

ACC 424 Internal Operational Auditing, and Systems (4)

Objectives, principles and methods of internal and operational auditing with special emphasis on examination and appraisal of internal controls in the various reporting systems. Problems of communication, delegation of authority, or organization. 4 lecture-discussions. Prerequisite: AAC 300 or 302, ACC 145, BUS 152.

ACC 432 Federal Tax (4)

Federal taxes on partnerships, corporations, estates, trusts, reorganizations and tax planning. 4 lectures. Prerequisite: ACC 331.

ACC 441, 442 Internship in Accounting (1-8) (1-8)

On-the-job training in accounting involving new, collegiate-level learning experiences. Experiences may be useful as a basis for senior projects. Prerequisite: Permission of the Coordinator of Accounting Internships.

ACC 443 Internship in Auditing CPA (4)

On-the-job training with a CPA firm in phases of auditing. The experience must be new to the student. Analytical reports of work accomplished by each student are made periodically to the faculty coordinator. One unit of credit is granted for each 120 hours of training. Units of college credit granted are dependent on departmental approval. Prerequisite: ACC 4198, ACC 145, BUS 152, and permission of the instructor. No credit given if previously granted for ACC 420.

ACC 461, 462 Senior Project (2) (2)

Selection and completion of a project under faculty supervision. Project typical of problems which graduates must solve in their fields of employment. Formal report is required. Required minimum of 120 hours. Prerequisite: ACC 211, 302, 145, BUS 152. ACC 461 is prerequisite for 462.

ACC 463 Undergraduate Seminar (2)

Study and discussion by students of recent developments in the students' major fields. 2 meetings. Prerequisite: ACC 462.

ACC 475 C.P.A. Law Problems (3)

Business law questions given in the C.P.A. examination. Fundamental principles of the law of contracts, agency, bailments, sales, negotiable instruments, partnerships, corporations, real and personal property, wills, insurance, suretyship, bankruptcy and other subjects. 3 lectures. Prerequisite: ACC 403, BUS 302 or consent of instructor.

ACC 476 C.P.A. Auditing Problems (3)

Standards and objectives; reports; internal control; examination of internal and external records; working papers; procedures; and other related topics. 2 lectures, 1 two-hour activity period. Prerequisite: ACC 419 or consent of the instructor.

ACC 477 C.P.A. Practice Problems and Theory (6)

Contemporary accounting theory with emphasis upon pronouncements of the American Institute of Certified Public Accountants, the American Accounting Association, and the Securities and Exchange Commission. Application to advanced problems of the type found in the C.P.A. examinations. 2 two-hour lectures, 2 two-hour activity periods. Prerequisite: ACC 401, 402, 403 or consent of instructor.

ACC 499 Special Topics for Upper Division Students (1-4)

Group study of a selected topic, the title to be specified in advance. Total credit limited to 8 units, with a maximum of 4 units per quarter. Prerequisite: permission of instructor.

BUSINESS MANAGEMENT

Warren C. Weber, *Chairman*

Richard Bergstrom
Madeline A. Currie
Leon A. Dale
Danny C. DeCeglie
Joseph A. Feigo
John T. Fleishans, III
David G. Foley
Robert J. Healey
Gilbert McKee
Celestine Nwacukwu
Frank Paul
Leonard E. Ross
Richard Sabo
Shiori Sakamoto
Richard H. Schoning
Sandra E. Toy
Paul F. Weisend
Mary E. Whitley
D. Wayne Williams
G. Dow Worley

The business management major offers options in industrial management and office management.

The industrial management option is designed to provide students with a general background in business management preparatory to careers in a wide variety of supervisory and managerial occupations. Through the careful selection of option courses, students may prepare for managerial positions in specialized areas of interest such as production and operations management.

The office management option is designed to prepare individuals for positions which facilitate and service organizational objectives through administrative activities such as: information and records management; the analysis, coordination and control of administrative methods, systems and procedures; and, providing a cvariety of office services and administrative assistance. Selection of option courses will allow students to prepare for such positions as: administrative services manager, office manager, records manager, office systems and procedures analyst, administrative analyst, administrative assistant, or executive secretary. Course offerings in the office management option also enable students to prepare for California State credential requirements for secondary school teachers of business subjects.

CORE COURSES FOR MAJOR

(Required of all students)

Principles of Accounting	ACC	124	(4)
Introduction to Managerial Accounting	ACC	125	(4)
Business Law	BUS	301	(4)
Business Law	BUS	302	
or Business Law for transfer students	BUS	304	(4)
Management Principles and Theory	BUS	307	(4)
Business Statistics	BUS	314	(4)
Management Policies and Systems	BUS	410	(4)
Senior Project	BUS	461	(2)
Senior Project	BUS	462	(2)
Undergraduate Seminar	BUS	463	(2)
Introduction to Computing	DP	110	(4)
Systems Analysis	DP	225	(4)
Introduction to Financial Management	FIR	304	(4)
Managerial Finance	FIR	305	(4)
Marketing Principles	MKT	305	(4)
Marketing Management	MKT	306	(4)

OPTION COURSES FOR MAJOR

(Required for specific option)

INDUSTRIAL MANAGEMENT

Intermediate Managerial Accounting	BUS	310	(4)
Industrial Supervision	BUS	313	(4)

Quantitative Analysis in Business	BUS	315	(4)

Plus a minimum of 32 units approved by advisor from those courses listed below:

Personnel Management	ABM	402	(3)
Cost Accounting	ACC	211	(4)
Income Taxes	ACC	232	(3)
Accounting Concepts and Applications	ACC	300	(5)
Institutional and Governmental Accounting	ACC	308	(3)
Business and Its Environment	BUS	103	(4)
Problems in Small Business	BUS	308	(4)
Communications for Management	BUS	324	(4)
Production and Operations Management	BUS	331	(4)
Production and Operations Management	BUS	332	(4)
Research Design and Methodology	BUS	390	(4)
Purchasing and Contract Admin	BUS	413	(4)
Industrial Relations	BUS	416	(4)
Contributions of Human Behaviorists to Business	BUS	418	(4)
Internship	BUS	441	(1-4)
Internship	BUS	442	(1-4)
Computer Programming	DP	2245	(4)
COBOL Programming	DP	244	(4)
Computer Applications	DP	316	(4)
Labor Economics	EC	414	(4)
Labor Problems and Practices	EC	415	(4)
Manufacturing Systems and Standards	ESM	201	(4)
Intermediate Corporate Finance	FIR	350	(4)
Fundamental Financial Management	FIR	360	(4)
Manufacturing Systems and Standards	IE	234	(4)
Marketing Logistics	MKT	309	(4)
Consumer Behavior	MKT	311	(4)
Industrial Marketing	MKT	407	(4)
International Business Environments	MKT	413	(4)
Legal Environment of Marketing	MKT	419	(4)
Human Relations	PSY	314	(4)
Industrial and Personnel Psychology	PSY	332	(4)

OFFICE MANAGEMENT

Administrative Services	BUS	320	(3)
Office Management	BUS	327	(4)
Records Management	BUS	403	(3)
Report Writing	COM	216*	(3)

Plus a minimum of 25 units approved by advisor from those courses listed below:

Personnel Management	ABM	402	(3)
Cost Accounting	ACC	211	(5)
Income Taxes	ACC	232	(3)
Accounting Concepts and Applications	ACC	300	(5)
Business and Its Environment	BUS	103	(4)
Advanced Typewriting	BUS	145	(2)
Shorthand	BUS	244	(3)
Shorthand	BUS	245	(3)
Shorthand	BUS	246	(3)
Problems in Small Business	BUS	308	(4)
Intermediate Managerial Accounting	BUS	310	(4)
Industrial Supervision	BUS	313	(4)
Quantitative Analysis in Business	BUS	315	(4)
Executive Secretarial Practice	BUS	321	(4)
Executive Secretarial Practice	BUS	322	(4)
Communications for Management	BUS	324	(4)
Research Design and Methodology	BUS	390	(4)
Purchasing and Contract Administration	BUS	413	(4)
Internship	BUS	441	(1-4)
Internship	BUS	442	(1-4)
Computer Programming	DP	224	(4)
COBOL Programming	DP	224	(4)
Computer Applications	DP	316	(4)
Fundamental Risk, Insurance	FIR	357	(4)
Fundamental Financial Management	FIR	360	(4)
Practices and Procedures for Single Subject Classrooms	TEP	407	(3)

SUPPORT AND ELECTIVE COURSES

(Required of all students)

American Civilization	AMC	201*	(4)
American Civilization	AMC	202*	(4)
Business Computations	BUS	152	(2)
Business Communications	COM	218*	(3)
Principles of Economics	EC	201*	(4)
Principles of Economics	EC	202*	(4)
Freshman Composition	ENG	104*	(4)
Descriptive Statistics	MAT	107*	(3)
Physical Education	PE	141*	(3)
General Psychology	PSY	201*	(4)
Public Speaking	SP	100*	(4)
Natural Sciences			*(6)
Humanities			*(6)
Additional General Education Courses			*(9)
Courses to complete option			(36-44)
Electives			**(34-42)

*May be used for the general education requirement. Select unspecified courses from the general education list. For general education breadth requirements, select four courses from a minimum of two schools other than the School of Business Administration.

**Basic Typewriting, BUS 144 (2) or proficiency exam is required.

Course Descriptions

BUS 103 Business and Its Environment (4)

American business system in its economic and social environment. A conceptual approach relating business and its legal forms to society as a whole. Career opportunities in business with emphasis on management. 4 lectures.

BUS 144 Basic Typewriting (2)

Fundamentals of the touch system. Training in preparing business letters, manuscripts and tabulated reports. 4 one-hour activity periods.

BUS 145 Advanced Typewriting (2)

Training in preparing business forms and business letters and the development of professional competency in typewriting. 4 one-hour activity periods. Prerequisite: BUS 144 with a grade of C or better, or equivalent proficiency examination.

BUS 152 Business Computations (2)

Development of skill in the use of electronic calculators. Applications of these skills to problems in the areas of depreciation, interest, sinking funds, annuities, discounts, applied statistics, merchandising mathematics, and payroll registers. 4 one-hour activity periods.

BUS 200 Special Problems for Lower Division Students (1-2)

Individual or group investigation, research, studies or surveys of selected problems. Total credit limited to 4 units, with a maximum of 2 units per quarter.

BUS 244, 245, 246 Shorthand (3) (3) (3)

Fundamentals of Gregg shorthand. Effective techniques for recording and transcribing business dictation. 2 hours lecture, 2 hours activity. Prerequisite: BUS 245, 244, or 60 wpm; BUS 246, 245 or 80 wpm.

BUS 299 Special Topics for Lower Division Students (1-4)

Grouped study of a selected topic, the title to be specified in advance. Total credit limited to 8 units, with a maximum of 4 units per quarter. Prerequisite: Permission of instructor.

BUS 301 Business Law (4)

Jurisprudential concepts. The adversary system of justice. Business-related torts. Contracts per Uniform Commercial Code; sales law (emphasis product liability, warranties, strict tort liability); real property; personal property; secured transactions. Case analysis, 4 meetings. Prerequisite: Junior standing.

BUS 302 Business Law (4)

The law of agency, employment, partnerships, corporations — emerging theories of "conflict of interest." Legal environment of federal legislation such as securities regulation. Negotiable instruments, bankruptcy law. A "risk analysis" and "preventive law" case approach. 4 meetings. Prerequisite: BUS 301 taken at Cal Poly.

BUS 304 Business Law (4)

Introduction or supplementation in the following jurisprudential areas (depending upon individual needs): Law of sales, corporations, partnerships, negotiable instruments, agency, real property, bankruptcy, and personal property. Only for transfer students entering with one course in business law. Case analysis. 4 meetings.

BUS 307 Management Principles and Theory (4)

Principles and functions of management as a universal process. Analysis of theories of organization and management. 4 lectures.

BUS 308 Problems of Small Business (4)

Small business hazards and factors in business success. Adequate protection and financing for the small business. Analysis and discussion of typical situation-problems. 4 lectures. Prerequisite: ACC 125; BUS 307; MKT 305.

BUS 310 Intermediate Managerial Accounting (4)

Accounting as a managerial tool, budgets, cost analysis and interpretation. Four meetings. Prerequisite: ACC 125. Not open to Accounting majors.

BUS 313 Industrial Supervision (4)

Management of personnel; selection, motivation and supervision of subordinates; training, employee performance appraisal; communications; employee remuneration; union-management relations; executive development; personnel department assistance of supervisors in achieving company and departmental objectives. 4 lectures.

BUS 314 Business Statistics (4)

Business application of techniques that require knowledge of; data distributions such as binomial, Poisson, and normal; probability; sampling theory. Use of statistical tests for inference such as estimation, hypothesis testing, analysis of variance, regression, and correlation. 4 lecture-discussions. Prerequisite: MAT 107.

BUS 315 Quantitative Analysis in Business (4)

Identification and solution of business problems by quantitative methods and techniques. Introduction to quantitative tools of analysis and construction of quantitative models useful in business decision making. Application of electronic computers. Seminars, lectures, and problem solving by small groups. 4 lectures. Prerequisite: BUS 314.

BUS 320 Administrative Services (3)

Services as related to office systems and procedures; use and integrated application of recording and communicating activities, transcribers, duplicators, copiers and miscellaneous office equipment in performing the functions of information handling. 2 lectures, 1 two-hour activity period. Prerequisite: BUS 144 with grade oc "C" or better or equivalent proficiency exam.

BUS 321, 322 Executive Secretarial Practice (4) (4)

Individual activities simulating those of an office. Practical application of secretarial theory and skills, including the use of machines. Management-level materials adapted to secretarial situations. 2 lectures and 2 two-hour activity periods. Prerequisite: Junior standing or consent of instructor.

BUS 324 Communication for Management (4)

Conducting management conferences, team project consultations and professional meetings using visual aids (charts, graphs, financial statements, progress reports, etc.). Briefing superiors on project status/projections. Techniques and devices of analysis and presentation of oral and written communications. Dictation machines employed. 4 lectures.

BUS 327 Office Management (4)

Relationship of office functions to the total business enterprise; planning, organizing, controlling and actuating in office management; analysis of information needs for management decisions; analytical approach to office services functions; 4 lectures.

BUS 331 Production and Operations Management (4)

An introduction to the fundamental concepts of industrial management. Allocating existing resources, product quality, manpower requirements, industrial scheduling and control, budgeting and investment analysis of equipment selection and replacement. 4 lecture-discussions. Prerequisite: BUS 307, 314.

BUS 332 Production and Operations Management (4)

A study of industrial organizations. Managerial applications and conceptual survey of facilities design and control systems for industrial operations, design of work systems, job simplification and motion and time study, analytical models and methods. Labor costs control and compensation. 4 lecture-discussions. Prerequisite: BUS 331, and BUS 315, or consent of instructor.

BUS 350 Survey of Business Functions (4)

Designed to increase the non-majors awareness of the many areas of interest and concern within the School of Business Administration. Team-teaching concept drawing from Accounting, Data Processing, F.I.R.E., Marketing Management, and Business Management. 2 two-hour periods per week. No prerequisites or previous business courses required.

BUS 390 Research Design and Methodology (4)

Identification of problems in a research format. How to state hypotheses, define and collect data, and select analysis techniques. Examination of typesof research (ex post facto, laboratory, field or survey), and limitations for inference. Seminar, 4 hours. Prerequisite: BUS 314.

BUS 400 Special Problems for Upper Division Students (1-2)

Individual or group investigation, research, studies or surveys of selected problems. Total credit limited to 4 units, with a maximum of 2 units per quarter.

BUS 403 Records Management (4)

Problems in the creation, use, maintenance, storage, and disposition of records. Emphasis on records management as an administrative service. 3 lectures.

BUS 410 Management Policies and Systems (4)

Case study approach to current administrative systems, and related problems and policies of general management—to include such areas as personnel, production, procurement, marketing, and finance. 4 lecture-discussion periods. Prerequisite: senior standing and BUS 307, FIR 304 and MKT 305.

BUS 413 Purchasing and Contract Administration (4)

Buying practices of institutional, industrial, and governmental purchasing operations. Interrelationship of purchasing and the other aspects of the organization. Emphasis on quality, service and price. Legal aspects of purchasing and contract administration. Case problems. 4 lecture-discussions. Prerequisite: BUS 302, 307.

BUS 416 Industrial Relations (4)

A micro analysis and emphasis upon industrial relations problems and developments in modern society; collective bargaining, labor law, managerial and economic factors relevant to union-management relations, wage markets, impact of public policy on the settlement of industrial disputes; increasing role of arbitration. 4 lectures. Prerequisite: BUS 301, BUS 307 and senior standing.

BUS 418 Contributions of Human Behaviorists to Business (4)

Early behaviorist breakthroughs in the business environment. Expansion of the human behavior school of management following World War II. Modern behaviorist thought as it applies to business administration. 4 lectures.

BUS 441, 442 Internship in Business Management (1-8) (1-8)

On-the-job training in business management involving new, collegiate-level learning experiences. Experiences may be useful as a basis for senior projects. Prerequisite: consent of internship coordinator.

BUS 461, 462 Senior Project (2) (2)

Selection and completion of a project under faculty supervision. Projects typical of problems which graduates must solve in their fields of employment. Formal report is required. Prerequisite: Senior standing. Required minimum of 120 hours.

BUS 463 Undergraduate Seminar (2)

Study and discussion by students of recent developments in the students' major fields. 2 lectures. Prerequisite: Senior standing or permission of instructor.

BUS 499 Special Topics for Upper Division Students (1-4)

Group study of a selected topic, the title to be specified in advance. Total credit limited to 8 units, with a maximum of 4 units per quarter. Prerequisite: permission of instructor.

DATA PROCESSING

Ronald W. Eaves, *Chairman*

Thomas H. Athey
Donald L. Bell
Peter P. Dawson
Koichiro R. Isshiki
Richard H. Smith
Robert E. Stroud
Robert V. Stumpf
Ward D. Testerman
Gerald E. Wagner

The data processing profession attracts many creative people because they find this dynamic field exciting, challenging, and rewarding.

The Cal Poly approach to data processing is unique in the field of computer education in several ways. First, the data processing courses are integrated with fundamental business administration courses to meet the needs of the major job market, business and government. Second, the program concentrates on the practical application of computer use rather than internal computing theory. Third, the program is designed with the student in mind—he or she is prepared not only for well paid employment but also a lifetime of learning and professional growth.

A student majoring in data processing will become prepared to seek employment in a variety of computer related fields such as programming, systems analysis or of computers. Regardless of the student's career interests, the data processing major provides the background needed for the use of computers as a tool for solving business research and forecasting problems and for supporting all operations within an organization.

CORE COURSES FOR THE MAJOR

(Required of all students)

Principles of Accounting	ACC	124	(4)
Introduction to Managerial Accounting	ACC	125	(4)
Business Law	BUS	301	(4)
Business Law	BUS	302	(4)
Management Principles and Theory	BUS	307	(4)
Business Statistics	BUS	314	(4)
Quantitative Analysis in Business	BUS	315	(4)
Management Policies and Systems	BUS	410	(4)
Introduction to Computing	DP	110	(4)
Computer Programming Principles	DP	224	(4)
Systems Analysis	DP	225	(4)
COBOL Programming	DP	244	(4)
Systems Documentation	DP	245	(4)
Data Management Concepts Systems Design	DP	315	(4)
Advanced Computer Programming	DP	334	(4)
Computer Based Information Systems	DP	335	(4)
Data Processing Management	DP	458	(4)
Senior Project	DP	461	(2)
Senior Project	DP	462	(2)
Undergraduate Seminar	DP	463	(2)
Introduction to Financial Management	FIR	304	(4)
Managerial Finance	FIR	305	(4)
Principles of Marketing Management	MKT	305	(4)
Principles of Marketing Management	MKT	306	(4)

SUPPORT AND ELECTIVE COURSES

(Required of all students)

Accounting Concepts and Applications	ACC	300	(5)
American Civilization	AMC	201	(4)
American Civilization	AMC	202	(4)

Contribution of Human Behaviorists to Business	BUS	418	(4)
Report Writing	COM	216	(4)
Principles of Economics	ECON	201	(4)
Principles of Economics	ECON	202	(4)
Freshman Composition	ENG	104	(4)
Statistics	MAT	107	(3)
Introduction to Mathematical Analysis	MAT	109	(3)
General Psychology	PSY	201	(4)
Public Speaking	SP	100	(4)

DIRECTED ELECTIVES: Each DP major must select three of the following seven courses with approval of advisor.

Cost Accounting	ACC	211	(5)
Intermediate Managerial Accounting	BUS	310	(4)
Computer Applications in Management Science	DP	316	(4)
Assembly Language Programming	DP	364	(4)
Computer Based Business Simulation	DP	416	(4)
Comparative Programming Languages	DP	434	(4)
Advanced Computer Concepts	DP	457	(4)

Course Descriptions

DP 110 Introduction to Computing (4)

Basic concepts of computer organization, data representation, algorithms, flowcharting, and programming. Capabilities and limitations of the electronic computer; the computer as a problem-solving tool. 4 lectures.

DP 200 Special Problems for Lower Division Students (1-2)

Individual or group investigation, research, studies or surveys of selected problems. Total credit limited to 4 units, with a maximum of 2 units per quarter.

DP 214 Programming Practice (1)

Practice in writing programs to solve typical business problems for students who desire increased proficiency in the FORTRAN language. One 2-hour activity. Prerequisite: DP 110 or permission of instructor.

DP 224 Computer Programming Principles (4)

Flowcharting as a primary programming tool. Assembly language concepts. Use of FORTRAN language to solve several business problems in batch and time-sharing modes. 4 lectures and programming projects. Prerequisite: DP 110 or permission of instructor.

DP 225 Systems Analysis (4)

Problem definition, information gathering, analysis of facts, and evaluating courses of action. Tools and techniques of systems studies. Human aspects of systems analysis. Case studies. 4 lectures.

DP 244 COBOL Programming (4)

Structure of the COBOL programming language. Compiler operation capabilities and limitations. Use of COBOL language to solve several business problems. 4 lectures and programming projects. Prerequisite: DP 224 or permission of instructor.

DP 245 Systems Documentation (4)

Case study approach to the documentation of a computer based business system. Includes design and/or documentation of codes, input media, records, files, data and run controls, output, audit trails, run timings, file parameter summaries, and written instructions. 4 lectures and projects. Prerequisite: DP 225 or permission of instructor.

DP 299 Special Topics for Lower Division Students (1-4)

Group study of a selected topic, the title to be specified in advance. Total credit limited to 8 units, with a maximum of 4 units per quarter. Prerequisite: Permission of instructor.

DP 314 Data Management Concepts (4)

Practical Problems in the use of information storage and retrieval techniques. Includes sequential and random file organization, building and using directories, developing hashing algorithms using an inverted file structure and other file management techniques. 4 lectures and projects. Prerequisites: DP 224 and DP 244 or permission of instructor.

DP 315 Systems Design (4)

Creative design of computer based systems to solve business problems. Involves fact collection, situation analysis and preparation of systems flow-charts that outline problem solution. Case study approach. 4 lectures. Prerequisites: DP 225 and DP 245 or permission of instructor.

DP 316 Computer Applications in Management Science (4)

Analysis, modeling, and solving of quantitative business problems using student-prepared and standard statistical computer programs. 4 lectures and projects. Prerequisites: DP 224 and BUS 315, or permission of instructor.

DP 334 Advanced Computer Programming (4)

Practical business problems using various sorting techniques, internal tables, string data, list and tree structures, dynamic storage allocation, recursive subroutines, modular programming, and other advanced programming concepts. 4 lectures and programming projects. Prerequisite: DP 314 or permission of instruvtor.

DP 335 Computer Based Information Systems (4)

Theory of computer-based management information systems. Case studies on attempts to apply theory to complex business environment. 4 lectures. Prerequisite: DP 315 or permission of instructor.

student-prepared and standard statistical computer programs. 4 lectures and projects. Prerequisites: DP 224 and BUS 315, or permission of instructor.

DP 334 Advanced Computer Programming (4)

Practical business problems using various sorting techniques, internal tables, string data, list and tree struvtures, dynamic storage allocation, recursive subroutines, modular programming, and other advanced programming concepts. 4 lectures and programming projects. Prerequisite: DP 314 or permission of instructor.

DP 335 Computer Based Information Systems (4)

Theory of computer-based management information systems. Case studies on attempts to apply theory to complex business environment. 4 lectures. Prerequisite: DP 315 or permission of instructor.

DP 364 Assembly Language Programming (4)

Advanced applications of symbolic addressing concepts, address modification, macro instructions and assemblers. Use of assembly programs to optimize computer characteristics in processing data. 4 lectures and programming projects. Prerequisite: DP 244 or permission of instructor.

DP 400 Special Problems for Upper Division Students (1-2)

Individual or group investigation, research, studies or surveys of selected problems. Total credit limited to 4 units, with a maximum of 2 units per quarter.

DP 416 Computer Based Business Simulation (4)

The design and testing of models that simulate business subsystems. Literature, properties, classifications, and techniques of simulation models. Model construction and programming. 4 lectures. Prerequisites: DP 244 and BUS 314, or permission of instructor.

DP 434 Comparative Programming Languages (4)

A comparison of several higher level programming languages. Definition, history, standardization problems, structure, capabilities and limitations of each language. Programming practice in several types of languages. 4 lectures and programming projects. Prerequisite: DP 244 or permission of instructor.

DP 441, 442 Internship in Data Processing (1-8) (1-8)

Faculty supervised on-the-job educational experiences in a real world data processing environment. Allocation of credit is dependent on the nature of the work done and the number of hours worked. Students usually receive pay for participation. Prerequisite: permission of the internship coordinator.

DP 457 Advanced Computer Concepts (4)

Study of data communications and modern computer hardware. Survey of the technology and use of mini-computers and microprogramming. Prerequisites: DP 245 and DP 314, or permission of instructor.

DP 458 Data Processing M Management (4)

Organizational decision-making and behavioral problems confronted by top and middle management in the automation of data processing activities. Case study approach. 4 lectures. Prerequisite: senior standing or permission of instructor.

DP 461, 462 Senior Project (2) (2)

Selection, analysis, and solution of a real world data processing problem with minimal faculty supervision. Formal written report required. Prerequisite: senior standing.

DP 463 Undergraduate Seminar (2)

Research and discussion of current problems, opportunities, and developments in data processing. 2 lectures. Prerequisite: senior standing or permission of instructor.

DP 499 Special Topics for Upper Division Students (1-4)

Group study of a selected topic, the title to be specified in advance. Total credit limited to 8 units, with a maximum of 4 units per quarter. Prerequisite: permission of instructor.

FINANCE, INSURANCE, AND REAL ESTATE

Raymond C. Rauch, *Acting Chairman*

Wallace C. Benjamin
Paul A. Hatt
Richard T. Nelson
Raymond C. Rauch
Alvin C. Ruppert

The current business climate is a result of vast growth in all segments of the United States financial markets. The finance, insurance and real estate department at Cal Poly has designed specific courses of practical importance in financial management, securities analysis, real estate, and urban land development.

Students in the major may select those courses which best prepare them for a career in their specific area of interest.

The finance area offers academic preparation needed for managers in the banking and savings and loan industry as well as preparing students to work as budgeting or financial analysts in the corporate section of the business community.

Available courses in securities analysis prepare the student for careers in securities brokerage, public finance and bonding, pension fund and banking trust operations and institutional lending practices as carried out by the local loan officer.

The real estate program is designed to emphasize the private real estate market; brokerage, mortgage lending, appraisal, title operations, real property investment analysis, and property management.

Urban land studies and development examine the public or governmental aspects of real property; real estate law, site acquisitions, municipal planning, public finance, taxation policies, and careers related to these general areas of study.

CORE COURSES FOR MAJOR

(Required of all students)

Principles of Accounting	ACC	124	(4)
Introduction to Managerial Accounting	ACC	125	(4)
Business Law	BUS	301	(4)
Business Law	BUS	302	(4)
**Business Law	BUS	304	(4)
Management Principles and Theory	BUS	307	(4)
Business Statistics	BUS	314	(4)
Quantitative Analysis in Business	BUS	315	(4)
Introduction to Computing	DP	110	(4)
Systems Analysis	DP	225	(4)
Introduction to Financial Management	FIR	304	(4)
Managerial Finance	FIR	305	(4)
Fundamentals of Financial Analysis	FIR	360	(4)
Senior Project	FIR	461	(2)
Senior Project	FIR	462	(2)
Undergraduate Seminar	FIR	463	(2)

**(Transfer students with credit in one but not both law courses — BUS 301 or BUS 302 — will enroll in BUS 304)

Plus a minimum of 32 units of directed electives to be chosen from the following list with approval of an advisor:

Income Taxes	ACC	232	(3)
Accounting Concepts and Applications	ACC	300	(5)
Concepts of Finance and Investments	FIR	100	(4)
Prin of Real Est and Land Econ	FIR	106	(4)
Real Estate Law	FIR	270	(4)
Real Estate Appraisal Theory	FIR	280	(4)
Intermediate Corporate Finance	FIR	350	(4)

Financial Systems	FIR	353	(4)
Fundamentals of Risk and Insurance	FIR	357	(4)
Mortgage Banking	FIR	390	(4)
Security Analysis	FIR	430	(4)
Seminar in Portfolio Theory and Capital Markets	FIR	433	(4)
Evaluation of Financial Policy	FIR	440	(4)
Advanced Methods of Financial Analysis	FIR	460	(4)
Urban Land Utilization and Development	FIR	480	(4)
Real Estate Investment Analysis	FIR	483	(4)
Advanced Real Estate Appraisal Theory	FIR	486	(4)
Real Property Management	FIR	490	(4)

SUPPORT AND ELECTIVE COURSES

(Required of all students)

American Civilization	AMC	201*	(4)
American Civilization	AMC	202*	(4)
Research Design and Methodology	BUS	390	(4)
Management Policies and Systems	BUS	410	(4)
Principles of Economics	EC	201*	(4)
Principles of Economics	EC	202*	(4)
Money and Banking	EC	308	(4)
Freshman Composition	ENG	104*	(4)
Descriptive Statistics	MAT	107*	(3)
Marketing Principles	MKT	305	(4)
Marketing Management	MKT	306	(4)
Physical Education	PE	141*	(3)
General Psychology	PSY	201*	(4)
Public Speaking	SP	100*	(4)
Natural Sciences			(8)
Humanities			(8)
Other General Education			(10)
Free Electives			(33)

*May be used for the general education requirement. Select unspecified courses from the general education list.

Course Descriptions

FIR 100 Concepts of Finance and Investments (4)

Analysis of the functions and concepts of financial management as applied to persons, business, real estate and investments. Includes examination of cash flow, sources of funds, capital investments, private investments and security market theory. 4 lecture-discussions.

FIR 106 Principle of Real Estate and Land Economics (4)

Analysis of the fundamentals, nature and classification of real property, emphasizing land utilization, urban study and growth, real estate market analysis and property valuation. 4 lecture and discussion periods.

FIR 200 Special Problems for Lower Division Students (1-2)

Individual or group investigation, research, studies or surveys of selected problems. Total credit limited to 4 units, with a maximum of 2 units per quarter.

FIR 270 Real Estate Law (4)

Rights and liabilities surrounding the acquisition, possession and transfer of real property. Definition and description of land including: easements, deeds, zoning ordinances, mortgages, foreclosure actions, landlord and tenant. 4 lecture-discussion periods. Prerequisites: FIR 106.

FIR 280 Real Estate Appraisal Theory (4)

An analysis of various approaches or measures of value as applied to all real property, with emphasis on urban properties. A survey of the value theory concepts as related to practical application through use of specific problem solving via the application of real property evaluation through demonstration reports. Prerequisite: FIR 106. 4 lecture-discussions.

FIR 299 Special Topics for Lower Division Students (1-4)

Group study of a selected topic, the title to be specified in advance. Total credit limited to 8 units, with a maximum of 4 units per quarter. Prerequisite: Permission of instructor.

FIR 304 Introduction to Financial Management (4)

An introduction to the principles and practices of financial management. Stress is placed on understanding how a business raises funds, and how these funds should be allocated within a firm. Discussion covers such topics as cash flow analysis, financial statements analysis, and equity and debt issues in the financial markets. lecture-discussions. Prerequisite: ACC 124.

FIR 305 Managerial Finance (4)

The second course in financial management with the stress placed on understanding the basic principles of financial decision making. Concepts covered include present value analysis, decision making with risk, use of leverage and investment portfolio analysis. 4 lecture-discussions. Prerequisite: FIR 304.

FIR 317 Rights of Way — Acquisition and Appraisal (4)

Practical applications and methods of appraising. This includes related legal and economic background factors, vital concepts of market value, public use and public necessity, just compensation, severance damages, leasehold interests, specific case studies and other definite factors. 4 lectures. For engineering technology majors and other majors with permission of instructor.

FIR 350 Intermediate Corporate Finance (4)

Theory of the firm applied to the financial functions of acquisition of funds, capital structure, allocation of funds, cost of capital and alternative valuation and investment criteria. Prerequisite: FIR 360.

FIR 353 Financial Systems (4)

A study of the institutional sources of funds and their relationship to the capital and money markets. Prerequisites: FIR 360. Individual projects and case study.

FIR 357 Fundamentals of Risk and Insurance (4)

Economics, legal and organizational aspects of insurance are investigated. Property insurance for personal and business uncertainties are covered. Emphasis is on the insurance mechanism as a tool for handling risk. Analysis and discussion of case problems dealing with current trends. 4 lecture-discussion periods.

FIR 360 Fundamentals of Financial Analysis (4)

This course is meant to introduce the student to methods of financial analysis. It will cover financial leverage, capital structure, portfolio theory and decision analysis. Although these can be advanced topics, the course will be designed to offer these concepts at a level of complexity suitable for the beginning finance major or business student. The course will be a combination of lectures and problem solving sessions. Prerequisite: BUS 314, FIR 305.

FIR 390 Mortgage Banking (4)

Analysis of financial institutions and procedures involved in financing real estate, mortgage banking, and lending. Mortgage banking case problems. 4 lecture-discussion periods. Prerequisites: FIR 270, FIR 280, and FIR 360.

FIR 400 Special Problems for Upper Division Students (1-2)

Individual or group investigation, research, studies or surveys of selected problems. Total credit limited to 4 units, with a maximum of 2 units per quarter.

FIR 407 Finance, Insurance and Bonding (4)

Analysis of construction operations to determine the types and amounts of financing selection of alternative sources using the tools of financial analysis. Insurance and risk problems of the construction industry including bonding and techniques to handle risk. 4 lectures. For engineering technology majors and other majors with approval of instructor.

FIR 420 Institution Financial Management (4)

Application of financial management to the unique administrative problems of institutions such as cash flow, cost control, risk management, and capital funding from public and private sectors. 4 lectures and case studies. Prerequisite: FIR 304, 305, 307.

FIR 430 Security Analysis (4)

The study of the behavior of security markets investment policy, quantitative and qualitative factors in analysis. Subjects covered include analysis of (1) the firm, (2) the industry, and (3) the financial environment. Prerequisite: FIR 360. 4 lecture-discussions.

FIR 433 Seminar in Portfolio Theory and Capital Markets ((4)

In depth analysis of setting investment objectives, managing portfolios, measuring portfolio performance and the role of the stock selection and timing for portfolio management. Prerequisite: FIR 360.

FIR 440 Evaluation of Financial Policy (4)

Contributions in the major areas of financial management. Encompasses both analytical and conceptual tools. Stresses funds procurement, asset management, external analysis of the firm and financial decision-making criteria. Prerequisites: FIR 350, 4 lecture-discussions.

FIR 441, 442 Internship in Finance (1-8) (1-8)

On-the-job training in finance involving new, collegiate-level learning experiences. Experiences may be useful as a basis for senior projects. Prerequisite: Permission of the Coordinator of Business Internships.

FIR 450 Risk Management (4)

Methods of handling risk and uncertainty as applied to the business organization. Assumption of risk, transfer of risk, self insurance, control of hazards, perils, and loss protection and prevention. Emphasis on tools and analysis of risk management using current problems and cases. 4 lecture-discussions. Prerequisite: FIR 357, 440.

FIR 460 Advanced Methods of Financial Analysis (4)

Techniques of financial analysis. Preparation for graduate work in finance, and for jobs requiring a reasonable facility with quantitative financial methods. Utilizing a combination of lectures and problem sessions the course will cover advanced portfolio theory and security analysis, advanced stochastic and Bayesian methods, methods in business to compensate for risk and a review of current articles. Prerequisite: BUS 315, FIR 360.

FIR 461, 462 Senior Project (2) (2)

Selection and completion of a project under faculty supervision. Projects typical of problems which graduates must solve in their fields of employment. Formal report is required. Prerequisite: Senior standing. Required minimum of 120 hours.

FIR 463 Undergraduate Seminar (2)

Study and discussion by students of recent developments in the student's major field. 2 lectures. Prerequisite: Senior standing or permission of instructor.

FIR 480 Urban Land Development (4)

Planning, estimating and development of real property. Emphasis will be on urban land operations and investment projects. 4 lecture-discussions. Prerequisite: FIR 390.

FIR 483 Real Estate Investment Analysis (4)

Specific case or problem solving methods applied to various levels involved in analyzing investments, marketing, and urban growth as found in real property. Specific emphasis will be placed upon the physical, locational, and legal basis, and/or urban setting concepts of the value and use of real property. Prerequisite: FIR 390 (prefer senior standing). 4 lecture-discussions.

FIR 486 Advanced Real Estate Appraisal Theory (4)

The procedure appropriate to appraising business land, residential land, business buildings, residential structures and farm properties. Special reference will be made to scientific systems developed to facilitate valuation. 4 lecture-discussions. Prerequisites: FIR 280.

FIR 490 Real Management (4)

A study of general practices, the legal aspects, and problem areas which are encountered by the professional property manager. 4 lecture-discussions. Prerequisite: FIR 305, 483.

FIR 499 Special Topics for Upper Division Students (1-4)

Group study of a selected topic, the title to be specified in advance. Total credit limited to 8 units, with a maximum of 4 units per quarter. Prerequisite: permission of instructor.

HOTEL AND RESTAURANT MANAGEMENT

Donald E. Lundberg, *Chairman* George B. Quinn Ralph M. Scarrow

The program in hotel and restaurant management has been designed to meet the growing need for managers in the rapidly expanding hotel and restaurant segments of the service sector of the American economy. Opportunities for building successful careers in these two fields are particularly good in the western states, including California.

The major focus of this program is to develop those managerial skills, abilities, and competencies essential to all professional managers as well as those unique to managers in the hotel and restaurant fields.

In addition to helping students develop basic managerial skills, majors in this program are expected to gain insight into the purchasing, control, preparation, and serving of food and to become knowledgeable about the economics and social aspects of the hospitality and leisure-time industries.

Laboratory experiences in foods and nutrition, interior design, and hotel and restaurant administration; field trips; individual and group projects; and practical work experience, gained via a supervised internship, are all important aspects of this program.

CORE COURSES FOR MAJOR

(Required of all students)

Principles of Accounting	ACC	124	(4)
Intro to Managerial Accounting	ACC	125	(4)
Business Law	BUS	301	(4)
Management Principles and Theory	BUS	307	(4)
Introduction to Computing	DP	110	(4)
Introduction to Leisure Industry	HRM	101	(4)
Senior Project	HRM	461	(2)
Senior Project	HRM	462	(2)
Undergraduate Seminar	HRM	463	(2)
Principles of Marketing Management	MKT	305	(4)
Principles of Marketing Management	MKT	306	(4)

Students are to select 21 units from the following with the consent of their advisor:

Meat Utilization	AS	327	(3)
Food Procurement	FN	224	(3)
Quantity Food Preparation	FN	331	(4)
Food Equipment and Layout	FN	427	(4)
Institutional Management	FN	436	(3)
Institutional Interiors	HE	307	(4)
Travel Management	HRM	201	(3)
Restaurant Management	HRM	205	(4)
Hotel Management	HRM	210	(4)
Wine & Spirits	HRM	215	(4)
Catering Management	HRM	301	(4)
Food & Beverage Cost Controls	HRM	302	(4)
Property Management	HRM	305	(4)
Hotel and Restaurant Management Law	HRM	310	(4)
International Travel	HRM	415	(4)

SUPPORT AND DIRECTED ELECTIVES

(Required of all students)

American Civilization	AMC	201*	(4)
American Civilization	AMC	202*	(4)
Business Statistics	BUS	314	(4)
Contributions Human Behaviorists to Business	BUS	418	(4)
Systems Analysis	DP	225	(4)
Principles of Economics	EC	201*	(4)
Principles of Economics	EC	202*	(4)
Freshman Composition	ENG	104*	(4)
Introduction to Financial Management	FIR	304	(4)
Managerial Finance	FIR	305	(4)
Introduction to Foods	FN	121	(4)
Nutrition and Physical Activity	FN	205	(3)
Food Services in Institutions	FN	337*	(4)
Introduction to Statistics	MAT	107*	(3)
Physical Education	PE	141*	(3)
Public Speaking	SP	100*	(4)

Natural Sciences	(6)
Humanities	(6)
Courses to complete general education requirements	**(10)
Electives	(56)

*May be used for the general education requirement. Select appropriate courses from general education list.

**Must include four courses from a minimum of two schools other than the School of Business Administration for fulfillment of the breadth requirements.

Course Descriptions

HRM 101 Introduction to the Leisure Industry (4)

Survey of the scope, history and interrelationships of hotel, restaurant, travel and leisure industries; the economic and social influences of leisure; vocational opportunities and limitations. 4 lectures.

HRM 200 Special Problems for Lower Division Students (1-2)

Individual or group investigation, research, studies or surveys of selected problems. Total credit limited to 4 units, with a maximum of 2 units per quarter.

HRM 201 Travel Management (4)

Comprehensive study of travel management; its principles, practices, philosophies and systems. Examination of tourism as a developing industry, its travel modes, organizations, laws and social and economic impact. Field trips. 4 lectures.

HRM 205 Restaurant Management (4)

Management principles for restaurants, planning and organizing concepts; supervisory training, payroll analysis, merchandising approaches, cost control systems, scope and importance of restaurant industry, field trips to restaurants. 4 lectures.

HRM 210 Hotel Management (4)

Comprehensive study of management in the lodging industry; consideration of management responsibilities for planning, financial, promotional, personnel, and control functions; administrative techniques and procedures needed for effective operation of a hospitality system. Field trips. 4 lectures.

HRM 215 Wines and Spirits (4)

Introduction to wines, grapes, wine-making, spirits, processing, storage and inventory control of spirits. History, economics, grography, evaluation and comparative tasting of wines. Selection, storage, service of wines, wine lists, wine pricing, wine sales promotion and profits. Wine and food. Lecture and Laboratory. Prerequisite: None.

HRM 299 Special Topics for Lower Division Students (1-4)

Group study of a selected topic, the title to be specified in advance. Total credit limited to 8 units, with a maximum of 4 units per quarter. Prerequisite: permission of instructor.

HRM 301 Catering Management (4)

The marketing and management of catering on and off-premise special functions. Planning, financing, organizing, marketing and operating ths catering service. The student plans, markets, prepares and serves functions in the Kellogg-West Dining Room. Emphasis is on creating and managing catered functions. Lecture and Laboratory. Prerequisite: HRM 215, FN 121, FN 205.

HRM 302 Food and Beverage Cost Controls (4)

Analyzing and controlling costs in food service and beverage operations to create a food and beverage cost control system for any size food and beverage operation, install it and supervise its operation. 4 Lectures. Prerequisite: ACC 124.

HRM 305 Property Management (4)

Examines the technical, mechanical and economic aspects of hotel, motel, or restaurant management in the construction, renovation and maintenance of the physical plant; engineering and housekeeping staff coordination needed to maintain the desired environment. 4 lectures.

HRM 310 Hotel and Restaurant Management Law (4)

Fundamentals of law which are of particular importance to hotels, restaurants, resorts and associated businesses; includes duties, rights and liabilities of the innkeeper-host and his guests. Cases. 4 lectures. Prerequisite: BUS 301.

HRM 400 Special Problems for Upper Division Students (1-2)

Individual or group investigation, research, studies or surveys of selected problems. Total credit limited to 4 units, with a maximum of 2 units per quarter.

HRM 415 International Travel (4)

Description and analysis of international travel from the view of the traveler and the travel entrepreneur. Problems of travel, destination development, analysis of major international travel destinations. 4 lectures. Prerequisite: HRM 201 recommended but not required.

HRM 441, 442 Internship in Hotel and Restaurant Management (1-8) (1-8)

On-the-job training in some phase of hotel, restaurant or travel. The experience must be new to the student. Analytical reports are made periodically to the faculty coordinator. One unit of credit is granted for each 150 hours of training. Units of college credit are dependent upon departmental approval. Prerequisite: HRM 101 and permission of the instructor.

HRM 461, 462 Senior Project (2) (2)

Management related on-the-job experience; selection of a typical current development or problem in the hotel, restaurant or travel industry; completion of a written project under faculty supervision. Prerequisite: senior standing. Required minimum 120 hours.

HRM 463 Undergraduate Seminar (2)

Study and discussion by students of their senior projects. Recent problems and developments in the students' major fields. Two seminar meetings. Prerequisite: senior standing or permission of the instructor.

HRM 499 Special Topics for Upper Division Students (1-4)

Group study of a selected topic, the title to be specified in advance. Total credit limited to 8 units, with a maximum of 4 units per quarter. Prerequisite: permission of instructor.

MARKETING MANAGEMENT

James R. Hill, *Acting Chairman*

Rajinder Arora
Dolores A. Barsellotti
Fred G. Cutler
Arthur Johnsen
James C. Petersen
L. George Smith
Stanley B. Smith
Charles L. Taylor

The field of marketing management involves analysis of the ways business firms plan, organize, administer and control their resources to achieve marketing objectives. Business plans increasingly begin with consideration of market forces and opportunities as the basis for designing whole systems of action.

The curriculum focuses on market forces, growth and survival of firms in competitive markets, and the marketing strategy and tactics of the firm. Courses are oriented toward providing a basic knowledge of the tools, types of organization, and institutions utilized in performing various marketing functions; the student will develop the ability to solve problems and make decisions, to plan and implement marketing policies, strategies and procedures.

Through proper course selection, a student can develop specialized interests; this will prepare him for a career in general marketing management, selling and sales management, retail merchandising and management, market research and analysis, advertising and promotion management, physical distribution management, international marketing, or industrial marketing.

CORE COURSES FOR MAJOR

(Required of all students)

Principles of Accounting	ACC	124	(4)
Introduction to Computing	DP	110	(4)
Systems Analysis	DP	225	(4)
Marketing Communications	MKT	208	(4)
Principles of Marketing Management	MKT	305	(4)
Principles of Marketing Management	MKT	306	(4)
Advertising Management	MKT	307	(4)
Sales & Sales Prom Mgmt	MKT	310	(4)
Consumer Behavior	MKT	311	(4)
Marketing Research	MKT	408	(4)
Marketing Problems	MKT	421	(4)
Senior Project	MKT	461	(2)
Senior Project	MKT	462	(2)
Undergraduate Seminar	MKT	463	(2)
(1) Major Electives			(18)

(1) The Major Electives Will be Selected from:

Computer Programming Prin	DP	224	(4)
Computer Applications in Managerial Science	DP	316	(4)
Retail Store Management	MKT	308	(4)
Marketing Logistics	MKT	309	(4)
Industrial Marketing	MKT	407	(4)
International Business Env.	MKT	413	(4)
International Marketing	MKT	414	(4)
Legal Environment of Marketing	MKT	419	(4)
Management Science Applications to Marketing	MKT	420	(4)
Marketing Strategy Formulation	MKT	424	(2)
Internship in Marketing	MKT	441	(1-8)
Internship in Marketing	MKT	442	(1-8)

In addition special topics courses (299 and 499) and special projects courses (200 and 400) may be utilized with the approval of the adviser.

SUPPORT AND ELECTIVE COURSES

(Required of all students)

Introduction to Managerial Accounting	ACC	125	(4)

American Civilization	AMC	201*	(4)
American Civilization	AMC	202*	(4)
Business Law	BUS	301	(4)
Business Law	BUS	302	(4)
Management Principles and Theory	BUS	307	(4)
Intermediate Managerial Accounting	BUS	310	(4)
Business Statistics	BUS	314	(4)
Quantitative Analysis	BUS	315	(4)
Management Policies and Systems	BUS	410	(4)
Business Communications	COM	218*	(3)
Principles of Economics	EC	201*	(4)
Principles of Economics	EC	202*	(4)
Freshman Composition	ENG	104*	(4)
Freshman Composition	ENG	105*	(4)
Intro to Financial Management	FIR	304	(4)
Managerial Finance	FIR	305	(4)
Descriptive Statistics	MAT	107*	(3)
Physical Education, 100-series			(3)
General Psychology	PSY	201*	(4)
Public Speaking	SP	100*	(4)
Natural Sciences			*(6)
Humanities			*(6)
Other General Breadth Requirements			**(6)
Electives			(41)

*May be used for the general education requirement. Select unspecified courses from the general education list.

**Must include four courses from a minimum of two schools other than the School of Business Administration for fulfillment of the breadth requirement.

Course Descriptions

MKT 200 Special Problems for Lower Division Students (1-2)

Individual or group investigation, research, studies or surveys of selected problems. Total credit limited to 4 units, with a maximum of 2 units per quarter.

MKT 201 The Consumer, Marketing and Society (4)

Overview of the marketing system and learning theory as applied to the needs/wants of individual consumers. Designed to make the individual an efficient consumer. Discusses advertising, personal selling, pricing and product characteristics as they affect the individual, together with the increasing role of government. 4 lecture-discussions.

MKT 208 Marketing Communications (4)

Persuasive personal communication on behalf of products, concepts, services. Individual counseling on oral presentations by students. 4 lecture-discussions.

MKT 299 Special Topics for Lower Division Students (1-4)

Group study of a selected topic, the title to be specified in advance. Total credit limited to 8 units, with a maximum of 4 units per quarter. Prerequisite: Permission of instructor.

MKT 305, 306 Principles of Marketing Management (4) (4)

Meeting the firm's objectives by developing a marketing strategy that can best satisfy customers and society. Determination of decisions concerning product, price, promotion and distribution for given customer situations. Courses to be taken in sequence. 4 lecture-discussions.

MKT 307 Advertising Management (4)

Management, planning, creation, and evaluation of advertising messages. Role of advertising in the marketing mix and its influence on consumer purchase decisions. Application of behavioral science in understanding the target market and the creation of "commercials. 4 lecture-discussions. Prerequisites: MKT 306 or permission of instructor.

MKT 308 Retail Store Management (4)

Examination and evaluation of changing concepts of retailing from a management viewpoint. Philosophy of modern management and measures of retail productivity are employed in individual student field projects. 4 lectures, case study. Prerequisite: MKT 306.

MKT 309 Marketing Logistics (4)

Integration of transportation, warehousing and facility location for optimum performance of distribution systems relative to cost and customer service. Analysis and discussion of situation problems in logistical support. Prerequisite: MKT 306.

MKT 310 Sales and Sales Promotion Management (4)

Analysis of the Field Sales Manager as a professional marketing tactician in a marketing oriented firm. Emphasis on the theoretical and applied approaches utilized to effectively manage a field sales force. Analysis of sales promotion programs. 4 lecture-discussions. Prerequisites: MKT 208, 306, or permission of instructor.

MKT 311 Consumer Behavior (4)

An analysis of the various factors that affect the consumer during his pre-purchase, purchase, and post-purchase decision-making process. Emphasis is upon a thorough understanding of the consumer to facilitate the development of effective marketing strategy. 4 lecture-discussions. Prerequisite: MKT 306.

MKT 400 Special Problems for Upper Division Students (1-2)

Individual or group investigation, research, studies or surveys of selected problems. Total credit limited to 4 units, with a maximum of 2 units per quarter.

MKT 407 Industrial Marketing (4)

Marketing structure for industrial goods and services. Written and oral analysis and defense of specific case problems. 4 lectures. Prerequisite: MKT 306.

MKT 408 Marketing Research (4)

Research process as an aid to decision-making in marketing. Fundamental techniques and practical experience in research methodology. Data sources, research design, sampling, investigation, analysis, and presentation of results of field projects. 4 lecture-discussions. Prerequisite: MKT 306, BUS 314.

MKT 413 International Business Environments (4)

Examination of major environmental factors and dynamic external forces which affect international business organizations. Reactions, responsibilities, and interrelationships of multinational business corporations and governments. 4 lectures. Prerequisite: MKT 306.

MKT 414 International Marketing (4)

Planning and organizing for international marketing operations. Cultural, economic and political influences on business arrangements in overseas markets and development of appropriate strategies. Analysis of management practices and problems. 4 lectures. Prerequisite: MKT 306.

MKT 419 Legal Environment of Marketing (4)

A critical analysis of the Federal laws relevant to the marketing process and assessment of the legal problems growing out of current marketing strategies. Hypothetical case analyses. 4 lecture-discussions. Prerequisites: MKT 306, BUS 302, or permission of instructor.

MKT 420 Management Science Applications in Marketing (4)

Application of mathematics and statistical methods in formulating and solving marketing problems. Multiple regression, discriminant analysis, principal component analysis. Concepts of design of experiments and decision theory. Elementary optimization models. Prerequisites: MKT 306, BUS 314, or permission of instructor.

MKT 421 Marketing Problems (4)

Application of marketing theory to contemporary marketing problems. Emphasis on the techniques of successful marketing decision-making. Problem approach utilized to develop student's ability to integrate all major areas of marketing. 4 lecture-discussions. Prerequisites: MKT 306 and senior standing.

MKT 424 Marketing Strategy Formulation (2)

Experience in decision-making in a realistic market environment. Emphasis on formulation and execution of marketing strategy. Testing of theories and concepts used in previous courses. Two lecture-discussions. Prerequisites: MKT 306 and senior standing.

MKT 441, 442 Internship in Marketing (1-8) (1-8)

Faculty supervised on-the-job educational experience in a real world marketing management environment. Allocation of unit credit is dependent upon the nature of the work done, the level of responsibility and the number of hours worked. Prerequisite: Permission of the departmental internship coordinator.

MKT 461, 462 Senior Project (2) (2)

Selection and completion of a project under faculty supervision. Projects typical of problems which graduates must solve in their fields of employment. Formal report is required. Prerequisite: Senior standing. MKT 408 or concurrent enrollment in MKT 408.

MKT 463 Undergraduate Seminar (2)

Study and discussion by students of recent developments in the students' major fields. 2 meetings. Prerequisite: Senior standing or permission of instructor.

MKT 499 Special Topics for Upper Division Students (1-4)

Group study of a selected topic, the title to be specified in advance. Total credit limited to 8 units, with a maximum of 4 units per quarter. Prerequisite: permission of instructor.





SCHOOL OF ENGINEERING

Beaumont Davison, Dean

Rodney D. Sutherland, Associate Dean

The School of Engineering is a professional engineering school whose purpose is to provide both undergraduate and graduate instruction in engineering. To accomplish its objectives, the School of Engineering is comprised of seven degree-granting departments and an engineering services department.

The degree of bachelor of science is offered in aerospace engineering, chemical engineering, civil engineering, electrical and electronics engineering, industrial engineering, mechanical engineering, and engineering technology.

The curricula in aerospace engineering, chemical engineering, civil engineering, electrical and electronics engineering, and mechanical engineering are accredited by the Engineers' Council for Professional Development.

All undergraduate engineering curricula are designed to give the student an understanding of the fundamental principles underlying scientific engineering and engineering practice. Each curriculum consists of four sequences: basic sciences and mathematics, humanities and social sciences, engineering sciences, and engineering analysis, design and systems.

Included in the basic sciences and mathamatics sequence are general chemistry, covering inorganic chemistry and selected topics in organic and physical chemistry; physics, including both classical and modern physics; mathematics through calculus and ordinary differential equations.

The humanities and social sciences sequence consists of American history, American government, principles of economics, and an elective group providing a means of broadening the perspective of the student in humanities.

The sequence in engineering sciences consists of studies in mechanics of solids, fluid mechanics, thermodynamics, transfer and rate mechanisms, electrical theory and the nature and properties of materials.

The engineering analysis, design and systems sequence is directed toward the creative and practical phases of economic design, involving analysis, synthesis, and engineering research and development. This sequence is the most distinctive feature of the engineering curricula, since it is the element of creative and economic design which distinguishes the engineer from the pure scientist.

Unlike the traditional engineering curricula which initiate course work in the major department in the junior year, engineering orientation courses begin in the freshman year, and are taken concurrently with mathematics, basic science and general education courses. Thus, the Cal Poly student obtains motivation and acquires knowledge of professional value in his chosen field as he progresses through his academic career.

Student chapters of major engineer-

ing professional societies offer co-curricular opportunities related to the course of study. Several chapters of national engineering honorary societies have also been installed at Cal Poly. The represented societies include Tau Beta Pi, all-engineering; Tau Alpha Pi, engineering technology; Pi Tau Sigma, mechanical engineering; and Eta Kappa Nu, electrical and electronics engineering.

Departments and Majors

MASTER OF ENGINEERING
Henry M. Clanton,
Graduate Studies Coordinator

AEROSPACE ENGINEERING
George R. Graves, Chairman
Aerospace major (BS)

CHEMICAL AND MATERIALS ENGINEERING
C. James Barr, Chairman
Chemical Engineering major (BS)

CIVIL ENGINEERING
Ray Morales, Chairman
Civil Engineering major (BS); Options in Civil Engineering, Water Resources Engineering

ELECTRICAL AND ELECTRONICS ENGINEERING
Richard J. Hermsen, Chairman
Electrical and Electronics Engineering major (BS)

ENGINEERING SERVICE
Quay D. Ives, Chairman

ENGINEERING TECHNOLOGY
James P. Todd, Chairman
Engineering Technology major (BS)

INDUSTRIAL ENGINEERING
Joseph P. Wymer, Chairman
Industrial Engineering major (BS)

MECHANICAL ENGINEERING
Kenneth J. Schneider, Chairman
Mechanical Engineering major (BS)

AGRICULTURAL ENGINEERING
see School of Agriculture

Courses in Related Engineering

EGR 126 Special Topics in Mathematics (3)

Solutions of first and second order homogeneous and non-homogeneous linear differential equations with constant coefficients, with applications in electric circuit theory; matrix algebra and determinants; introduction to infinite series and euler's equation. Not open to Mathematics majors. 3 lectures. Corequisite: MAT 116. Not open to students with credit for MAT 215 or 241.

EGR 201 Role of Engineering in Society (3)

A study of the development of technology, explosion of knowledge in the scientific fields; impact on culture, education and economics; automation; current developments in industry and technology. For non-engineering majors. 3 lectures.

Graduate courses are listed in the graduate section of the catalog. See p. 392.

AEROSPACE ENGINEERING

George R. Graves, *Chairman*

Donald C. Curran
Conrad F. Newberry
Rodney D. Sutherland
Joseph W. McKinley
Arthur G. Powell

Traditionally the aerospace engineer has been involved with the design and development of high speed vehicles such as aircraft, missiles and spacecraft. In recent years this list has evolved to include ocean vessels and high speed land vehicles. The extreme environments in which the above class of vehicles operate have dictated the construction of the most complex engineering systems devised by man. The aerospace engineer is confronted with problems which cannot be defined fully and require imaginative and sophisticated solutions.

The department offers a major in aerospace engineering. The major provides a broad background in the humanities and social sciences, mathematics, basic science, engineering science, analysis, design and systems. The basic concepts taught in the above areas are illustrated and reinforced by applications taken from current industrial practice. The advanced engineering (applied mechanics, computer applications, systems analysis, etc.) which has been pioneered by the aerospace industry is a mainstay of the program. Facilities available for experimental studies include subsonic and supersonic wind tunnels, environment simulation equipment, flight structures laboratory, and an aerospace construction laboratory.

Graduates of the program are prepared to do productive work in their first job as well as to grow with their profession throughout their engineering career. The curriculum is designed to prepare a student for direct entry into the engineering profession and for graduate school. The aerospace engineering curriculum is accredited by the Engineers' Council for Professional Development.

Aerospace engineering students have the opportunity to join the student branch of the American Institute of Aeronautics and Astronautics, a national society organized for the advancement of aerospace knowledge.

CORE COURSES FOR MAJOR

(Required of all students)

Aerospace Engr Fund	ARO	124	(2)
Aerospace Engr Fund	ARO	125	(2)
Aerospace Engr Fund	ARO	126	(2)
Experimentation Systems	ARO	244	(2)
Intro to Systems Egr	ARO	245	(2)
Systems Engr	ARO	246	(2)
Vector Fluid Dynamics	ARO	301	(4)
Energy, Mass & Moment Trans	ARO	304	(4)
Subsonic Aerodynamics	ARO	305	(4)
Gas Dynamics	ARO	311	(4)
Propulsion Systems	ARO	312	(4)
Intro to Structural Mech	ARO	326	(4)
Aerospace Structural Mech	ARO	327	(4)
Supersonic Aerodynamics	ARO	404	(4)
Dynamics of Aerospace Systems	ARO	406	(4)
Advanced Aerospace Analysis	ARO	444	(3)

Advanced Aerospace Analysis	ARO	445	(3)
Adv Aerospace Design Proj	ARO	446	(2)
Senior Project	ARO	461	(2)
Senior Project	ARO	462	(2)
Undergraduate Seminar	ARO	463	(2)
Vector Statics	ME	214	(3)
†Approved Electives			(18)

SUPPORT AND ELECTIVE COURSES

(Required of all students)

American Civilization	AMC	201*	(4)
American Civilization	AMC	202*	(4)
Life Science	BIO	110*	(3)
General Chemistry	CHM	111*	(3)
General Chemistry	CHM	112*	(3)
General Chemistry Lab	CHM	151*	(1)
General Chemistry Lab	CHM	152*	(1)
Principles of Economics	EC	201*	(4)
Elements of Elec Engr	EEE	231	(4)
Elec Instru & Control	EEE	333	(4)
Analog Comp Lab	EEE	343	(1)
Freshman Composition	ENG	104*	(4)
Descriptive Geometry	ESG	125	(2)
or Comp Aided Drafting	ESG	210	
Analytical Geom & Calc	MAT	114*	(3)
Analytical Geom & Calc	MAT	115*	(3)
Analytical Geom & Calc	MAT	116*	(4)
Calc of Several Variables	MAT	214	(4)
Calc of Several Variables	MAT	215	(4)
Differential Equations	MAT	216	(4)
Laplace Trans & Fourier Ser	MAT	317	(3)
Math Analysis of Engr Prob	MAT	318	(3)
Vector Dynamics	ME	215	(4)
Thermodynamics	ME	301	(4)
Materials Science	MTE	207	(3)
Physical Education 100-series			(3)
General Physics	PHY	131*	(4)
General Physics	PHY	132*	(4)
General Physics	PHY	133*	(4)
Basic Science Elective			(3)
Humanities		*	(8)
Social Science—Humanities		*	(7)
Electives			(5)

† To be selected with the approval of adviser.

*May be used for the general education requirements. Select unspecified courses from the general education list. For general education breadth requirements, select four courses from a minimum of two schools other than the School of Engineering.

Course Descriptions

ARO 124 Aerospace Engineering Fundamentals (2)

Application of basic engineering fundamentals to aerospace problems. Concepts of fluid flow. Instrumentation and operation of the subsonic wind tunnel. 2 three-hour laboratories.

ARO 125 Aerospace Engineering Fundamentals (2)

The atmosphere, Archimedes' principle, properties of real fluids, viscosity, Reynolds' number, Stokes' law, laminar and turbulent boundary layers, effect of streamlining. 2 three-hour laboratories. Prerequisite: ARO 124.

ARO 126 Aerospace Engineering Fundamentals (2)

Introduction to digital computation. Flow charting, computational error analysis, data evaluation and presentation. Solution of problems generated from the aerospace sciences. 1 lecture, 1 three-hour laboratory. Prerequisite: MAT 114.

ARO 200 Special Problems for Lower Division Students (1-2)

Individual or group investigation, research, studies or surveys of selected problems. Total credit limited to 4 units, with a maximum of 2 units per quarter.

ARO 242 Aerospace Engineering Fundamentals (3)

Fluid flow parameters, viscous flow characteristics, similarity parameters, boundary layer concepts. Planning of experiments, error analysis, data analysis by statistical and numerical methods. 1 lecture, 2 three-hour laboratories. Prerequisite: For transfer students who have completed a physics course equivalent to PHY 131.

ARO 244 Experimentation Systems (2)

Planning of experiments, error analysis, checking and rejection of test data. Data analysis by statistical and numerical methods. Applications from the aerospace sciences. 2 three-hour laboratories. Prerequisites: ARO 125.

ARO 245 Introduction to Systems Engineering (2)

Techniques for the planning and design of complex systems. Needs analysis, information gathering, modeling, value theory, synthesis analysis, decision theory, optimization. Considerations of social, economic and environmental factors. 2 three-hour laboratories. Prerequisites: ARO 125 or ARO 242, ARO 126, MAT 214 and ME 214.

ARO 246 Systems Engineering (2)

Matrix algebra, state-space concepts, linear programming. Man machine systems. Application of system concepts to engineering systems. Computer simulation of engineering systems. Prerequisite: ARO 245, MAT 215.

ARO 299 Special Topics for Lower Division Students (1-4)

Group study of a selected topic, the title to be specified in advance. Total credit limited to 8 units, with a maximum of 4 units per quarter. Prerequisite: permission of instructor.

ARO 301 Vector Fluid Dynamics (4)

Properties of the continuum. Control volume and control surface concepts. Inertial and noninertial systems. Potential flow theory. Development and application of the Navier-Stokes equations. Boundary layer theory. 4 lectures. Prerequisites: ARO 125 or 242, PHY 132 concurrent, MAT 318.

ARO 304 Energy, Mass and Momentum Transfer (4)

Kinetic theory. Transport properties. Transfer of momentum and energy in laminar and turbulent boundary layers. Energy transfer in high velocity, rarefied and dissociated flows. Energy transfer by conduction and radiation. Mass transfer , molecular diffusion, convection. 4 lectures. Prerequisite: ARO 301.

ARO 305 Subsonic Aerodynamics (4)

Pressure distributions; airfoils; bodies of revolution. Thin airfoil theory; mappings. Wing characteristics; spanwise force and moment distributions, basic and additional lift effects, twist. Transonic flows; similarity parameters. 4 lectures, Prerequisites: ARO 301, 304.

ARO 308 Engineering Computer Applications (4)

Numerical methods in engineering. Algorithms. Interpolating polynomials, difference formulas, numerical differentiation and integration, matrix methods, linear systems. Solution of differential equations. Applications in the aerospace sciences. 4 lectures. Prerequisites: ARO 126, MAT 216.

ARO 311 Gas Dynamics (4)

Thermodynamic processes. One-dimensional compressible flow. Area change, friction, heat addition. Normal and oblique shock waves. Nozzle and diffuser theory. Propulsion system analysis. Gas dynamics laboratory. 3 lectures, 1 three-hour laboratory. Prerequisites: ARO 301, ME 301.

ARO 312 Propulsion Systems (4)

Systems analysis of the fuel burning performance of aircraft and missile power plants. Aerothermodynamics of inlets, combustors and nozzles. Cycle analysis. Turbomachines. Emphasis on turboprop, turbojet, ramjet and liquid and solid rockets. 4 lectures. Prerequisite: ME 301, ARO 311.

ARO 326 Introduction to Structural Mechanics (4)

Vector statics for equilibrium. Engineering material properties, elasticity, plasticity, environmental effects, stress and strain. Uniaxial stress and deflection. Two- and three-dimensional states of stress and strain. Shear and moment diagrams, beam stresses and deflections. 3 lectures, 1 three-hour laboratory. Prerequisites: ME 214, MAT 215.

ARO 327 Aerospace Structural Mechanics (4)

Torsional shear stress and deflections. Pressure vessels. Column and instability theory. Theories of failure, statically indeterminate structures. Joints and connections. 3 lectures, 1 three hour laboratory. Prerequisites: ARO 326, MAT 216.

ARO 328 Aerospace Structures (4)

Semi-monocoque structures, energy methods for deflections. Aerospace structural design, computer applications in structures. 3 lectures, 1 three-hour laboratory. Prerequisite: ARO 327.

ARO 400 Special Problems for Upper Division Students (1-2)

Individual or group investigation, research, studies or surveys of selected problems. Total credit limited to 4 units, with a maximum of 2 units per quarter.

ARO 404 Supersonic Aerodynamics (4)

Effects of compressibility; two-dimensional and conical supersonic flow fields; similarity concepts; solution of wave equations; shock expansion theory. 4 lectures. Prerequisite: ARO 311 or consent of instructor.

ARO 406 Dynamics of Aerospace Systems (4)

Three-dimensional vector dynamics of aerospace systems; linear and angular momentum; lagrangian dynamics; method of euler; introduction to space vehicle motion. 5 lectures. Prerequisite: ME 215, MAT 318, MAT 317 concurrent.

ARO 407 Aerospace Vehicle Performance (4)

Three dimensional rigid body motion methods of Neton and Lagrange. Euler Transformations. Performance analysis of aircraft, missiles and spacecraft. 4 lectures. Prerequisite: ARO 305, 409, MAT 318.

ARO 408 Introductory Finite Element Structure (4)

Matrix operations. Stiffness and flexibility. Finite element properties, force method, stiffness method. Computer applications, advanced elements, structural dynamics, instabilities. 4 lectures. Prerequisites: ARO 308, 327.

ARO 409 Astrodynamics (4)

Kepler's laws of motion and satellite orbits, orbital transfers. Space vehicle motion, despinning of satellites. Performance and optimization of single and multistage rocket. 4 lectures. Prerequisite: ARO 407.

ARO 410 Hydronautics (4)

Statics and dynamics of ocean-surface craft and submersible craft; propeller and cavitation theory; hydrofoils, drag reduction; underwater propulsion systems. 4 lectures. Prerequisite: ARO 301 or consent of instructor.

ARO 412 High Speed Vehicle Aerodynamics (4)

Application of aerodynamic theory to the configuration design of high speed aircraft and missiles. Aerodynamic characteristics of stability and control; air loads, dihedral effect, maneuvers. External flow in the vicinity of vehicles; effect of downwash. Design criteria. Wingbody interference effects. 4 lectures. Prerequisite: ARO 305 and ARO 404.

ARO 418 Atmospheric Pollution (4)

Application of engineering concepts to atmospheric pollution problems. Reaction kinetics. Diffusion. Atmospheric emissions; particulate, gaseous. Atmospheric boundary layer. Plume rise. Combustion; flame structure, droplet burning. Photochemical smog. Control concepts. 4 lectures. Prerequisites: ME 301, ARO 301 or consent of instructor.

ARO 426 Aerospace Surface Systems (4)

Aerospace fundamentals of high speed surface systems. Station-to-station concepts. Air cushion and tubeflight systems. Airload determination. Drag reduction. Propulsion systems and braking. Guideway considerations. Stability and control. 4 lectures. Prerequisites: ARO 301 or consent of instructor.

ARO 427 Aeroacoustical Noise (4)

Scales and units of noise measurement. Sources and characteristics of aircraft noise. Techniques of noise reduction at the source and abatement along the path. Physiological effects of noise. The Walsh-Healy Act. The Sonic Boom. Structural effects of noise. 4 lectures. Prerequisite: ARO 406, 305, 311 or equivalent.

ARO 431 Intermediate Finite Element Structures (2)

Structural dynamics and structural stability in the finite element methods. Basic theory will be augmented strongly by computer programming and computation. Group effort on the actual construction of programs. Use of standard, prepared programs. 2 three-hour laboratories. Prerequisite: ARO 408 or equivalent introduction to finite element of matrix-computer methods.

ARO 435 Experimental Techniques in Aerodynamics (2)

Test plan formulation. Pressure, temperature and force measurement. Test section calibration and correction. Subsonic and supersonic wind tunnel applications. 2 three-hour laboratories. Prerequisites: ARO 301, 311 or consent of instructor.

ARO 444 Advanced Aerospace Analysis (3)

Formulation of mathematical models for physical phenomena by vector and matrix methods. Coordinate systems and transformations. Free body methods. Generalized charge and generalized force techniques in system analysis. Virtual displacement techniques applied to steady state systems. 1 lecture, 2 three-hour laboratories. Prerequisite: ARO 301, 311, 327, 335, MAT 317. Concurrent: ARO 406.

ARO 445 Advanced Aerospace Analysis (3)

Formulation of mathematical models for unsteady state phenomena occurring in aerospace engineering. Numerical techniques of solution. Optimization and parametric studies of typical aerospace systems. 1 lecture, 2 three-hour laboratories. Prerequisite: ARO 444.

ARO 446 Advanced Aerospace Design Project (2)

Preliminary design of aerospace systems. System analysis. Design optimization. Design compromise in multi-disciplined systems. Verbal and written presentation of system design. 2 three-hour laboratories. Prerequisite: ARO 445.

ARO 461, 462 Senior Project (2) (2)

Selection and completion of a project under faculty supervision. Projects typical of problems which graduates must solve in their fields of employment. Project results are presented in a formal report. Minimum 120 hours total time. Concurrent: AR0 444.

ARO 463 Undergraduate Seminar (2)

Preparation, oral presentation, and discussion by students of technical papers on recent engineering developments. 2 lectures. Concurrent: ARO 462.

ARO 499 Special Topics for Upper Division Students (1-4)

Group study of a selected topic, the title to be specified in advance. Total credit limited to 8 units, with a maximum of 4 units per quarter. Prerequisite: permission of instructor.

CHEMICAL AND MATERIALS ENGINEERING

C. James Barr, *Chairman*

Christopher Caenepeel
Robert G. Feeney
William M. Harris
Edward C. Hohmann
John L. Tomlinson

Chemical engineering is that branch of professional engineering which embraces the development and application of industrial processes and materials in which chemical and physical changes of material are involved. These changes are accomplished in a competitive economy to create products which are useful and essential to the modern world. Chemical engineering includes the design, development, and production of many products such as fuels and petrochemicals, plastics, fibers, paper, foods, building materials and pharmaceuticals.

The program blends the basic sciences with engineering disciplines to focus upon the design, development and engineering of industrial processes and plants. Students are well prepared upon graduation for beginning either their professional career or a program of graduate study.

The ECPD accredited curriculum provides courses leading to the B.S. degree with a major in chemical engineering. Each student may select a specified program of electives of 20 or more units to provide emphasis in such diverse areas as environmental engineering, business management, biochemistry, physical metallurgy, engineering economics, thermodynamics, or operations research.

The chemical engineering major includes, in addition to basic courses in chemistry, physics, mathematics, and electrical and mechanical engineering, a modern treatment of transport phenomena, unit operations and processes, thermodynamics, kinetics, design, engineering materials and economics. A senior research program enables the student to develop essential planning, experimenting and reporting skills in a subject of his choice. Extensive laboratory and test facilities exist for process and materials investigations, as well as complete pilot plant scale equipment for extended development and confirmatory studies.

Courses in materials engineering are offered by the department. These include studies in properties and behavior of engineering materials. Emphasis is placed on the atomic, molecular, and crystalline structure, the physical properties of solids, thermodynamic properties of materials, transport phenomena, reactions, and mechanical behavior. Problems in the preparation, properties, applications of ceramics, polymers, metals, and alloys are considered in light of scientific and engineering principles. The department's laboratories include facilities for metallography, heat treating, mechanical properties testing,

materials joining, and non-destructive testing.

Students planning to enter the chemical engineering curriculum should take the maximum in high school or junior college in mathematics, chemistry and physics courses.

Transfer students who have completed appropriate junior college programs may expect to receive their B.S. degree in chemical engineering in six quarters at Cal Poly.

CORE COURSES FOR MAJOR

(Required of all students)

Chem Engr Fundamentals	CHE	131	(2)
Fortran Prog Che Appl	CHE	132	(2)
Exp Plan and Anal.	CHE	133	(2)
Stoichiometry	CHE	201	(2)
Energy Balances	CHE	202	(2)
Chem Engr Thermo	CHE	302	(4)
Chem Engr Thermo	CHE	303	(4)
Process, Kinetics and Cataly	CHE	304	(4)
Momentum Transport	CHE	311	(4)
Energy Transport	CHE	312	(4)
Process Modeling	CHE	321	(4)
Chemical Processes	CHE	401	(3)
Chemical Process Synthesis	CHE	402	(4)
Chem. Engr Proc Anal and Des	CHE	403	(4)
Mass Transport	CHE	413	(4)
Chem Proc Cont and Opt	CHE	421	(4)
Advanced Unit Operations	CHE	422	(4)
Advanced Unit Operations	CHE	423	(4)
Senior Project	CHE	461	(2)
Senior Project	CHE	462	(2)
Undergraduate Seminar	CHE	463	(2)
Matls Sci and Engr	MTE	233	(4)

SUPPORT & ELECTIVE COURSES

(Required of all students)

American Civilization	AMC	201*	(4)
American Civilization	AMC	202*	(4)
General Chemistry	CHM	111*	(3)
General Chemistry	CHM	112*	(3)
General Chemistry Lab	CHM	151*	(1)
General Chemistry Lab	CHM	152*	(1)
Organic Chemistry	CHM	211	(3)
Organic Chemistry	CHM	212	(3)
Organic Chemistry Lab	CHM	251*	(1)
Physical Chemistry	CHM	311	(4)
Physical Chemistry	CHM	312	(3)
Physical Chemistry	CHM	313	(3)
Principles of Economics	EC	201*	(4)
Fund of Elec Engr	EEE	231	(4)
Elect Instr & Control	EEE	333	(4)
Freshman Composition	ENG	104*	(4)
Engineering Graphics	ESG	121	(2)
Analytic Geom & Calculus	MAT	114*	(3)
Analytic Geom & Calculus	MAT	115*	(3)
Analytic Geom & Calculus	MAT	116*	(4)
Calc of Several Variables	MAT	214	(4)
Calc of Several Variables	MAT	215	(4)
Diff Equations	MAT	216	(4)
Vector Statics	ME	214	(3)
Strength of Materials	ME	218	(3)
Physical Education 100-series			(3)
General Physics	PHY	131*	(4)
General Physics	PHY	132*	(4)
General Physics	PHY	133*	(4)
Social Science elective			(4)
Chem Engr Electives			(3)
Adv.Chem Electives			(7)
Humanities		*	(9)
**Electives			(10)

*May be used for the general education requirements. Select unspecified courses from the-general education list. For general education breadth requirements, select four courses from a minimum of two schools other than the School of Engineering.

Course Descriptions

CHE 131 Chemical Engineering Fundamentals (2)

Lectures and discussions of chemical engineering. Formulation and solution of elementary problems in material and energy balances. Laboratory work with basic unit operations, with emphasis on report writing. 1 lecture, 1 three-hour laboratory.

CHE 132 Computer Programming With Chemical Engineering Applications (2)

Introduction to analog a d digital computers (mini, batch and timesharing systems). Proficiency in writing Fortran programs is developed. The use of computers in solving chemical engineering problems. 1 lecture, 1 three-hour laboratory. Prerequisite: CHE 131.

CHE 133 Experimental Planning and Analysis (2)

Statistical methods in the planning and analysis of chemical engineering experimentation. Typical chemical process operations are studied. Numeric computation depends heavily on computer methods. 1 lecture, 1 three-hour laboratory. Prerequisite: CHE 132.

CHE 200 Special Problems for Lower Division Students (1-2)

Individual or group investigation, research, studies or surveys of selected problems. Total credit limited to 4 units, with a maximum of 2 units per quarter.

CHE 201 Stoichiometry (2)

Application of physical laws to chemical industry calculations. Material balances for physical and chemical processes. 2 lectures. Prerequisites: CHE 133, CHM 112.

CHE 202 Energy Balances (2)

Energy balances in chemical industry problems. Combined material and energy balances. 2 lectures. Prerequisite: CHE 201.

CHE 299 Special Topics for Lower Division Students (1-4)

Group study of a selected topic, the title to be specified in advance. Total credit limited to 8 units, with a maximum of 4 units per quarter. Prerequisite: permission of instructor.

CHE 302 Chemical Engineering Thermodynamics (4)

The first and second laws of thermodynamics with applications to industrial chemical processes. Ideal gases. The phase rule. P-V-T relations of fluids, particularly non-ideal gases. Sensible heat, latent heat, heats of reaction and combustion, and heats of mixing. The calculation of thermodynamic properties from laboratory data. 4 lectures. Prerequisite: MAT 216.

CHE 303 Chemical Engineering Thermodynamics (4)

Thermodynamics of flow processes. Applications of the first and second laws to heat engines and heat pumps. Refrigeration using heat pumps, absorption and the Joule-Thompson effect. Thermodynamic analyses of processes. Phase equilibria of ideal and non-ideal systems. The Gibbs-Duhem equation. Chemical reaction equilibria. 4 lectures. Prerequisite: CHE 302.

CHE 304 Process Kinetics and Catalysis (4)

Chemical reaction kinetics of homogeneous and heterogeneous systems. Application to chemical reactor design and operation with emphasis on catalytic processes. 4 lectures. Prerequisite: CHE 303, CHE 311.

CHE 311 Momentum Transport (4)

Basic course in fluid mechanics with emphasis on real fluids and applications to unit operations of chemical engineering, including topics in fluid properties, kinematics, and dynamics of fluid flow, friction, boundary conditions, classic flows and turbulence. 4 lectures. Prerequisite: CHE 202, 321.

CHE 312 Energy Transport (4)

Heat transfer with application to the unit operations of chemical engineering, including topics in energy transfer by conduction, convection and radiation in chemical process equipment. 3 lectures. 1 laboratory. Prerequisite: CHE 311.

CHE 321 Process Modeling (4)

Solution of problems starting with fundamental physical and chemical principles. Development of methods of solution of problems encountered in the study of transport phenomena. Treatment includes solution of ordinary differential equations by analytical and series methods. 4 lectures. Prerequisite: MAT 216.

CHE 400 Special Problems for Upper Division Students (1-2)

Individual or group investigation, research, studies, or surveys of selected problems. Total credit limited to 4 units, with a maximum of 2 units per quarter.

CHE 401 Chemical Processes (3)

Study of the individual unit processes involved in the complex overall industrial chemical process. Basic reactions, unit operations and equipment, and economic influences attending each unit process. 3 lectures. Prerequisite: Senior standing. Background in organic and physical chemistry, thermodynamics and kinetics and the transport process.

CHE 402 Chemical Process Synthesis (4)

Integration of unit processes, unit operations and their economics in the synthesis of the total chemical process and plant. Analysis of the major chemical industries; study of the synthesis of their processes. 2 lectures. 2 three-hour laboratories. Prerequisite: CHE 401.

CHE 403 Chemical Engineering Process Analysis and Design (4)

Economic and engineering principles guiding the selection of chemical processes, design of optimum flows and equipment, design of process operations and a plant. 2 lectures, 2 three-hour laboratories. Prerequisite: CHM 212, CHM 313, CHE 304, CHE 313.

CHE 413 Mass Transport (4)

Mass transfer and its application to the unit operations of chemical engineering, including topics in molecular diffusion, convective diffusion, simultaneous heat and mass transfer, distillation and extraction. 3 lectures, 1 laboratory. Prerequisite: CHE 304, 312.

CHE 421 Chemical Process Control and Optimization (4)

Introduction to theory and application of automatic control to chemical processes. Techniques for optimizing chemical process models. 3 lectures and 1 three-hour laboratory. Prerequisites: CHE 321, EEE 333 or permission of instructor.

CHE 422 Advanced Unit Operations (4)

An extended treatment of mass, momentum and heat transport viewed with the traditional unit operations emphasis. Multicomponent and multiphased operations are considered. 3 lectures and 1 three-hour laboratory. Prerequisite: CHE 413.

CHE 423 Advanced Unit Operations (4)

Lectures and experiments in the applications of unit operations in chemical engineering, including exercises requiring group planning, data gathering and treatment, report writing and oral defense of the reports. 2 lectures, 2 three-hour laboratories. Prerequisite: CHE 422.

CHE 432 Pollution Abatement (3)

Identification and development of solutions to problems created in the human environment by modern industry. Categorization and analysis of major influences imposed on the environment by industrial plants, by application of principles, equipment and techniques of chemical engineering. 2 lectures, 1 three-hour laboratory. Prerequisite: junior standing.

CHE 450 Environmental Training Simulations (3)

A review of the simulation exercises used in training personnel for an awareness of the scope of community pollution problems. Particular attention will be paid to the EPA's computerized air pollution exercise (APEX). Problems of technology, politics, economics and passions are included in these gaming models. 2 lectures, 1 three-hour laboratory. Prerequisite: Consent of instructor.

CHE 461, 462 Senior Project (2) (2)

Formal encounter with a professional assignment, simulating the graduate chemical engineer at work, and culminating in a final engineering report. Prerequisite: Senior standing.

CHE 463 Undergraduate Seminar (2)

Research on, and presentation of, recent developments in chemical engineering. 2 lectures. Prerequisite: Senior standing.

CHE 499 Special Topics for Upper Division Students (1-4)

Group study of a selected topic, the title to be specified in advance. Total credit limited to 8 units, with a maximum of 4 units per quarter. Prerequisite: permission of instructor.

MTE 207 Materials Science (3)

Engineering requirements of materials. Interatomic forces and the arrangement of atoms in materials. Imperfections in solids including dislocations. Phase equilibria and transformation. Relation between structural features and properties. 3 lectures. Prerequisite: CHM 112, MAT 116, PHY 132.

MTE 233 Materials Science and Engineering (4)

Introduction to the structure and properties of engineering materials. Application of basic principles of chemistry and physics to the study of crystalline and non-crystalline materials, including metals, alloys, and polymeric (plastic) materials, and to the selection and use of materials in engineering. 3 lectures, 1 three-hour laboratory. Prerequisites: CHM 211, concurrent ME 218.

MTE 251 Fundamentals of Art Welding (3)

Fundamentals of welding processes. Emphasis on skills and techniques required to develop competency to visualize the potentials and limitations in self-expression in the media of metals. 2 lectures, 1 three-hour laboratory.

MTE 304 Engineering Metallurgy (3)

Structure of metals. Constitution diagrams. Relationship of properties and structure. Mechanical working. Thermal processing. Applications and designations of steel and light metals. Principles of metallography and laboratory practice. 2 lectures. 1 three-hour laboratory. Prerequisite: CHM 112, PHY 131.

MTE 305 Physical Metallurgy—Mechanical Properties (4)

Basic principles underlying the structure and properties of crystalline solids. Metallic and covalent bonding theories; crystallography; solid solutions, intermetallic compounds and alloys. Crystal imperfections, elastic and plastic deformation. Ductile and brittle fracture, fatigue and creep. 4 lectures. Prerequisite: Material Science or Metallurgy course.

MTE 306 Physical Metallurgy—Solidification and Strengthening Reactions (4)

Principles of solid-state reactions including elementary kinetics, nucleation and growth theory; annealing of cold-worked metals; diffusionless transformation, precipitation reactions and tempering physical metallurgy of steels; relation between properties and microstructure. Laboratory experiments related to phase transformations in steel and precipitation hardening. 3 lectures, 1 three-hour laboratory. Prerequisite: material science or metallurgy course.

MTE 337 Welding Fabrication and Design (3)

Introduction to welding design, including properties and geometry of welded joints. Consideration of thermal effects and previous processing. Application of selected welding processes. Automation related to design. Evaluation methods. Cost factors. 2 lectures, 1 three-hour laboratory. Prerequisite: ME 214, MTE 304.

MTE 351 Welding Laboratory (2)

Welding laboratory for the creation of special projects. Designed for the student who is not intensely interested in welding per se, but desires to use welding as a means to obtain his own particular ends — art, research, invention, etc. Emphasis on individual development and creativity. 2 three-hour laboratories. Prerequisites: MTE 251, its equivalent, or consent of instructor.

CIVIL ENGINEERING

Ray Morales, *Chairman*

Donald E. Breyer
Ronald L. Carlyle
John W. Comer
Fenton Harding
Donald W. King
Claude B. Ogle
Robert R. Schneider
Harrison P. Seuberling
James B. Thompson
Blaine Voegn
Julie H. Wei
Donald G. Wells

The civil engineering program prepares graduates to enter the profession in design, construction or management capacities on such projects as freeways, highways, major buildings, dams, bridges, aqueducts, pipelines, airports, hydro-electric installations, water treatment plants, sewage treatment plants, flood control works, and urban development programs. The department offers two options; the civil engineering option and the water resources engineering option; the student earns the baccalaureate degree in civil engineering upon completion of either option. The general civil engineering option is fully accredited by the Engineers' Council for Professional Development. Students desiring to develop a background in general civil engineering or the structural aspects of the profession should select this option.

The water resources engineering option provides the student with a background in the acquisition and uses of water and the ability to solve environmental pollution problems caused by liquid and solid wastes.

Graduates are employed by governmental agencies at federal, state, and municipal levels and by engineering contractors and private consulting firms. Other areas of employment are sales engineering, teaching, research, materials testing, city planning and administrative fields.

Many projects, including freeway construction, water treatment plants and distribution systems, sewage treatment plants, and new housing developments offer excellent opportunities for demonstration of operational functions and as examples of practical applications of classroom and laboratory instruction.

CORE COURSES FOR MAJOR

(Required of all students—20 courses)

Civil Engineering	CE	122	(3)
Elem. Surveying	CE	134	(4)
Adv. Surveying	CE	135	(5)
Economics of Engr. Decisions	CE	302	(3)
Structural Analysis	CE	304	(3)
Structural Analysis	CE	305	(3)
Soil Mechanics	CE	323	(3)
Soil Mechanics and Found. Engrg	CE	324	(3)
Hydraulic Engineering	CE	332	(4)
Hydraulic Engineering	CE	332	(4)
Engr. Law, Contracts and Spec	CE	403	(3)
Water Supply Engineering	CE	431	(4)
Water Quality Engineering	CE	432	(4)

Senior Project	CE	461	(2)
Senior Project	CE	462	(2)
Undergrad. Seminar	CE	463	(2)
Engineering Statics	ME	211	(3)
Engineering Dynamics	ME	212	(4)
Strength of Materials	ME	218	(3)
Strength of Materials	ME	219	(3)
Fluid Mechanics	ME	311	(3)
Courses to complete major			(38)

OPTION COURSES FOR MAJOR

(Required for specific option)

GENERAL CIVIL ENGINEERING

Transportation Engr	CE	221	(4)
Highway Engr Design	CE	222	(4)
Structural Design: Steel	CE	406	(4)
Struc Design: Rein conc	CE	421	(5)
Struc Design: Timber	CE	433	(3)
Thermodynamics	ME	301	(4)
Engineering Materials	ME	315	(3)
Technical Electives			(6)
Free Electives			(5)

WATER RESOURCES ENGINEERING

Ecology for Sanitary Engrs	BIO	305	(3)
Limnology	BIO	434	(3)
Env Resource Syst.	CE	351	(4)
Indus & Radioactive Wastes	CE	434	(3)
Engineering Hydrology	CE	451	(4)
Water Quality Mgmt	CE	454	(3)
River & Coastal Engineering	CE	455	(3)
Solid Waste Mgmt	CE	457	(3)
Technical Electives			(8)
Free Electives			(4)

SUPPORT & ELECTIVE COURSES

(Required of all students)

American Civilization	AMC	201*	(4)
American Civilization	AMC	202*	(4)
Life Science	BIO	110*	(3)
General Chemistry	CHM	111*	(3)
General Chemistry	CHM	112*	(3)
General Chemistry Lab	CHM	151*	(1)
General Chemistry Lab	CHM	152*	(1)
Technical Writing	COM	219*	(4)
Principles of Economics	EC	201*	(4)
Elem of Elec Engr	EEE	231	(4)
Freshman Composition	ENG	104*	(4)
Engineering Geology	ESC	321	(4)
Engineering Graphics	ESG	121	(2)
Anal Geom &M Calculus	MAT	114*	(3)
Anal Geom & Calculus	MAT	115*	(3)
Anal Geom & Calculus	MAT	116	(4)
Calc of Several Variables	MAT	214	(4)
Calc of Several Variables	MAT	215	(4)
Diff Equations	MAT	216	(4)
Statistical Methods in Engr	MAT	309	(3)
Strength of Materials	ME	218	(3)
Strength of Materials	ME	219	(3)
Fluid Mechanics	ME	311	(3)
Physical Education 100-series			*(3)
General Physics	PHY	131*	(4)
General Physics	PHY	132*	(4)
General Physics	PHY	133*	(4)
General Psychology	PSY	201*	(4)
Humanities			* (11)

*May be used for the general education requirement. Select unspecified courses from the general education list. For general education breadth requirements, select four courses from a minimum of two schools other than the School of Engineering.

Course Descriptions

CE 122 Civil Engineering (3)

Fundamental concepts of civil engineering. The technical, professional, and social responsibilities of the civil engineer. Elementary digital computer programming for civil engineering problems. 2 lectures, 1 three-hour laboratory.

CE 134 Elementary Surveying (4)

Use and care of surveying instruments, fundamental surveying methods, traverse measurements, area computations, precise equipment and topographic mapping. 2 lectures, 2 three-hour laboratories. Prerequisite: MAT 104 or equivalent.

CE 135 Advanced Surveying (5)

Astronomical observations. Theory of hydrographic, geodetic and control surveys. City and land surveys. Route location and layout. Simple, transition and vertical curves. Earthwork computations. Introduction to electronic and photogrammetric methods. 3 lectures, 2 three-hour laboratories. Prerequisite: CE 134.

CE 200 Special Problems for Lower Division Students (1-2)

Individual or group investigation, research, studies or surveys of selected problems. Total credit limited to 4 units, with a maximum of 2 units per quarter.

CE 221 Transportation Engineering (4)

History and operation of several principal modes of transportation. The principal modes include highways, air, inland waterways, railroads, coastwise shipping and ocean transportation. Emphasis is placed on the financing and planning aspects of transportation. Special modes are also developed. 2 lectures, 2 three-hour laboratories. Prerequisite: CE 135 or consent of instructor.

CE 222 Highway Engineering Design (4)

Geometric design of highways; highway sub-structure design; roadway structural section; flexible pavement design; rigid pavement design; highway surface treatments and stabilization. 3 lectures, 1 three-hour laboratory. Prerequisite: CE 221.

CE 299 Special Topics for Lower Division Students (1-4)

Group study of a selected topic, the title to be specified in advance. Total credit limited to 8 units, with a maximum of 4 units per quarter. Prerequisite: Permission of instructor.

CE 302 Economics of Engineering Decisions (3)

Principles governing the economic aspects of engineering decisions. Retirement and replacement studies. Effect of taxes on engineering decisions. 3 lectures.

CE 304 Structural Analysis (3)

Classification of structures, types of framing systems and loadings. Statics and stability of determinate structures including cables, cantilever types, arches, beams, frames, and trusses by analytical and graphical methods. Deformation of determinate beams, frames, and trusses. Approximate methods of indeterminate frame analysis. 3 lectures. Prerequisite: ME 219.

CE 305 Structural Analysis (3)

Types and characteristics of indeterminate beams and framed structures. Analysis utilizing classicial methods including consistent displacements, virtual work, slope deflection, moment distribution. Computer solutions based upon flexibility and stiffness matrices. 3 lectures. Prerequisite: CE 304.

CE 323 Soil Mechanics (3)

Soil composition, description, and classification. Groundwater and seepage analysis. Stress analysis. Soil compaction. Stress-strain and strength properties of soils for engineering purposes. Determination of the physical properties of soils by laboratory experiments. 2 lectures, 1 three-hour laboratory. Prerequisite: ME 219.

CE 324 Soil Mechanics and Foundation Engineering (3)

Engineering soil mechanics analysis of foundations, retaining structures, and the stability of slopes. Specific topics include: field investigations, soil consolidation, stress analysis, settlement analysis, footings, mats, raft foundations, caissons, piles, retaining walls, excavation bracing, and the stability of unsupported slopes. 3 lectures. Prerequisite: CE 323.

CE 332 Hydraulic Engineering (4)

Principles of hydrostatics, hydrokinetics, and hydrodynamics. Problems involving dam analyses, flow in open channels, flow through pipes, pipe networks, pump-pipe-reservoir systems, surge tanks, water hammer, and turbines. 3 lectures, 1 three-hour laboratory. Prerequsite: ME 311.

CE 351 Environmental Resource Systems (4)

Engineered systems for optimum beneficial use and management of water resources. Technical, aesthetic, and social aspects of water quality control. Anatomy of Environmental Impact Statements, and the mechanics for preparation of environmental impact reports. 3 lectures, 1 three-hour laboratory. Prerequisites: CE 122, BIO 110, or consent of instructor.

CE 400 Special Problems for Upper Division Students (1-2)

Individual or group investigation, research, studies, or surveys of selected problems. Total credit limited to 4 units, with a maximum of 2 units per quarter.

CE 403 Engineering Law, Contracts & Specifications (3)

Basic principles of law and contract documents as applied to civil engineering practices; varieties of construction contracts; relationship of owner, engineer and contractor. 3 lectures.

CE 406 Structural Design Steel (4)

Theory and design of structural steel elements. Connection design. AISC specifications and design methods. Design of complete structural systems, including rigid frames, for both vertical and lateral loads. 3 lectures, 1 three-hour laboratory. Prerequisite: CE 421.

CE 421 Structural Design — Reinforced Concrete (5)

Analysis, design, and detailing of reinforced concrete structural elements including beams, slabs, columns, and footings. Elements of integrated building design, all with primary emphasis on ultimate strength design theory. Introduction to working stress theory. Concrete usage as a structural material including its composition, proportioning and control, testing and strength. 4 lectures, 1 three-hour laboratory. Prerequisite: CE 305.

CE 427 Photogrammetry (4)

Interpretation of aerial photographs. Stereoscopy. Application of aerial surveying to engineering problems, mapping. 3 lectures, 1 three-hour laboratory. Prerequisite: CE 134.

CE 429 Traffic Engineering (4)

Driver and vehicle characteristics. Origin and destination studies. Volume, speed and accident studies. Traffic control devices. Channelization design. Parking facilities design. Intersection design. Roadway lighting. Administration and financing of improvements. 3 lectures, 1 three-hour laboratory. Prerequisite: CE 222.

CE 431 Water Supply Engineering (4)

The hydrologic cycle and its influence on the natural distribution of water. Statistical methods for determination of water demand and for enhancing flood mitigation. Ground water and stream flow determinations for the economic design of a water supply system with special emphasis on collection, reservoir management, quality control, and public distribution of water. 3 lectures, 1 three-hour laboratory. Prerequisite: CE 332.

CE 432 Water Quality Engineering (4)

Characteristics of waste waters; analysis and treatment of sewage and industrial wastes. Basic design of waste treatment plants and sewerage systems. 3 lectures, 1 three-hour laboratory. Prerequisite: CE 431.

CE 433 Structural Design Timber (3)

Design of wood structural elements including plywood diaphragms. Connection design. Seismic analysis. Fire resistive requirements. Design load requirements. Design of complete structural systems for both vertical and lateral loads. Concrete formwork design. 2 lectures, 1 three-hour laboratory. Prerequisite: CE 406 or consent of instructor.

CE 434 Industrial and Radioactive Wastes (3)

Source of industrial water pollutants; processes for prevention and treatment of industrial wastes. Elements of radioactive wastes and disposal methods. 2 lectures, 1 three-hour laboratory. Prerequisite: CE 432.

CE 437 Soil Strength, Slope Stability and Earth Dams (4)

Advanced soil stress-strain and strength concepts. The analysis of the stability of slopes and the design of stable slopes. Earth dam analysis, design and construction. 4 lectures. Prerequisite: CE 324.

CE 442 Masonry Design (4)

Properties of clay brick and concrete masonry materials. Analysis and design of reinforced masonry members, and structural systems with emphasis on lateral force analysis of masonry structures and their connections. Reinforced masonry applications in high rise construction. 4 lectures. Prerequisite: CE 421.

CE 443 Flexible Pavement Design (4)

Study of asphalt materials; design control and testing of asphaltic mixtures; asphaltic concrete mix design; road mix asphalt pavement control, design and test methods; surface treatments. 2 lectures, 2 three-hour laboratories. Prerequisite: CE 222, 223 or consent of instructor.

CE 451 Engineering Hydrology (4)

Modern hydrology related to surveys on water resources for the analyses of the magnitude and frequency of floods and prediction of dependable water supplies. Hydraulics of water movement in porous materials. 3 lectures, 1 three-hour laboratory. Prerequisite: CE 431.

CE 454 Water Quality Management (3)

Engineering aspects of quality management. Technological and economic feasibility of water renovation for return to the resource pool. The economics of regional water quality management. 3 lectures. Prerequisite: CE 432.

CE 455 River and Coastal Engineering (3)

Hydrology and sedimentation mechanics related to river hydraulics and multiple purpose river development. Estuarine waters and marine disposal of wastes. 3 lectures. Prerequisite: CE 432.

CE 456 Water Resources Development (4)

Optimum development of a drainage basin system. Basic water resources engineering subjects applied for the most advantageous use of available water. 3 lectures, 1 three-hour laboratory. Prerequisite: CE 432.

CE 457 Solid Waste Management (3)

Solid waste treatment and disposal methods including incineration, sanitary landfill, and pyrolysis. Recycling and reclamation of solid wastes. Energy from solid wastes. Treatment and disposal of wastewater sludges. 3 lectures. Prerequisite: junior standing in civil engineering or consent of instructor.

CE 461, 462 Senior Project (2) (2)

Selection and completion of a project under faculty supervision. Projects typical of problems which graduates must solve in their field of employment. Presentation of project in a formal report. Minimum 120 hours total time. Prerequisite: Senior standing.

CE 463 Undergraduate Seminar (2)

Seminar discussion of new developments, policies, practices and procedures. Preparation and presentation by each student of an engineering development in his chosen field. 1 lecture, 1 three-hour laboratory. Prerequisite: Senior standing.

CE 499 Special Topics for Upper Division Students (1-4)

Group study of a selected topic, the title to be specified in advance. Total credit limited to 8 units, with a maximum of 4 units per quarter. Prerequisite: permission of instructor.

ELECTRICAL AND ELECTRONICS ENGINEERING

Richard J. Hermsen, *Chairman*

Arthur Y. Arellanes
Melvin B. Belcher
Robert A. Bruns
Jacob I. Castleman
Shu-Bing Chan
Henry M. Clanton
David L. Clark
Alan P. Felzer
Arthur Glenn
Alben C. Johnson
A. Russell Knudsen
Seung P. Li
James A. McAllister
John C. McMillan
George A. Mellard
Daniel J. Nesin
Norman S. Nise
John P. Palmer
Earl E. Schoenwetter
Harold P. Skamser
Owen K. Skousen
Donald B. Smedley
Arthur W. Sutton, Jr.
William O. Thomas
Gustav N. Wassel
William T. Wootton

A major in electrical and electronics engineering enables the student to prepare for a career in the application of science in that branch of engineering concerned with communications, automatic controls, computer design and application, microwave engineering, electronic instrumentation, and the generation and distribution of electrical power.

The ECPD-accredited curriculum specifies those courses common to all electrical and electronics engineering majors. Electived in the program provide the student choice for professional development in either electronics or power, and with adviser guidance, in areas of special interest such as biomedical engineering, ocean engineering, computer engineering, and environmental systems.

Graduates of this department are in demand by a broad cross section of industry, government agencies, public utilities, marketing groups and educational institutions and are employed in design and development, in test and evaluation, in applied research, and in technical sales.

For this major, the high school student should take a balanced program including mathematics and physical science. The transfer student should take courses which fulfill requirements of this curriculum, especially mathematics through calculus and the natural sciences.

Membership is available in a student branch of the Institute of Electrical and Electronics Engineers. The department also has a chapter of Eta Kappa Nu, the national honor society.

CORE COURSES FOR MAJOR

(Required of all students)

Intro to El & Elcs Engr	EEE	107	(4)
Intro to El & Elcs Engr	EEE	108	(4)
Physical Electronics	EEE	202	(4)
Network Theory	EEE	208	(4)
Network Theory	EEE	209	(4)
Electronics Lab	EEE	242	(1)
Comp Appl Elec Net	EEE	250	(2)
Network Lab	EEE	252	(1)
Network Lab	EEE	253	(1)
Basic Active Ckts	EEE	304	(4)
Linear Act. Ckts Des.	EEE	305	(4)
Wave Shaping & Dig Ckts	EEE	306	(4)
Network Theory	EEE	308	(4)
Control Systems Engr	EEE	312	(3)
Electromechanics	EEE	317	(4)
Electronic Engr. Instrumentation	EEE	324	(4)
Basic Active Circuits Design Lab	EEE	344	(1)
Linear Active Circuits Design Lab	EEE	345	(1)
Wave Shaping & Dig Ckts Lab	EEE	346	(1)
Computer Simulation	EEE	349	(2)
Systems Laboratory	EEE	352	(1)
Electromagnetic Fields	EEE	402	(3)
Senior Project	EEE	461	(2)
Senior Project	EEE	462	(2)
Undergraduate Seminar	EEE	463	(2)
**EEE Restricted Electives			(20)

SUPPORT & ELECTIVE COURSES

(Required of all students)

American Civilization	AMC	201*	(4)
American Civilization	AMC	202*	(4)
General Chemistry	CHM	111*	(3)
General Chemistry	CHM	112*	(3)
General Chemistry Lab	CHM	151*	(1)
General Chemistry Lab	CHM	152*	(1)
Technical Writing	COM	219*	(4)
or Egr Reports, Specs, and Proposals	EEE	311	(4)
Principles of Economics	EC	201*	(4)
Spec Topics in Math	EGR	126	(3)
Freshman Composition	ENG	104*	(4)
Analytic Geom & Calc	MAT	114*	(3)
Analytic Geom & Calc	MAT	115*	(3)
Analytic Geom & Calc	MAT	116*	(4)
Calc of Several Variables	MAT	214*	(4)
Calc of Several Variables	MAT	215*	(4)
Differential Equa	MAT	216*	(4)
Advanced Math (MAT 300 or 400 level)			(3)
Vector Statics	ME	214	(3)
Vector Dynamics	ME	215	(4)
Thermodynamics	ME	301	(4)
or Thermal Physics	PHY	333	(4)
Engineering Materials	ME	314	(3)
Physical Education 100-series			(3)
General Physics	PHY	131*	(4)
General Physics	PHY	132*	(4)
General Physics	PHY	133*	(4)
Basic Science Elective		†	(3)
Adv Science Elective		†	(3)
Humanities		*	(6)
Socio-Humanistic Elective		†	(8)
Engineering Elective		†	(6)

*May be used for the general education requirement. Select unspecified courses from the general education list. For general education breadth requirements, select four courses from a minimum of two schools other than the School of Engineering.

**Select with department approval.

† Select with adviser's approval.

Course Description

EEE 107 Introduction to Electrical and Electronics Engineering (4)

Modern engineering problem solutions. Linear and non-linear DC circuit analysis including topology and network solutions by computer. Methods and procedures associated with an electronics laboratory with emphasis on the use of modern test equipment and the reporting of test results. 3 lectures and 1 three-hour laboratory.

EEE 108 Introduction to Electrical and Electronics Engineering (4)

Selected topics and laboratory experiments designed to familiarize the student with the electrical and electronics engineering profession. 2 lectures, 2 three-hour laboratories. Prerequisite; EEE 107.

EEE 200 Special Problems for Lower Division Students (1-2)

Individual or group investigation, research, studies or surveys of selected problems. Total credit limited to 4 units, with a maximum of 2 units per quarter.

EEE 202 Physical Electronics (4)

Fundamentals of semiconductor physics, and devices. Physical characteristics of junctions, diodes, and transistors. Basic bias circuits for transistors. 4 lectures. Prerequisites: EEE 108 or EEE 210, MAT 214, PHY 133, CHM 111. Concurrent: EEE 242.

EEE 208, 209 Network Theory (4) (4)

An introduction to network analysis in the time and frequency domains with computer applications. 4 lectures. Prerequisites: EEE 250, EGR 126, PHY 133, EEE 108 or equivalent and MAT 216.

EEE 210 Introduction to Electrical and Electronics Engineering (4)

Introduction to the fundamental laws of electrical engineering, applications to D.C. circuit analysis, selected laboratory experiments emphasizing the use and operation of electrical test equipment, for transfer electrical engineering majors. 2 lectures, 2 three-hour laboratories. Prerequisite: Consent of instructor.

EEE 223 Electrical Power and the Environment (4)

Survey of the needs and uses of electric power; environmental, technical, economic and social implications in the construction of the various types of electrical power plants. State and Federal policies which control electrical energy generation. 4 lectures. Prerequisite: Introductory physics and chemistry.

EEE 231 Elements of Electrical Engineering (4)

Electrical principles DC and AC circuit analysis, simple transients, three phase circuits, industrial wiring practice, electrical instruments and measurements, for non-electrical engineering majors. 3 lectures, 1 three-hour laboratory. Prerequisite: MAT 116, PHY 133.

EEE 242 Electronics Laboratory (1)

Fundamental experiments concerned with the more common types of semiconductor devices. 1 three-hour laboratory. Concurrent or prerequisite: EEE 202.

EEE 250 Computer Applications to Electrical Networks (2)

Fortran computer programming for electrical and electronics engineers, problem-oriented computer language applications to electrical networks. 1 lecture, 1 one-hour recitation period. Prerequisite: EEE 108, or equivalent, may be taken concurrently with EEE 210.

EEE 252, 253 Laboratory (1) (1)

Selected laboratory exercises in electrical engineering. 1 three-hour laboratory. Prerequisite or concurrent: EEE 208, 209.

EEE 255 Digital Electronics (4)

A survey of electrical elements commonly found in digital computers with emphasis on their application in computer hardware. 3 lectures. 1 three-hour laboratory. Prerequisite: PHY 133 or equivalent. Not open to EEE majors.

EEE 256 Digital Electronics (4)

Implementation of logic used in computers including gates and flip-flops. Applications of integrated circuits. Combinational logic, counters and shift registers. 3 lectures, 1 three-hour laboratory. Prerequisite: EEE 255. Not open to EEE majors.

EEE 299 Special Topics for Lower Division Students (1-4)

Group study of a selected topic, the title to be specified in advance. Total credit limited to 8 units, with a maximum of 4 units per quarter. Prerequisite: Permission of instructor.

EEE 304 Basic Active Circuits (4)

Biasing and stability. Low and high frequency incremental models of bipolar and field-effect transistors. Basic configurations of amplifiers, noise in amplifiers. 4 lectures. Prerequisites: EEE 202, 208, 242; MAT 214. Concurrent: EEE 344.

EEE 305 Linear Active Circuits (4)

Feedback amplifiers, stability and oscillators, operational amplifiers, large signal amplifiers, regulated power supplies, SCR power circuits. Prerequisites: EEE 209, 304, 344; MAT 215. Concurrent: EEE 345.

EEE 306 Waveshaping & Digital Circuits (4)

Diode and digital circuits, gates, logic and sweep circuits, multivibrators and comparators. Integrated circuits as digital systems. 4 lectures. Prerequisites: EEE 209, 304, 344; MAT 215. Concurrent: EEE 346.

EEE 308 Network Theory (4)

Analysis of network functions in the time and frequency domains. 4 lectures. Prerequisite or concurrent: MAT 216 or equivalent. Prerequisite: EEE 209.

EEE 311 Engineering Reports, Specifications, and Proposals (4)

Techniques of conveying and interpreting technical information, developing a facility with engineering language, both written and oral, reading drawings, making sketches, and reading schematics, technical proposals. Avoiding technical, legal and manufacturing pitfalls in engineering specification. 3 lectures, 1 discussion period. Prerequisite: ENG 104, EEE 210 or PHY 133, or equivalent.

EEE 312 Control Systems Engineering (3)

System modeling and performance specifications. Analysis and design of feedback control systems via root locus and frequency response techniques. State space analysis. 3 lectures. Prerequisites: EEE 308. Concurrent:

EEE 313 Electric Machines (3)

Physical and electrical characteristics of the more common types of DC and AC machinery. Provides background facilitating selection of appropriate machine for a specific job. For non-electrical engineering majors. 2 lectures, 1 three-hour laboratory. Prerequisite: EEE 231.

EEE 316 Environmental Measurements (4)

A survey of environmental measurement systems using electronic means to measure man's impact on atmospheric, terrestrial, and oceanic ecosystems. Prerequisites: PHY 121, 122, 123 or equivalent; CHM 104, 141 or equivalent.

EEE 317 Electromechanics (4)

Basic principles of electromechanical energy conversion, basic rotating machines, engineering considerations underlying machine ratings, applications and governing test codes and standards. 3 lectures, 1 three-hour laboratory. Prerequisites: EEE 209, 253.

EEE 318 Electromechanics (4)

Continuation of EEE 317 with emphasis upon AC machine analysis, operation and applications. 3 lectures, 1 three-hour laboratory. For power systems engineering students. Prerequisite: EEE 317.

EEE 319 Electromechanics (4)

Continuation of EEE 317 and 318 with emphasis upon special purpose machines, new energy conversion devices, conventional and solid-state control circuits, transfer functions and the consideration of the machine as a component of a system. For power systems engineering students. 3 lectures, 1 three-hour laboratory. Prerequisite: EEE 318.

EEE 324 Electronic Engineering Instrumentation (4)

Major types of instrumentation and techniques used in the measurement of electrical and non-electrical parameters; electronic circuits associated with instrumentation systems; sensors and data presentation methods. Statistical methods, applicable to measurements and information transmission. 3 lectures, 1 three-hour laboratory. Prerequisite: EEE 305, 345.

EEE 325 Underwater Electronics (4)

Electronic instrumentation for basic underwater measurements of flow, pressure, water analysis, etc. Data readout displays and recording. Data transmission from underwater sites. Principles of underwater acoustics. 3 lectures, 1 three-hour laboratory. Prerequisite: EEE 231, or equivalent and consent of instructor.

EEE 333 Electronic Instrumentation and Controls (4)

Principles and applications of electromagnetic and solid state instruments, transducers, and readouts, rotational electro-magnetic devices, instrumentation systems, amplifiers and signal conditioners, loading, impedance matching, frequency and time response. Elementary feedback systems. For non-electrical engineering majors. 3 lectures, 1 three-hour laboratory. Prerequisites: EEE 231; MAT 216.

EEE 343 Analog Computers Lab (1)

Application of analog computer to solutions of engineering problems with emphasis on system simulation. For non-electrical engineering majors. 1 three-hour laboratory. Prerequisite: MAT 216, EEE 333 (EEE 333 may be taken concurrently).

EEE 344 Basic Active Circuits Design Lab (1)

Design and evaluation of basic amplifier circuits. 1 three-hour laboratory. Prerequisite: EEE 242. Concurrent: EEE 305.

EEE 345 Linear Active Circuits Design Lab (1)

Design and evaluation of linear active circuits. 1 three-hour laboratory. Prerequisite: EEE 344. Concurrent: EEE 305.

EEE 346 Waveshaping & Digital Circuits Lab (1)

Design and evaluation of waveshaping and digital circuits. 1 three-hour laboratory. Prerequisite: EEE 344. Concurrent: EEE 306.

EEE 349 Computer Simulation of Dynamic Systems (2)

Analog and digital simulation of dynamic systems utilizing time and frequency modeling techniques. Signal flow graphs, transfer functions and state variables. 1 lecture, a laboratory. Prerequisite: EEE 308.

EEE 352 Systems Laboratory (1)

Selected laboratory exercises based upon the course work of EEE 312. 1 three-hour laboratory. Prerequisites: EEE 312 and 349.

EEE 355 Computer Architecture (4)

Study of computer structures. Memory and control, arithmetic unit and input-output equipment. Computer applications in business and industry. 3 lectures and 1 three-hour laboratory. Prerequisite: EEE 256. Not open to EEE majors.

EEE 400 Special Problems for Upper Division Students (1-2)

Individual or group investigation, research, studies or surveys of selected problems. Total credit limited to 4 units, with a maximum of 2 units per quarter.

EEE 402 Electromagnetic Fields (3)

Static electric and magnetic fields; LaPlace's, Poisson's and Maxwell's equations; introduction to time varying fields. 3 lectures. Prerequisite: MAT 216.

EEE 403 Network Theory (4)

Design of passive and active filters. 4 lectures. Prerequisites: EEE 305, 308.

EEE 404 Digital Systems Design (3)

Logical and Switching circuit design consisting of applied Boolean algebra, functions and truth tables, number systems and binary arithmetic operations, combinatorial switching circuit simplification techniques, including topological nets and Karnaugh maps; adders and counters, coding, introduction to sequential circuit design. 3 lectures. Prerequisite: EEE 306 or EEE 256, concurrent EEE 444.

EEE 405 Communications Systems (3)

The study of various types of communication systems with emphasis on their analysis in the frequency domain. The role of system bandwidth and noise rejection in limiting the transmission and reception of information included. 3 lectures. Prerequisites: EEE 308, 324.

EEE 406 Electromagnetic Fields and Applications (3)

Continuation of EEE 402. Electromagnetic fields and Maxwell's equations. Wave and wave equations, reflection and scattering of waves. Transmission line equations and solutions. Impedance matching. 3 lectures. Prerequisite: EEE 402.

EEE 407 Advanced Circuit Design (4)

Design and evaluation of advanced linear circuits utilizing state-of-the-art electronic devices. 3 lectures and 1 three-hour laboratory. Prerequisites: EEE 305, 308, 345.

EEE 408 Active Filters (4)

Active and digital filter design. 4 lectures. Prerequisite: EEE 403.

EEE 409 Communications Systems (4)

Random noise and signal theory. Comparative performance analysis of information, transmission systems, introduction to digital communications. 3 lectures, recitation period. Prerequisite: EEE 404, 405.

EEE 410 Microwave Engineering (4)

Microwave generation and propagation. Applications in coupling and radiating structures and laboratory measurements. 3 lectures and 1 three-hour laboratory. Prerequisites: EEE 402, 406 and 446.

EEE 412 Solid State Electronics (4)

Physics and technology of solid state electronic devices with emphasis on recent developments in the field. 3 lectures, 1 recitation. Prerequisite: EEE 305.

EEE 414 Control Systems Engineering (4)

Performance integrals. Design of series equalization. AC control systems. Continuation of state space analysis. Introduction to nonlinear and sampled-data systems. 3 lectures, 1 recitation period. Prerequisites: EEE 312. Concurrent: EEE 352.

EEE 415 Electronics Design (4)

Special topics in advanced electronic design. 3 lectures, 1 three-hour laboratory. Prerequisites: EEE 305, 306 or consent of instructor.

EEE 417 Analog Computer Simulation (4)

Operation and design of analog computer components, use of computer to solve problems in mathematics, engineering, medicine, etc. Introduction to hybrid computers. 3 lectures, 1 three-hour laboratory. Prerequisite: MAT 216.

EEE 418 Integrated Circuit Design (4)

Analytic treatment of integrated electronics. Active and passive elements in integrated circuits. Thin film technology. Oxide isolation. Vacuum systems. Integrated circuit processing. Designing with integrated circuits. 3 lectures, 1 three-hour laboratory. Prerequisite: EEE 305, 306, MAT 317.

EEE 419 Probability Concepts for EEE (4)

Probabilistic concepts required for the analysis of electrical and electronic systems associated with random phenomena. Application to communication, control, information, and logic systems. 4 lectures. Prerequisites: EEE 324; MAT 216.

EEE 420 Lasers (4)

Fundamental principles and applications of lasers. Energy levels and mechanisms of excitation, basic types of lasers, Q switching and modes modulation and detection. 3 lectures, 1 recitation. Prerequisite: EEE 305, 345 and MAT 216.

EEE 421 Energy Conversion Systems Engineering (4)

Advanced and special methods of analysis of power systems, symmetrical components, representation of power systems, use of AC network boards, analog and digital computers for the solution of systems problems, power system transmission line concepts. 3 lectures, 1 three-hour laboratory. Prerequisite: Senior standing and EEE 319, or equivalent.

EEE 422 Energy Conversion Systems —Problems and Design (4)

System stability and fault conditions, specific design considerations, load flow studies, economic operation practices. Standards and requirements governing industrial and utility systems operation. 3 lectures, 1 three-hour laboratory. Prerequisite: EEE 421.

EEE 425 Sequential Logic Design (4)

A systems approach to the design of combinational and sequential networks to perform specified computing functions. 3 lectures, 1 three-hour laboratory. Prerequisites: EEE 404, 444.

EEE 426 Computer Aided Circuit Design (4)

Fundamentals of computer-aided analysis programs. Use of computer-aided analysis programs in design. 4 lectures. Prerequisites: EEE 250, 304, 308.

EEE 427 Logic Systems Hardware (4)

Theory and organization of digital computer sybsystems such as: core, memory, arithmetic unity, ROM's and RAM's, multipliers, selection gating, etc. Special IC modules and their role in logic systems design: CMOS, tri-state, PLL, multiplexors, etc. 3 lectures, 1 three-hour laboratory. Prerequisite: EEE 404.

EEE 428 Modeling and Simulation (4)

A study of mathematical models of physical and social systems, emphasizing methods of simulating these systems with computers. 4 lectures. Prerequisites: CS 205, MAT 216 or 242 or equivalent.

EEE 429 Computer Modeling of Environmental Systems (4)

Basic principles of simulation with examples taken from environmental systems. 4 lectures. Prerequisites: Computer programming language and college algebra.

EEE 444 Digital Systems Lab (1)

Selected laboratory exercises from topics covered in EEE 404. 1 three-hour laboratory. Prerequisite: EEE 346 or equivalent. Concurrent: EEE 404.

EEE 445 Communications Lab (1)

Demonstrations of the individual aspects of communication techniques. 1 three-hour laboratory. Prerequisite: EEE 349, 405.

EEE 446 Electromagnetic Fields and Applications Lab (1)

Experimental consideration of the characteristics and behavior of VHF and UHF transmission lines. Stub matching and transmission line parameter measurements by several methods. 1 three-hour laboratory. Prerequisite: EEE 402, 406.

EEE 461, 462 Senior Project (2) (2)

Completion of a project under faculty supervision. Project results are presented in a formal report. Minimum 120 hours total time. Prerequisite: EEE 463.

EEE 463 Undergraduate Seminar (2)

New developments, policies, practices, procedures and ethics in Electrical and Electronics engineering. Each student is responsible for the preparation of an approved project proposal in the field of electrical and electronics engineering. 2 lectures. Prerequisite: Completion of all 100-300 level required courses. EEE 312 may be taken concurrrently.

EEE 499 Special Topics for Upper Division Students (1-4)

Group study of a selected topic, the title to be specified in advance. Total credit limited to 8 units, with a maximum of 4 units per quarter. Prerequisite: permission of instructor.

ENGINEERING SERVICE

Quay D. Ives, *Chairman*

Bratcher L. Bright
Daniel H. Fillhart
Edward D. Galbraith
Leonhard M. Myers
Jack L. Pomeroy

Courses offered in engineering service provide students with an industrial orientation, basic skills, theoretical and practical knowledge, a fundamental understanding of technological concerns, and a base for the development of judgment referenced to manufacturing methods, processes, and operations. Emphasis is placed upon product planning, applied design and graphical representation, process control, economical utilization of materials, production techniques, machine capabilities and limitations as they are related to present day engineering and manufacturing enterprises.

Laboratories in the department are equipped with modern machine tools, attachments, instrumentation, and precision instruments for the construction of dies, tools, jigs, and fixtures. Punch presses, die-sinking machines, plastic presses and plastic mold-making equipment are provided. Manufacturing analysis demands that the student make use of mathematical concepts, industrial practices, computers, and the higher intellectual processes of analysis and problem solving to meet the present demands and future needs of industry.

Course Descriptions

ESM 201 Manufacturing Processes — System Overview (4)

A comprehensive study considering the possibilities and limitations of materials, methods, machine tools, processes, operations, procedures, and techniques of production as an optimum system of relationships necessary for the creation of a product in the field of manufacturing. 4 lectures.

ESM 221 Manufacturing Processes — Metal Removal (2)

An introduction to the principles of metal removal and the physics of metal cutting. The student studies tool geometry requirements of modern processes. Consideration of machine speeds, feeds, tolerances, and surface finish determinates as related to both manually and numerically controlled machines. 1-hour lecture; 1 three-hour laboratory.

ESM 222 Manufacturing Processes — Tool Selection (2)

Machine tools referenced to the study of cutting tool geometry, tool materials, cutting forces, feed, speed, surface finish, horsepower requirements, capacity, capability, efficiency, coolants, vibration, and machine tool evaluation with computer applications. 1 lecture, 1 three-hour laboratory. Prerequisite: ESM 221, or consent of instructor.

ESM 230 Manufacturing Processes — Forming and Assembling (2)

An overview of processes and operations employing pressure and temperature to shape metals by utilizing its plastic qualities. Basic sheet metal and pressworkings are used in the research, design, and manufacture of a marketable product. Emphasis is placed upon analysis and synthesis of the problem-solving processes. 1-hour lecture; 1 three-hour laboratory.

ESM 327 Manufacturing Processes — Numerical Control (2)

Theory and application of the control of machines and manufacturing processes through the utilization of numerical control (N/C) systems. Course will relate basic manufacturing processes to the manual and computer assisted programming of N/C systems. The course will emphasize the influence of N/C systems on the engineering design of manufactured products. 1 lecture, 1 three-hour laboratory. Prerequisite: ESM 222 or equivalent experience.

ESM 438, 439 Manufacturing Processes—Non Metallic (2) (2)

An investigation of non-metallic materials, their use, and proper processing. Fibers, powders, materials, formulations, mixing, flow characteristics, stability, ASTM test procedures, and material failure are studied. Coatings; laminations, machining; compression, transfer, injection, extrusion, pulp, vacuum, and blow molding; drawing, and casting processes are studied. Emphasis is placed upon safe operations and processing in wood and plastic. 1 lecture, 1 three-hour laboratory.

ESG 121 Engineering Graphics (2)

Functional graphic communication of engineering information including projection theory, sectional and auxiliary views, dimensioning, tolerancing, fastening devices, drawings for typical manufacturing methods, current drafting materials and practices. 2 three-hour laboratories.

ESG 122 Advanced Engineering Graphics (2)

Continuation of Engineering Graphics. Emphasis placed upon theory of orthographic projection, freehand sketching, threads and fastener specification, dimensioning and working drawings. 2 three-hour laboratories. Prerequisite: EST 121 or consent of instructor.

ESG 125 Descriptive Geometry (2)

Study of spatial geometric relationships between lines and planes. Graphical solution of common problems encountered in descriptive engineering expression. 2 three-hour laboratories. Prerequisite: ESG 121 or permission of instructor.

ESG 210 Computer-Aided Drafting (2)

Application of the digital computer and plotter to engineering drafting. 2 three-hour laboratories. Prerequisite: ESG 121, 125.

ESG 246 Graphics for Electronics (2)

Principles and techniques for design and drafting of printed circuit and integrated circuit electronic packaging systems. Design considerations, problems, practices are evaluated in the development and adaptation of electronic circuits and artwork for electronic and electrical printed circuit production processes. 2 three-hour laboratories. Prerequisite: ESG 121 or equivalent.

ENGINEERING TECHNOLOGY

James P. Todd, *Chairman*

Donald C. Curran Jack L. Pomeroy Earl E. Schoenwetter

Donald W. King

The department offers courses leading to a bachelor of science degree in engineering technology. The program has a flexible, broad curriculum to enable each student to match his talents and interests with a career objective, and emphasizes the upper division education of technology graduates from community colleges. Students having a certificate or an associate's degree in technology from a community college should be able to complete degree requirements in two additional years.

Engineering technology is concerned primarily with the application of established scientific and engineering knowledge and methods. Elective courses will permit each student to pursue an area of interest (e.g., aerospace, electronics, construction, mechanical, manufacturing). An advisor will coordinate the curriculum for each student. All students will have required courses in the shops and laboratories where they learn to use instruments and equipment which are characteristic of their career objective. Fundamentals and basic engineering principles will be taught in terms of typical problems which require applied solutions for industry.

Industrial specialization in this country continues to increase the need for engineering teamwork, and engineering teams require both engineering technologists and engineers.

CORE COURSES

(Required of all students)

Engr Graphics	ESG	121	(2)
Manufacturing Processes	ESM	221	(2)
Manufacturing Processes	ESM	230	(2)
Comp Prog E.T.	ETT	110	(4)
Electrical Technology	ETT	201	(4)
Applied Mechanics	ETT	210	(4)
Strength Mat'ls E.T.	ETT	220	(4)
Materials Joining	ETT	234	(2)
Engr Econ Analysis E.T.	ETT	305	(4)
Engineering Materials	ETT	307	(4)
Applied Fluid Mechanics	ETT	310	(4)
Senior Project	ETT	461	(2)
Senior Project	ETT	462	(2)
Undergraduate Seminar	ETT	463	(2)

SUPPORT & ELECTIVE COURSES

(Required of all students)

American Civilization	AMC	201*	(4)
American Civilization	AMC	202*	(4)
Life Science	BIO	110*	(3)
College Chemistry	CHM	104*	(3)
College Chemistry Lab	CHM	141*	(1)
Tech Writing	COM	219	(4)
Principles of Economics	EC	201*	(4)
Freshman Composition	ENG	104*	(4)
Trigonometry	MAT	104*	(4)
College Algebra	MAT	105*	(4)
Technical Calculus	MAT	130	(4)
Technical Calculus	MAT	131	(4)
Physical Education 100-series			(3)
College Physics	PHY	121*	(4)
College Physics	PHY	122*	(4)
College Physics	PHY	123*	(4)
Communication Arts Elective		*	(4)
Engineering Technology Electives			(56)
Graphics Elective			(2)
Humanities Electives		*	(8)
Math Elective		*	(3)
Social Science Elective			(4)
Electives			(21)

*Used to satisfy the general education requirements. Select unspecified courses from the general education list. For general education breadth requirements, select four courses from a minimum of two schools other than the School of Engineering.

Course Descriptions

ETT 110 Computer Programming for Engineering Technologist (4)

Structure and operation of computer systems. Block Diagramming, Documentation and Programming problems applicable to the various fields of Engineering Technology. 2 lectures, 2 three-hour laboratories.

ETT 200 Special Problems for Lower Division Students (1-2)

Individual or group investigation, research, studies or surveys of selected problems. Total credit limited to 4 units, with a maximum of 2 units per quarter.

ETT 201 Electrical Technology (4)

Introduction to operation and application of basic electrical measuring instruments. D.C. and A.C. circuit applications involving resistance, inductance and capacitance. 3 lectures, 1 three-hour laboratory. Prerequisite: PHY 123 or equivalent.

ETT 210 Applied Mechanics (4)

Introduction to the basic concepts of mechanics emphasizing the action of forces on rigid bodies and the response of those bodies to the applied forces. The first portion is devoted to the study of statics or stationary bodies followed by a study of forces acting on bodies in motion (dynamics). 4 lectures. Prerequisite: MAT 108, PHY 121.

ETT 220 Strength of Materials for Engineering Technology (4)

Stress-strain diagrams, tension and compression, working stresses and factors of safety, torsion in shafts, stresses in beams, riveted joints, welded connections, columns, 3 lectures, 1 three-hour laboratory. Prerequisite: ETT 210 or equivalent.

ETT 234 Materials Joining (2)

Methods of materials joining used in modern industry as applied to metals and plastics. Introduction to evaluation methods. 1 hour lecture, 1 three-hour laboratory. Prerequisite: None.

ETT 270, 370, 470 Engineering Technology Internship (4) (4) (4)

Supervised on-the-job engineering technology employment. Analytical reports of assigned tasks and relevant engineering technology publication reviews. Full-time employment. Prerequisite: Internship must be approved in advance by department coordinator.

ETT 299 Special Topics for Lower Division Students (1-4)

Group study of a selected topic, the title to be specified in advance. Total credit limited to 8 units, with a maximum of 4 units per quarter. Prerequisite: Permission of instructor.

ETT 305 Engineering Economics Analysis for Engr. Technology (4)

Fundamental principles and basic techniques of economic analysis of engineering and manufacturing projects. Topics such as costs and their estimation, time value of money, economic evaluation criteria, basic comparative models, and replacement analysis. Consideration of income taxes, risk, and intangibles. 4 lectures. Prerequisite: MAT 105 or equivalent.

ETT 307 Engineering Materials (4)

Concepts of the structure and properties of materials and their relevance to industrial applications, properties of metals, ceramics, plastics, composites, and semiconductors. 3 lectures and 1 three-hour laboratory. Prerequisite: CHM 104 or equivalent.

ETT 310 Applied Fluid Mechanics (4)

Applied principles of fluid flow. Properties of fluids. Fluid impulse and momentum. Viscous flow in pipes and open channels. 4 lectures. Prerequisite: ETT 210, MAT 109.

ETT 400 Special Problems for Upper Division Students (1-2)

Individual or group investigation, research, studies or surveys of selected problems. Total credit limited to 4 units, with a maximum of 2 units per quarter.

ETT 461, 462 Senior Project (2) (2)

Selection and completion of a project under faculty supervision. Projects typical of problems which graduates must solve in their field of employment. Presentation of project in a formal report. Minimum 120 hours total time. Prerequisite: COM 219, senior standing.

ETT 463 Undergraduate Seminar (2)

Seminar discussion of new developments, policies, practices and procedures. Preparation and oral presentation by each student of his senior project, 2 hours seminar per week. Prerequisite: ETT 462.

ETT 499 Special Topics for Upper Division Students (1-4)

Group study of a selected topic, the title to be specified in advance. Total credit limited to 8 units, with a maximum of 4 units per quarter. Prerequisite: permission of instructor.

ETA 222 Aerospace Construction Laboratory (2)

Techniques, procedures, materials and tools involved with manufacture and maintenance of aerospace structures. Light metal forming, joining and riveting, piping. Use of plastics. 2 three-hour laboratories. Prerequisite: ESM 230, ETT 234.

ETA 301 Applied Aerodynamics (4)

The atmosphere, dynamics and thermodynamics of air, airspeed determinations, types of fluid flow, fluid friction, airfoil theory, wing theory, lift, induced drag, parasite drag, power. 4 hours lecture. Prerequisite: ETT 310.

ETA 323 Wind Tunnel Testing (2)

Theory and operation of the subsonic and supersonic wind tunnel. Testing and instrumentation methods. Model design. Analysis of test results. 2 three-hour laboratories. Prerequisite: ETA 301.

ETA 324 Applied Aerospace Structures (4)

Aerospace vehicle load factors. Shear and moment computation, beam deflection. Analysis of thin web structural sections: bending, torsion, buckling. Truss analysis. 4 lectures. Prerequisite: ETT 220.

ETA 349 Aerospace Structures Laboratory (2)

Structural testing of aerospace vehicle components. Strain gage, photoelastic and stress coat methods. Instrumentation of components for testing. 2 three-hour laboratories. Prerequisite: ETA 324.

ETA 405 Principles of Flight (4)

Performance analysis of propeller and jet aircraft. Lift and drag analysis. Stability and control, static and dynamic balance, wing moments, operation of control surfaces. 4 lectures. Prerequisite: ETA 301.

ETA 415 Aerospace Powerplants (4)

Analysis of reciprocating, turboprop, turbojet and rocket engines with respect to fuel burning performance, thermodynamic analysis, structural and mechanical requirements. 4 lectures. Prerequisite: ETA 301, ETM 410.

ETA 437 Aircraft Applied Design (2)

Preliminary design of aircraft in response to a request for proposal. Includes effects of configuration and aerodynamic characteristics. Performance, structural integrity and stability. 2 three-hour laboratories. Prerequisite: ETA 405.

ETC 101 Construction Engineering (3)

An introduction to Construction Engineering. An overview of the Construction Engineering program, the scope of the field of construction engineering and the responsibilities of the construction engineer. 2 lectures, 1 three-hour laboratory.

ETC 102 Construction Drafting (3)

Structural, topographic, plan and profile and surveying drawing practices. Line and lettering work, use of drafting machines and office practices are stressed. 1 lecture, 2 three-hour laboratories. Prerequisite: ESG 121 or equivalent.

ETC 131 Construction Surveying (4)

Fundamental surveying methods as applied to construction layout. Use of transit and level for location and control of structures. Vertical and horizontal control. 2 lectures, 2 three-hour laboratories. Prerequisite: MAT 104.

ETC 132 Construction Surveying (4)

Profile surveys; borrow pit and earthwork measurements and distribution analysis. Highway curves — horizontal and vertical. 2 lectures. 2 three-hour laboratories. Prerequisite: ETC 131.

ETC 270 Electrical Installations (4)

Fundamentals of electrical equipment and installations as related to the construction industry. Electrical wiring, transformers, machines, illumination, heating, wiring codes and specifications. 3 lectures, 1 three-hour laboratory. Prerequisite: PHY 123 or equivalent.

ETC 301 Equipment and Facilities Cost Analysis (3)

Fundamental principles and basic techniques of cost analysis of equipment and facility ownership, retirement and replacement considering the time value of money, income taxes and risk. 3 lectures.

ETC 304 Construction Estimates (4)

Fundamentals of building and heavy construction estimating procedures, considering equipment, labor, material and overhead costs. 4 lectures. Prerequisite: Junior standing.

ETC 310 Rights of Way—Appraisal and Acquisition (3)

Principles of rights of way and industrial property assessment, appraisal and acquisition. 3 lectures.

ETC 311 Structural Theory (3)

Fundamentals of structural analysis for beams, trusses and frames. Static and dynamic effects on statically determinate structures. 3 lectures. Prerequisite: ETT 220.

ETC 312 Construction Equipment and Methods (3)

Construction procedures, job planning layout and scheduling, selection and application of construction equipment to building and heavy construction projects. 2 lectures, 1 three-hour laboratory.

ETC 315 Timber & Framework Design (4)

Design of timber structure elements and their connection. Design of formwork and shoring for the construction of concrete structures. 3 lectures, 1 three-hour laboratory. Prerequisite: ETC 311.

ETC 316 Concrete and Steel Design (4)

Design of reinforced concrete and steel structure elements and their connections. Plain concrete composition, proportioning, mixing, placing and testing. 4 lectures. Prerequisite: ETC 315.

ETC 402 Contracts and Specifications (3)

Basic principles and detailed review of design drawings and contract documents, including plans, specifications and agreements involved in the construction of facilities. 3 lectures. Prerequisite: ETC 102.

ETC 403 Construction Safety (3)

Safety engineering in construction, considering safety legislation, OSHA. Safety programs, accident prevention and public safety. 3 lectures. Prerrequisite: Senior standing.

ETC 404 Construction Inspection (3)

Inspection responsibilities, authority, licensing and registration requirements related to heavy and building construction. 3 lectures. Prerequisite: Senior standing.

ETC 405 Construction Planning and Cost Control (3)

Methods and procedures used in planning, scheduling and cost control related to construction projects. Principles of Critical Path Method (CPM) techniques will be emphasized. 3 lectures. Prerequisite: ETT 110.

ETC 406 Construction Organization and Management (3)

Constractor's policies and procedures used for centralized and/or job-site management of construction projects. Personnel job descriptions and assignments, and their relationship to the functional structure of an organization. Material procurement and control. 3 lectures. Prerequisite: Senior standing.

ETC 411 Foundations and Soil Mechanics (4)

Selection and methods of installation of foundations and other soil-supported structures. Footings, piles, caissons, retaining structures, soil embankments and fills. 3 lectures, 1 three-hour laboratory. Prerequisite: ESC 321 or equivalent.

ETC 431 Concrete Mix Design (2)

Theory and practice of concrete materials and the methods utilized in the mix design, production, placement and testing of structural concrete. 1 lecture, 1 laboratory. Prerequisite: ETC 316.

ETC 432 Bituminous Pavement Design (3)

Theory and practice of asphalt pavement structure design. The properties of asphaltic concrete materials and the methods utilized in production, placement and testing of asphaltic pavement. 2 lectures, 1 three-hour laboratory. Prerequisite: ETC 431.

ETE 102, 103 Electrical Circuits (4) (4)

D.C. and A.C. circuit analysis involving resistance, inductance and capacitance. Basic magnetic circuits. Theory of operation and application of basic electrical measuring instruments. 3 lectures, 1 three-hour laboratory. Prerequisite: MAT 104 or equivalent.

ETE 203, 204, 205 Electronic Devices and Circuits (4) (4) (4)

A study of vacuum, gaseous and semiconductor electronic devices. Operating characteristics, parameters, biasing and circuit applications, algebraic and graphical analysis of circuits. 3 lectures, 1 three-hour laboratory. Prerequisite: ETE 103 or equivalent.

ETE 215 Electronic Circuits (5)

Electronic circuit analysis involving single stage amplifiers, bi-polar and field effect transistors. D.C. stability design and analysis, small signal parameters and A.C. equivalent circuits. For transfer students. 4 lectures, 1 three-hour laboratory. Prerequisite: Community college electronics courses.

ETE 300 Electrical Circuit Analysis (4)

Single phase and polyphase circuit applications. Resonant circuits and filter networks, two-port parameters, magnetic circuits and transformers. 3 lectures, 1 three-hour laboratory. Prerequisite: ETE 103 or equivalent.

ETE 303 Switching and Waveshaping Circuits (4)

A study of pulse, waveshaping and switching circuits primarily related to digital computers. Multivibrators, pulse and switching amplifiers, special waveshape generators. 3 lectures, 1 three-hour laboratory. Prerequisite: ETE 205 or equivalent.

ETE 314 Linear Amplifier Circuits (4)

Thermal stability, small signal equivalent circuits, multistage and large signal amplifiers, frequency response, feedback amplifiers and oscillators. 3 lectures, 1 three-hour laboratory. Prerequisite: ETE 205 or equivalent.

ETE 315 Digital Logic (4)

Introduction to applied Boolean algebra and number systems. Characteristics of digital logic devices and applications of integrated circuits to computers. Combinational logic, flip flops, registers and counters. 3 lectures, 1 three-hour laboratory. Prerequisite: ETE 303 or equivalent.

ETE 318 Integrated Circuits (4)

Fabrication techniques of monolithic, film and hybrid circuits. Linear integrated circuit applications. 3 lectures, 1 three-hour laboratory. Prerequisite: ETE 314 or equivalent.

ETE 320 Electrical Machines (4)

A.C. and D.C. machines including associated equipment and control circuits. Machine ratings, test methods and industrial standards. 3 lectures, 1 three-hour laboratory. Prerequisite: ETE 300 or equivalent.

ETE 435 Communication Systems (4)

The study of radio frequency circuitry involved in amplitude and frequency modulation systems; single side band, multiplex and telemetry systems. 3 lectures, 1 three-hour laboratory. Prerequisites: ETE 314 or equivalent.

ETE 437 RF Measurements (4)

Electronic measurement equipment and techniques for measurements at radio frequencies of such quantities as power, impedance, standing wave ratio, frequency, voltage, and current, Smith Charts, impedance matching, radio receiver measurements, antenna measurements. 3 lectures, 1 three-hour laboratory. Prerequisite: ETE 314 or equivalent.

ETE 438 Microwave Techniques (4)

Microwave safety, generation, transmission, wave guides, wave guide components and measurements. Microwave measurement systems and techniques. 3 lectures, 1 three-hour laboratory. Prerequisite: MAT 109, ETE 437, or consent of instructor.

ETE 440 Logic Systems (4)

Study and operation of logic subsystems of digital computers. Sequential circuits, data selection nets, memory organization, peripheral equipment, control circuits and A/D — D/A conversions. 3 lectures, 1 three-hour laboratory. Prerequisite: ETE 315 or equivalent.

ETE 446 Advanced Digital Devices (3)

Characteristics and application of medium and large scale integrated circuit devices used in logic systems and related applications. Includes study of the Arithmetic Logic Unit, Phase Lock Loop, Timers and Multiplexors. 2 lectures, 1 three-hour laboratory. Prerequisite: ETE 440 or consent of instructor.

ETE 448 Digital Computer Operations (4)

Operation, maintenance and trouble shooting of computers. Familiarization with logic and circuit documentation used in solving problems. Peripheral equipment and service routines. 3 lectures, 1 three-hour laboratory. Prerequisite: ETE 315 or equivalent.

ETE 450 Developmental Testing (4)

Evaluation and qualification of electromechanical components and systems under individual or combined ambient conditions. Developing performance specifications, procedures, techniques, and instrumentation pertinent to this function; utilizing, calibrating, and maintaining these systems. 2 lectures, 2 three-hour laboratories. Prerequisites: ETM 330 or consent of instructor.

ETE 455 Laser Technology (4)

Introduction to lasers. Basic laser theory. Laser modulation and detection. Characteristics of solid, liquid, gaseous and semiconductor lasers. Laser technology applied to various fields. 4 lectures. Prerequisite: ETE 314 or equivalent.

ETE 460 Electronic Systems Toubleshooting (4)

Theory of electronic troubleshooting, special testing methods, failure diagnosis. Component operational theory. Maintenance, repair and safety procedures. 3 lectures, 1 three-hour laboratory. Prerequisites: ETE 300, 314 or equivalent.

ETM 306 Applied Thermodynamics (4)

Applications of fundamental concepts of work, heat, energy. Basic power and refrigeration cycles, and reciprocating machines. First and second law of thermodynamics as applied to engineering technologist. Use of generalized charts and handbooks in solving thermodynamic problems. 4 lectures. Prerequisite: PHY 123, ETT 210.

ETM 308 Applied Heat Transfer (3)

Survey of the application of empirical and algebraic equations used in the solution of practical and laboratory type of heat transfer problems. Includes three modes of heat transfer: conduction, convection, and radiation. 3 lectures. Prerequisite: ETM 306.

ETM 315 Machine Elements (3)

The practical application of the fundamentals of mechanics and the strength of materials to the design of machine elements. 3 lectures. Prerequisite: ETT 307, 220.

ETM 320 Power Transmission Systems (4)

Theory and operation of transmissions, torque converters, hydrostatic drives, clutches, differentials and final drives. 3 lectures, 1 three-hour laboratory. Prerequisite: ETT 220.

ETM 324 Applied Mechanisms (4)

A study of the elements of mechanisms; cams, gears, kinematics. 3 lectures, 1 three-hour laboratory. Prerequisite: ESG 121, ETT 210.

ETM 330 Instrumentation Applications (4)

Application of engineering measurement techniques, pressure gages, calibration and servicing, strain gages and strain indicators, pressure transducers and instrumentation, thermocouples and instrumentation. 3 lectures, 1 three-hour laboratory. Prerequisite: PHY 123, ETT 201 or equivalent.

ETM 334 Applied Heating and Air Conditioning (4)

Installation of heating and air conditioning units. Types available. Layout of associated ducting and plumbing. Systems balancing. Controls. 3 lectures, 1 three-hour laboratory. Prerequisite: ESG 121 or equivalent.

ETM 335 Heating and Air Conditioning (4)

Thermal environmental requirements for human habitation. Psychrometrics. Building heating and cooling loads. Air-handling equipment. 3 lectures, 1 three-hour laboratory. Prerequisite: ETM 306, ETT 310.

ETM 410 Internal Combustion Engines (3)

Theory and performance of internal combustion engines including spark ignition, diesel and gas turbine. Operation of carburetion, ignition and cooling systems. Selection and rating of fuels. 2 lectures, 1 three-hour laboratory. Prerequisite: ETM 306.

ETP 276 Production Control (4)

Principles of planning and controlling production activities; product development, forecasting, scheduling and loading, routing, material control, dispatching, progress reporting and corrective action. Design of production control systems. 3 lectures, 1 three-hour laboratory.

ETP 279 Engineering Cost Accounting (3)

Fundamental concepts, definitions and terminologies of engineering cost accounting. Basic techniques and policies commonly employed in engineering cost accounting systems by industry. 2 lectures, 1 three-hour laboratory.

ETP 302 Industrial Safety (3)

An introduction to the problems of industrial safety. Emphasis upon accident prevention and control. Covers state and federal OSHA regulations and implications of the Williams-Steiger Occupational Safety and Health Act of 1970. 3 lectures. Prerequisite: Junior standing.

ETP 305 Manufacturing Engineering Technology Supervision (3)

A study of technological and professional specialization in engineering supervision within manufacturing engineering. This course will cover processes, materials, tooling, tool control, quality control, methods, production as focal points of concern in manufacturing engineering management. 3 lectures. Prerequisite: Junior standing or consent of instructor.

ETP 307 Manufacturing Engineering Technology Management (3)

A study of technological and professional specialization in engineering management within manufacturing engineering. This course will cover systems, product, forecasting, sales, plant layout, production a focal points of concern in manufacturing engineering management. 3 lectures. Prerequisite: Junior standing or consent of instructor.

ETP 308 Applied Metallurgy (3)

Structural and phase changes resulting from plastic deformation and thermal treatments. Application economics in the selection of metals and metallurgical processing. 3 lectures. Prerequisite: ETT 307.

ETP 310 Technical Sales (3)

The pricing and distribution of manufactured goods. Micro-economic studies applied to the small independent manufacturer as well as examination of large manufacturing distribution techniques. Case studies and seminar discussions. 3 lectures. Prerequisite: Junior standing.

ETP 323, 324 Production Drafting (2) (2)

Continuation of engineering graphics with emphasis upon industrial practice. Preparation of working drawings. 2 three-hour laboratories. Prerequisite: ESG 121 or equivalent.

ETP 325, 326 Metrology (2) (2)

Methods used in industrial measurement with emphasis upon precision measuring instruments and measurement using light waves. Application of metrology to industrial manufacturing quality control. 1 lecture, 1 three-hour laboratory.

ETP 334 Advanced Materials Joining (2)

Consideration of materials and relative cost factors in the selection and application of joining processes. 1 lecture, 1 three-hour laboratory. Prerequisite: ETT 234 or equivalent.

ETP 335, 336 Production Welding (2) (2)

Production welding applications considered in terms of codes, specifications and production cost. Preparation of detailed welding procedures. 1 lecture, 1 three-hour laboratory. Prerequisite: ETP 334.

ETP 355, 356 Production Machining (2) (2)

Precision machining operations with emphasis on methods used in mass production. Cutting tools and fluids used in production machining. Selection of machines and tooling for production operation. 1 lecture, 1 three-hour laboratory. Prerequisite: ESM 221 or equivalent.

ETP 365, 366 Pressed Metal Technology (2) (2)

A study emphasizing the techniques in pressed metal design. Machine types, characteristics, and capabilities are stressed with reference to function and economical factors. Hot and cold working of materials. 1 lecture, 1 three-hour laboratory. Prerequisite: ESM 230.

ETP 371 Production and Facilities Planning (4)

Concepts and methods of planning engineering projects, production programs, and plant layouts and facilities. Loading and scheduling, product and process planning, facilities analysis, layout planning, and materials analysis. 3 lectures, 1 three-hour laboratory. Prerequisite: ETP 276 or equivalent.

ETP 372 Printed Circuit and Electronic Packaging Technology (3)

Fundamental principles and basic techniques of manufacturing with particular emphasis on printed circuit and electronic packaging technology. Topics such as process and product development procedures, wiring techniques, circuit packaging, materials and processes, costs. 2 lectures, 1 three-hour laboratory. Prerequisite:: ESG 246 or equivalent.

ETP 373, 374 Tool and Die Technology (2) (2)

An introduction to tool and die fundamentals. Function, components, and appropriate manufacturing techniques are stressed. Die life, maintenance, storage, and safety are included. 1 lecture, 1 three-hour laboratory. Prerequisite: ESM 221, 230.

ETP 375, 376 Quality Assurance (2) (2)

Quality planning, analysis and control. Inspection systems, process control techniques, and acceptance sampling methods. Use of statistical and other methods for assuring desired quality levels. 1 lecture, 1 three-hour laboratory each. Prerequisite: MAT 107.

ETP 377 Systems Engineering (3)

Study and use of systems engineering methods. Analysis, application and computation of statistical methods and mathematical programming procedures to engineering and industrial systems. 2 lectures, 1 three-hour laboratory. Prerequisite: MAT 107.

ETP 381 Foundry Techniques (2)

Design and production of patterns. Sand system and metallurgical properties influencing castings. Thermal control and heat treating of casting to achieve engineering properties. Gate and riser design. Students will work with sand, investment, centrifugal and die casting. 1 lecture, 1 three-hour laboratory. Prerequisite: IE 134, ETT 307.

ETP 385, 386 Numerical Control (2) (2)

Advanced numerical control systems including positioning and contouring metal cutting machines. Application of numerical control to industrial manufacturing processes, including computer-aided manufacturing. 1 lecture, 1 three-hour laboratory. Prerequisite: ESM 327.

ETP 395 Non-Traditional Manufacturing Processes (2)

A study of specialized material removal and forming processes such as ECM, EDM, etc. Specific industrial operations and processes are analyzed with references to theory of operation, applications and economic considerations. 2 lectures. Prerequisite: ESM 222, ESM 230.

ETP 404 Manufacturing Engineering Technology Administration (3)

A current appraisal of knowledge, understanding, skill and judgment required of an administrative manufacturing engineer. A study of processes, materials, tool and control, operations, plant layout and material handling, quality control, methods, product and production as forms of manufacturing engineering. 3 lectures. Prerequisite: junior standing or consent of instructor.

ETP 405 Manufacturing Engineering Material Management (3)

A technical examination of manufacturing engineering material management referenced to the total integrated system of converting raw material into a finished product. 3 lectures. Prerequisite: Senior standing.

ETP 406 Manufacturing Engineering Safety Management (3)

An introduction to essential elements involved in establishing a safety management program in the manufacturing enterprise. Worker, supervisor, management, and administrative contribution to the program will be discussed. 3 lectures. Prerequisite: Senior standing.

ETP 407 Manufacturing Engineering Value Analysis (3)

Selected topics and problems utilizing value analysis as a tool for determining the proper relationship between price, cost, and value received. An integration of technical and economical factors of quality. 3 lectures. Prerequisite: Senior standing.

ETP 430 Manufacturing Cost Estimation (2)

A study of cost estimation in modern manufacturing based upon processing analysis. The role, function and use of various types of estimates is discussed. 2 lectures. Prerequisite: Senior standing.

ETP 432 Applied Weld Design (4)

Design and performance of welded joints. Effects of variations in materials and processes and their relation to tooling. 3 lectures, 1 three-hour laboratory. Prerequisite: ETT 210, 234, ETP 308.

ETP 433 Welding Design Application (2)

Case studies of design of weldments, brazements and tooling. 2 three-hour laboratories. Prerequisite: ETP 432.

ETP 437, 438 Nondestructive Testing (2) (2)

Discontinuities in materials and their detection. Process principles and equipment for radiographic, magnetic particle, penetrant, and eddy current methods. Reference to other processes. Radiation health physics. 1 lecture, 1 three-hour laboratory. Prerequisite: ETT 307.

ETP 470 Computer-Aided Manufacturing (3)

A synthesis of computer utilization in manufacturing engineering. N/C, automation, cybernetics, data systems, CAD/CAM, and computer simulation. 2 lectures, 1 three-hour laboratory. Prerequisite: Junior standing or consent of instructor.

ETP 473, 474 Project Planning and Control (2) (2)

Concepts and techniques for planning, scheduling and controlling of projects. Use of analytical methods such as activity analysis, critical path method, PERT, resource allocation, Line of Balance, learning curves and decision-making under uncertainty. 1 lecture, 1 three-hour laboratory each. Prerequisite: Senior standing.

INDUSTRIAL ENGINEERING

Joseph P. Wymer, *Chairman*

John D. O'Neil — Panchatcharam Ramalingam — J. Garrard Wright

Robert A. Quaney — Richard H. Schippers

The industrial engineering major prepares graduates for a variety of assignments in industry such as manufacturing engineering, production planning and control, plant layout and materials handling, methods and standards, quality control, operations research, systems and procedures, engineering liaison, and other duties concerned with improving efficiency and quality.

Emphasis is placed on planning the use of tools and equipment rather than on designing the equipment; on the production method and quality of the product rather than on designing the product itself; and on the managerial and financial aspects of planning production, and sales. The industrial engineer considers not only the functions of tools and equipment, but also the behavior of people as they operate together in organizations.

Instruction is realistic and characteristic of the requirements of industry. Many local industries have permitted students to work on projects in their plants.

CORE COURSES FOR MAJOR

(Required of all students)

Industrial Engineering Fund	IE	111	(4)
Process Design	IE	128	(4)
Work Analysis and Design	IE	224	(4)
Work Analysis and Design	IE	225	(4)
Production Plng and Control	IE	236	(4)
Indus Costs and Controls	IE	239	(5)
Indus Engr Math Anal	IE	311	(3)
Ele of Ind Engr Sys	IE	327	(4)
Plant Layout & Design	IE	331	(4)
Plant Layout & Design	IE	332	(2)
Engineering Economy	IE	405	(3)
Quality Control by Stat Met	IE	415	(4)
Intro to Oper Research	IE	416	(4)
Intro to Oper Research	IE	417	(4)
Reliability Concepts & Tech	IE	419	(3)
Industrial Computer Sys	IE	428	(4)
Industrial System Design	IE	429	(4)
Senior Project	IE	461	(2)
Senior Project	IE	462	(2)
Undergraduate Seminar	IE	463	(2)
Industrial Engr electives			(3)

SUPPORT & ELECTIVE COURSES

(Required of all students)

American Civilization	AMC	201*	(4)
American Civilization	AMC	202*	(4)
Life Science	BIO	110*	(3)
General Chemistry	CHM	111*	(3)
General Chemistry	CHM	112*	(3)
General Chemistry Lab	CHM	151*	(1)
General Chemistry Lab	CHM	152*	(1)
Technical Writing	COM	219*	(4)
Principles of Economics	EC	201*	(4)
Principles of Economics	EC	202*	(4)
Elements of Elec Engr	EEE	231	(4)
Elect Inst & Contr	EEE	333	(4)
Freshman Composition	ENG	104*	(4)
Engineering Graphics	ESG	121	(2)
Anal Geometry & Calculus	MAT	114*	(3)
Anal Geometry & Calculus	MAT	115*	(3)
Anal Geometry & Calculus	MAT	116*	(4)
Calc of Several Variables	MAT	214	(4)
Calc of Several Variables	MAT	215	(4)
Diff Equations	MAT	216	(4)
Stat Methods in Engr	MAT	309	(3)
Vector Statics	ME	214	(3)
Vector Dynamics	ME	215	(4)
Strength of Materials	ME	218	(3)
Strength of Materials	ME	219	(3)
Engineering Metallurgy	MTE	304	(3)
Physical Education 100-series			(3)
General Physics	PHY	131*	(4)
General Physics	PHY	132*	(4)
General Physics	PHY	133*	(4)
General Psychology	PSY	201*	(4)
Literature or Philosophy		*	(6)

Engr Science Electives	(11)
Basic Science Elective	(3)

*May be used for general education requirements. Select appropriate courses from general education list. For general education breadth requirements, select four courses from a minimum of two schools other than the School of Enginering.

Course Descriptions

IE 111 Industrial Engineering Fundamentals (4)

Introduction to industrial engineering concepts, functions and techniques. Fundamentals of digital computer methods; logic diagramming; FORTRAN programming. Solution of elementary industrial engineering problems. 3 lectures, 1 three-hour laboratory.

IE 128 Process Design (4)

Development of the methods of manufacture of the product design so that the product can be produced at a competitive price. Evaluation of alternative methods of processing relative to delivery, volume, and quality specifications. Capabilities and limitations of commonly used industrial processes. 3 lectures, 1 three-hour laboratory.

IE 134 Molding and Casting (2)

Shaping of metals while in the liquid state; common molding and casting techniques for both ferrous and non-ferrous materials and alloys. 1 lecture, 1 three-hour laboratory.

IE 200 Special Problems for Lower Division Students (1-2)

Individual or group investigation, research, studies or surveys of selected problems. Total credit limited to 4 units, with a maximum of 2 units per quarter.

IE 214 Industrial Incentives (3)

Types of incentives used in industry. Individual and group incentive plans, bonus plans, and suggestion systems. 3 lectures. Prerequisite: IE 224, 225.

IE 224, 225 Work Analysis and Design (4) (4)

Theory and application of work analysis as related to process design, facilities, work place layout, tools and equipment and services. Analytical techniques of measurement of work content including stopwatch time study, micro-motion study, predetermined time systems, and work sampling. Survey of man's psychological and physiological characteristics and how they influence engineering and design of machines and man-machine systems. 3 lectures, 1 three-hour laboratory.

IE 234 Manufacturing Systems and Standards (4)

Plant location, selection and utilization of plant equipment, materials handling and flow, principles of plant layout. Theory and application of work analysis as it relates to facilities layout, work place layout, tools, and equipment. Analytical techniques of the measurement of work content including stop watch, predetermine time systems, and work sampling. 3 lectures, 1 three-hour laboratory.

IE 236 Production Planning and Control (4)

Principles of planning and controlling manufacturing activities. Product development, forecasting, scheduling and loading, process planning and routing, materials planning and control, dispatching, progress reporting, and corrective action. Quantitative methods. Design of planning and control systems. Case studies of actual systems. 3 lectures, 1 three-hour laboratory. Prerequisite: IE 111.

IE 239 Industrial Costs and Controls (5)

Engineering approach to cost recording, budgetary procedures and controls. Estimating production costs. Engineering problems used to teach fundamentals. Current techniques in mechanizing the cost recording and cost control functions. 3 lectures, 2 three-hour laboratories. Prerequisite: IE 236.

IE 254 Cast Metals (3)

A basic study of cast metals technology. Designed to provide the nontechnical student with entry level knowledge of cast metals. Course will emphasize methods and techniques applicable to a broad range of art and environmental applications. 2 lectures, 1 three-hour laboratory.

IE 299 Special Topics for Lower Division Students (1-4)

Group study of a selected topic, the title to be specified in advance. Total credit limited to 8 units, with a maximum of 4 units per quarter. Prerequisite: Permission of instructor.

IE 311 Industrial Engineering Mathematical Analysis (3)

Applications of linear equations, matrices, and determinants to the solution of industrial engineering problems. Mathematical analysis of the results of changing manufacturing and distribution parameters to improve quality and/or to reduce costs. Discussion of some nonlinear mathematical relationships between production variables. 3 lectures. Prerequisite: MAT 215 or consent of instructor.

IE 324 Production Engineering (3)

Review of the principles of design as applied to a product. Product redesign based on the use of cost analysis and value engineering principles. The design and development of a detailed plan. Selection of production processes, sequence of operations, equipment facilities, methods, tool plans, and requirements. 2 lectures, 1 three-hour laboratory. Prerequisite: ESG 121, IE 128, 236 or equivalent.

IE 325 Production Engineering (3)

Designing the required tools—jigs, fixtures, dies, special purpose tools, and numerical control programs—required to provide economy and the quality of manufacturing required. Designing tools for automated manufacturing processes, integrated methods, transfer mechanisms, etc. Design of production accessories, electro-mechanical tooling devices. Review of tool manufacturing techniques. 2 lectures, 1 three-hour laboratory. Prerequisite: ESG 121, IE 128, 236 or equivalent.

IE 327 Elements of Industrial Engineering Systems (4)

Concepts and principles of system engineering theory as related to the large scale human system problem. Introduction to the theory and methodology of the engineered system. Development of analytic techniques to establish needs, objectives, priorities and utilities, and the evaluation of system effectiveness. 3 lectures, 1 three-hour laboratory. Prerequisite: MAT 116, MAT 309, IE 311 or consent of instructor.

IE 331, 332 Plant Layout and Design (4) (2)

Planning and designing plant layouts, physical requirements, and material handling systems. Use of quantitative analysis techniques. Projects. 331: 3 lectures, 1 three-hour laboratory; 332: 1 lecture, 1 three-hour laboratory. Prequisites: IE 128, IE 236. MAT 309 recommended.

IE 400 Special Problems for Upper Division Students (1-2)

Individual or group investigation, research, studies or surveys of selected problems. Total credit limited to 4 units, with a maximum of 2 units per quarter.

IE 405 Engineering Economy (3)

Economic decision making for engineering projects and capital expenditures proposals. Concepts of time value of money, cash flow and capital rationing. Basic comparative models for evaluating alternatives. Sensitivity and probability analyses; depreciation and tax consequences; replacement studies; consideration of intangibles. 3 lectures. Prerequisite: Junior standing in engineering courses.

IE 415 Quality Control by Statistical Methods (4)

Systems of inspection, analysis and action taken to control manufacturing processes. Process control techniques, acceptance sampling methods, statistical analysis and other techniques used by management to control costs and improve quality. 4 lectures. Prerequisite: MAT 309.

IE 416 Introduction to Operations Research (4)

Application of statistical methods, linear programming, queuing and other analysis techniques to problems encountered in industry. 4 lectures. Prerequisite: IE 311, MAT 309.

IE 417 Introduction to Operations Research (4)

Development and application of planning and inventory models, network techniques, Markov analysis, waiting lines, simulation and scheduling algorithms to problems encountered in industry. 4 lectures. Prerequisite: IE 416.

IE 419 Reliability Concepts and Techniques (3)

Reliability concepts and techniques as they are used in various types of industrial organizations. Analysis of the influence of reliability on such factors as complexity, state of the art, environment and workmanship. Component reliability related to systems requirements. 3 lectures. Prerequisite: IE 415.

IE 428 Industrial Computer Systems (4)

Provides basic familiarity with digital and analog computers. How computers function and the range of industrial applications for which they are appropriate. Integration, evaluation, and design of computer-centered systems. 2 lectures, 2 three-hour laboratories. Prerequisite: Junior standing, computer programming course.

IE 429 Industrial Systems Design (4)

Systems analysis, design and measurement. Data gathering and analytical tools used in formulating and optimizing work systems. Theory of systems concepts based on logical synthesis and empirical analysis. Case studies and industrial simulations. 3 lectures, 1 three-hour laboratory. Prerequisite: IE 327, 428, MAT 309.

IE 446 Die Casting (2)

Principles and techniques of hot chamber and cold chamber die casting. Comparison of the relative economy of die casting with other methods of manufacturing the same parts. Fundamentals of die design and construction. 1 lecture, 1 three-hour laboratory. Prerequisite: IE 134.

IE 461, 462 Senior Project (2) (2)

Selection and completion of a project under faculty supervision. Projects typical of problems which graduates must solve in their fields of employment. Project results are presented in a formal report. Minimum 120 hours total time. Prerequisite: Senior standing.

IE 463 Undergraduate Seminar (2)

Preparation, oral presentation, and discussion by students of technical papers on recent engineering developments. 2 lectures. Prerequisite: Senior standing.

IE 499 Special Topics for Upper Division Students (1-4)

Group study of a selected topic, the title to be specified in advance. Total credit limited to 8 units, with a maximum of 4 units per quarter. Prerequisite: permission of instructor.

MECHANICAL ENGINEERING

Kenneth J. Schneider, *Chairman*

Dean P. Athans
Robert L. Beardmore
Leonard Berkowitz
John R. Biddle
George F. Engelke
James D. Goodin
Charles J. Kessler
Gary W. Koonce
E. Richard Mertz
Harvey A. Mylander
Edwin H. Williams
Darryl C. Zell

Mechanical engineering has traditionally been one of the most general branches of engineering. A mechanical engineer requires a broad knowledge in many fields — mechanics, thermal science, design, electrical machinery and instrumentation, and many more. The breadth and flexibility of a mechanical engineer's education provides a wide choice of careers and allows movement into a variety of engineering areas to better meet the challenges of a changing world. The mechanical engineering curriculum permits the student to explore different fields with the option of specializing in one or more of them as he finds his true interests. Many technical elective courses are available both for specialization and for exploring individual interests.

Mechanical engineers work in industry, business, government, universities, and in the professions of law and medicine. They are involved in research, development, design, testing, production, operation, maintenance, marketing, sales, administration, and management.

During the junior and senior years students may choose approved electives in any recognized engineering discipline or any area related to engineering practice. The department offers technical electives in the areas of advanced machine design, nuclear engineering, heat and power, air conditioning, advanced vibrations, creativity, and human engineering. Principles developed in the classroom are applied to the operation and testing of heat transfer equipment, fluid-handling apparatus, heat power equipment, internal combustion engines, and engineering materials.

The high school student preparing for a career in mechanical engineering should take a balanced high school program including mathematics, physical sciences and drafting. It is now possible for the community college transfer to complete a B.S. degree at Cal Poly in six quarters (four semesters) after transferring. The community college student planning to transfer into this department should obtain a copy of the community college transfer curriculum for a B.S. in mechanical engineering at Cal Poly by consulting his school counselor or contacting the department at Cal Poly concerning courses which meet the accredited curriculum requirements of the Engineers' Council for Professional Development.

An active co-curricular program includes a chapter of Pi Tau Sigma, national mechanical engineering honor-

ary fraternity; and student sections of the American Society of Mechanical Engineers and the Society of Automotive Engineers.

CORE COURSES FOR MAJOR

(Required of all students)

Mechanical Engr Fund	ME	131	(2)
Engr Digital Computations	ME	132	(3)
Vector Statics	ME	214	(3)
Vector Dynamics	ME	215	(4)
Strength of Materials	ME	218	(3)
Strength of Materials	ME	219	(3)
Intro to Mechanical Design	ME	233	(4)
Thermodynamics	ME	301	(4)
Thermodynamics	ME	302	(4)
Fluid Mechanics	ME	311	(3)
Fluid Mechanics	ME	312	(4)
Heat Transfer	ME	313	(4)
Vector Dynamics	ME	316	(2)
Stress Analysis	ME	319	(4)
Machine Design	ME	325	(4)
Synth of M.E. Problems	ME	340	(3)
Mechanical Vibrations	ME	413	(4)
Adv Engineering Meas	ME	435	(3)
Senior Project	ME	461	(2)
Senior Project	ME	462	(2)
Undergraduate Seminar	ME	463	(2)
Technical Electives			(4)

SUPPORT & ELECTIVE COURSES

(Required of all students)

American Civilization	AMC	201*	(4)
American Civilization	AMC	202*	(4)
General Chemistry	CHM	111*	(3)
General Chemistry	CHM	112*	(3)
General Chemistry Lab	CHM	151*	(1)
General Chemistry Lab	CHM	152*	(1)
Principles of Economics	EC	201*	(4)
Elem of Elec Engr	EEE	231	(4)
Electric Machines	EEE	313	(3)
Elec Instr & Control	EEE	333	(4)
Freshman Composition	ENG	104*	(4)
Engineering Graphics	ESG	121	(2)
Advanced Engineering Graphics	ESG	122	(2)
Manugacturing Processes	ESM	221	(2)
Manufacturing Processes	ESM	230	(2)
Engineering Economy	IE	405	(3)
Analytic Geom & Calculus	MAT	114*	(3)
Analytic Geom & Calculus	MAT	115*	(3)
Analytic Geom & Calculus	MAT	116*	(4)
Calc of Several Variables	MAT	214	(4)
Calc & Several Variables	MAT	215	(4)
Differential Equa	MAT	216	(4)
Engineering Metallurgy	MTE	304	(3)
Welding Fabrication & Des	MTE	337	(3)
Physical Education 100-series			(3)
General Physics	PHY	131*	(4)
General Physics	PHY	132*	(4)
General Physics	PHY	133*	(4)
Basic Science Elective		*	(6)
Humanities Electives		*	(6)
Math Elective (300 & 400 series)			(3-4)
Social Science Humanities Electives		*	(8)
Technical Electives			(11-12)
Electives			(2-4)

*May be used for the general education requirement. Select unspecified courses from the general education list. For general education breadth requirements, select four courses from a minimum of two schools other than the School of Engineering.

Course Descriptions

ME 131 Mechanical Engineering Fundamentals (2)

Fundamental concepts of mechanical engineering, both analytical and experimental. Introduction to units and dimensions, engineering computation, the engineering report, and design with applications from the mechanical engineering profession. 1 lecture, 1 three-hour laboratory.

ME 132 Engineering Digital Computations (3)

Problems involving basic computational methods including elementary concepts of digital computer programming. Proficiency will be gained in writing computer programs using fortran. Assignments include the use of the computer facilities. 2 lectures, 1 three-hour laboratory.

ME 200 Special Problems for Lower Division Students (1-2)

Individual or group investigation, research, studies or surveys of selected problems. Total credit limited to 4 units, with a maximum of 2 units per quarter.

ME 211 Engineering Statics (3)

Classical treatment of statics. Resultants and resolution of forces. Two- and three-dimensional equilibrium, trusses, frames and machines, dry friction. Centroids and centers of gravity of composite areas and bodies. Moments of inertia of areas and masses. Parallel axis theorem and radius of gyration. 3 lectures. Prerequisites: PHY 131, MAT 115.

ME 212 Engineering Dynamics (4)

Classical treatment of dynamics. Kinematics and kinetics of particles and rigid bodies. Rectilinear, curvilinear and plane motion. Newton's second law, work-energy and impulse-momentum. 4 lectures. Prerequisite: ME 211, MAT 116.

ME 214 Vector Statics (3)

Two and three dimensional equilibrium of frames, machines and trusses employing vector algebra. Principles of dry friction, centroids, moments and products of inertia. 3 lectures. Prerequisite: PHY 131, MAT 116 concurrent.

ME 215 Vector Dynamics (4)

Vector mathematics treatment of absolute and relative motion of particles and rigid bodies in translating and rotating reference frames. Newton's laws of motion, work-energy, impulse-momentum. 4 lectures. Prerequisite: ME 214, Math 214 concurrent.

ME 218 Strengths of Materials (3)

Plane stress and strain. Principal stresses and strains, Mohr's Circle. Properties of materials, stress strain diagrams. Design loads, working stresses, and factor of safety. Statically indeterminate axially loaded members. Torsional shearing stresses and displacements. Flexural and transverse shear stresses. Shear and moment diagrams. Beams of two materials. 3 lectures. Prerequisite: ME 214 or ME 211 and MAT 116.

ME 219 Strength of Materials (3)

Deflection and slope of beams by double integration, singularity functions, area-moment, superposition and Castigliano's Theorem. Statically indeterminate beams. Column analysis—centric and eccentric loading. Commercial and standard test of materials. Experimental stress analysis—strain gauges and photoelasticity. 2 lectures, 1 three-hour laboratory. Prerequisite: ME 218, MAT 116.

ME 299 Special Topics for Lower Division Students (1-4)

Group study of a selected topic, the title to be specified in advance. Total credit limited to 8 units, with a maximum of 4 units per quarter. Prerequisite: Permission of instructor.

ME 233 Introduction to Mechanical Design (4)

Introduction to machine and product design techniques and the design and selection of power transmission elements such as couplings; U-joints; roller and silent chains; V, flat and gear belts; gears and gear transmissions; cams, and friction drives. Introduction to shaft design, bearings and attachments. The execution of layouts and engineering specifications for manufacture. 3 lectures, 1 three-hour laboratory. Prerequisite: ESG 122.

ME 301 Thermodynamics (4)

Thermodynamic properties and processes; equations of state; tables and charts of thermodynamic properties; work and heat; the first law of thermodynamics and first law properties; the second law of thermodynamics and entropy; power cycles. 4 lectures. Prerequisites: PHY 132, MAT 215 concurrent.

ME 302 Thermodynamics (4)

Thermodynamic relations for ideal gases, gas mixtures, and gas-vapor mixtures; psychrometrics; availability and irreversibility; reciprocating machines; analysis of cycles of engineering importance including Rankine, Otto, and vapor compression refrigeration. 4 lectures. Prerequisite: ME 301.

ME 311 Fluid Mechanics (3)

Properties and behavior of fluids at rest and in motion with emphasis on both liquids and gases. Fundamental concepts; fluid statics, steady flow energy transformation; flow of incompressible frictionless fluid; laminar and turbulent flow or real liquid in pipes; impulse and momentum applied to fluids (including theory of jet and rocket propulsion). 3 lectures. Prerequisites: ME 212 or 215. Concurrent: ME 301, MAT 215.

ME 312 Fluid Mechanics (4)

Selected topics in fluid mechanics, including: calculation of head losses in pipes and fittings; similarity and dimensional analysis; flow of real compressible fluids; and forces on immersed objects. 3 lectures, 1 three-hour laboratory. Prerequisite: ME 311.

ME 313 Heat Transfer (4)

Basic principles of conduction, convection and radiation heat transfer. One-dimensional and multi-dimensional conduction, steady and unsteady state. Theoretical and empirical relations for free and forced convection in external surface flows and in tube and duct flows. Boiling heat transfer, condensation, and heat exchanger design. Basic laws of radiation heat transfer, radiation properties of surfaces, and radiant energy exchange among simple surfaces. 4 lectures. Prerequisites: ME 301, MAT 216, ME 311.

ME 314 Materials in Electrical Engineering (3)

Concepts of materials science and their relevance to electrical and electronics engineering. Requirements for conductors, insulators, encapsulation, adhesives, and magnetic, thermal, and mechanical applications. Properties of metals, ceramics, organics and semi-conductors are compared. 3 lectures. Prerequisites: CHM 112, PHY 133.

ME 315 Engineering Materials (3)

Concepts of materials science and their relevance to engineering. The engineering properties and principle applications of ferrous and non-ferrous metals, plastics, glasses, epoxy resins, elastomers, and composite materials. Recent advances in engineering materials. 3 lectures. Prerequisite: ME 219 or equivalent.

ME 316 Vector Dynamics (2)

Three-dimensional kinematics and dynamics of rigid bodies. Moments and products of inertia. Rotating axis transformation. Kinetic energy and angular momentum. 2 lectures. Prerequisite: ME 215.

ME 319 Stress Analysis (4)

Fundamentals of elasticity. Combined stresses from machine loads. Theories of failure. Stress concentration determination and reduction. Repeated loading fatigue, endurance strength. Connections, joints, and springs. Beam analysis. Stability phenomena. Thick-walled pressure vessels. 4 lectures. Prerequisite: ME 219.

ME 320 Creativity (3)

A survey of creativity. Learning the skill and techniques for creative thought by using creative exercises and overcoming stiflers. Demonstration of creative solutions to problems. 3 hours lecture. Prerequisite: Junior standing in any major.

ME 325 Machine Design (4)

Design and application of machine components such as brakes, clutches, gears, mechanisms, bearings, ways, sleeves, and bushings. Lubrication of machine elements, gaskets, seals, "o" rings, and fasteners. Design techniques and the design of a simple machine. 3 lectures, 1 three-hour laboratory. Prerequisites: ME 215, ME 233, ME 319, ESM 221, ESM 222 or 230.

ME 326 Machine Design (3)

The emphasis of this course will be placed on the actual process of design and the lectures and laboratories will be devoted to the design of a complete and complex machine or product. The projects are so chosen as to demand the application of knowledge learned in other courses and act as a synthesizing agent. 1 lecture, 2 three-hour laboratories. Prerequisite: ME 325.

ME 330 Engineering Numerical Computations (4)

Use of digital computers and numerical techniques for solving the more difficult problems in mechanical engineering. Emphasis on flow charting, programming and numerical techniques. 4 lectures. Prerequisites: MAT 216, ME 132, 215, and 301.

ME 340 Synthesis of Mechanical Engineering Problems (3)

Synthesis and analysis of steady state and transient engineering problems associated with mechanical engineering. Variable fluid flow, mixture processes, reaction and decay rates, dynamical and vibrational energy systems, electro-mechanical systems, compound interest application, and heat flow systems will be treated from a synthesis aspect. 3 lectures. Prerequisite: MAT 216.

ME 400 Special Problems for Upper Division Students (1-2)

Individual or group investigation, research, studies or surveys of selected problems. Total credit limited to 4 units, with a maximum of 2 units per quarter.

ME 408 Nuclear Engineering (4)

Atomic structure, binding energy, nuclear stability, radioactivity, neutron reactions. Nuclear fission; general features of nuclear reactors; fission cross-sections; fission products; accumulation, radioactivity, and decay of fission products. The production of neutrons; interaction of neutrons with matter; scattering and capture of neutrons; delayed neutrons; reactor power, decay heat power. 4 lectures. Prerequisite: ME 212 or 215, MAT 216.

ME 411 Heat Power (4)

Application of thermodynamics and heat transfer principles to actual power plant cycles. Steam and gas turbine theory and laboratory experiments. Modern combustion power plant component operation, including detailed discussion of auxiliary equipment. Economics of power generation. 3 lectures, 1 three-hour laboratory. Prerequisites: ME 302, ME 312, ME 313.

ME 412 Internal Combustion Engines (4)

The development of analytical and experimental techniques to estimate the performance of internal combustion engines. Discussion includes ideal and actual cycles, combustion, carburetion, fuel injection, ignition, supercharging, cooling, and fuels as applied to spark ignition and compression ignition engines. 3 lectures, 1 three-hour laboratory. Prerequisites: ME 302, ME 313, or consent of instructor.

ME 413 Mechanical Vibrations (4)

Free and forced vibrations with and without damping. Rayleigh's method. Rotating unbalance, vibration isolation, vibration measuring instruments, vibration of several degrees of freedom. 4 lectures. Prerequisites: ME 316, 340 or consent of instructor.

ME 414 Advanced Vibrations (3)

Vibrations of multi-degree freedom systems employing matrix methods; transient vibrations; shock response spectrum; Holzer's method; phase plane methods. 3 lectures. Prerequisite: ME 413.

ME 417 Air Conditioning (4)

Thermal environmental requirement for human habitation. Psychrometrics. Building heating and cooling loads. Air handling equipment and distribution systems. Refrigeration systems and equipment. 4 lectures. Prerequisite: ME 302.

ME 418 Air Conditioning (4)

Heating systems and equipment. Fuel burning appliances; air conditioning systems and their control; application of the principles of environmental engineering in the design of a complete system of compatible components for the control of the thermal environment. 3 lectures and 1 three-hour laboratory. Prerequisite: ME 417.

ME 421 Dynamics of Machinery (4)

Velocity and acceleration analysis of mechanical mechanisms by analytical and graphical techniques. Calculation of static and dynamic forces on machine components. Balancing of rotating masses. Analysis of gyroscopic action with applications. 3 lectures and 1 three-hour laboratory. Prerequisite: ME 316.

ME 435 Advanced Engineering Measurements (3)

Application of sensing, modifying and signal read-out equipment to problems of engineering measurements. Experimental errors are predicted using statistical methods. Preparation of both formal engineering reports and memo-type reports are required. 2 lectures, 1 three-hour laboratory. Prerequisites: ME 413 and EEE 333.

ME 438 Human Engineering in Design (2)

Design of products and/or systems based on the theory of human engineering principles, study of dimensional and strength characteristics of human anatomy, capabilities and limitations of senses, responses to sensory stimuli. The application of human engineering principles or human factors in the design and mock-up of projects. 1 lecture, 1 three-hour laboratory. Prerequisite: Junior standing in engineering science, architecture or industrial design.

ME 439 Advanced Machine Design (4)

Design and comparisons of hydraulic and pneumatic power systems. Control logic using Boolean algebra and truth tables. Pneumatic control circuit theory and design. Fluidic circuit theory and design. Electrical control circuit theory and design. Hydraulic power and control circuit design. Introduction to dynamic response in control systems. The design of control projects. Recent design developments. 2 lectures, 2 three-hour laboratories. Prerequisite: Junior standing in engineering or science.

ME 461, 462 Senior Project (2) (2)

Selection and completion of a project under faculty supervision. Projects typical of problems which graduates must solve in their fields of employment. Project results are presented in a formal report. Minimum 120 hours total time. Prerequisite: senior standing.

ME 463 Undergraduate Seminar (2)

New developments, policies, practices, and procedures are discussed through regular seminar. Each individual is responsible for the development and oral presentation of one or more topics in his chosen field. The presentation shall include audio-visual aids prepared by the student. 2 lectures. Prerequisite: Completion of senior project or permission of instructor.

ME 499 Special Topics for Upper Division Students (1-4)

Group study of a selected topic, the title to be specified in advance. Total credit limited to 8 units, with a maximum of 4 units per quarter. Prerequisite: permission of instructor.


ARCHI
TECTURE

SCHOOL OF ENVIRONMENTAL DESIGN

H. Frederick Koeper, Dean
William E. Sparks, Associate Dean

The School of Environmental Design offers three undergraduate majors leading to the bachelor of science degree and three programs leading to the master's degree. Information concerning the master's curricula may be found in the Graduate listings.

The undergraduate programs provide a broad range of occupational choice from positions with many offices engaged in private practice to civil service opportunities with city, county, state, and federal governments.

The school aims to develop professional designers aware of practical problems yet seeking better patterns of life for the future.

The foundation year courses, ENV 101-102-103-221 are taken by all students in all majors, based on the theory that a common environmental perspective is a necessary requirement for landscape architects, urban planners, and architects. Because these professions critically influence city and regional development, the practitioners must understand the fundamental and interlocking concepts of community growth and renewal.

The foundation year courses are taught cooperatively by faculty from the three departments. This experience is intended to learn cooperation and the relevant contributions that each profession has to offer. This interdisciplinary study gives students an opportunity to understand the relationship between their own major discipline and the theory and practice of other environmental design professions.

Departments and Majors

ARCHITECTURE
Richard J. Chylinski, Chairman
Architecture major (BS)
Master of Architecture

LANDSCAPE ARCHITECTURE
Cameron Man, Chairman
Landscape Architecture major (BS)
Master of Landscape Architecture

URBAN PLANNING
Harry A. Anthony, Chairman
Urban Planning major (BS)
Master of Urban Planning

Course Descriptions

Env 101 Environmental Design (7)
Development of man's relationship to his environment through design awareness and an understanding of form, function and design process. Basic graphic techniques; drawing for reproduction; equipment and materials of graphic communication. 4 lectures, 3 three-hour laboratories. Prerequisite: Admission to major in Architecture, Landscape Architecture, or Urban Planning.

ENV 102 Environmental Design (7)
Theory and practice of environmental design applied to architecture, urban planning, and landscape architecture. Fundamentals of design programming, research and analysis. Preparation of design solutions for a variety of environmental problems. 4 lectures, 3 three-hour laboratories. Prerequisite: ENV 101.

ENV 103 Environmental Design (7)

Physical environment determinants influencing design. Problems common to the three professions with emphasis upon natural and physical processes and form responses. Application to simple and complex design exercises. 4 lectures, 3 three-hour laboratories. Prerequisite: ENV 102.

ENV 221 History of Environmental Design (4)

The study of man's efforts to create and control his environment emphasizing qualitative, physical solutions from political, social, and economic relationships. Open to non-majors. 4 lectures.

ENV 510 Environmental Design and Graphics (6)

For graduate students with degrees in fields other than environmental design to develop basic skills in design and graphic communications in preparation for advanced methodology. Lecture-discussion, 3 hours, laboratory, 9 hours.

ARCHITECTURE

Richard J. Chylinski, *Chairman*

Jack E. Causey
J. Ingraham Clark
Juan G. Espinoza
W. Lawrence Harvey
David M. Lowe
Lawrence A. Luick
Sergio Miranda
Edward E. Pickard
James Pulliam
Elpidio Rocha
Dariouche G. Showghi
Bernard Zimmerman

The Department of Architecture offers a program of study leading to a Bachelor of Science in Architecture. To aid in qualifying for professional registration as an architect, the student should follow this curriculum with a two-year Master of Architecture degree.

The undergraduate major in architecture is designed to enlarge the liberal education of the general student, through an introduction to perceptual thinking, through examination of the condition of the man-made environment, and through studies in creative response to visual and environmental situations.

The central core of the undergraduate curriculum in architecture is the study of design, with related exercises and drawing, graphics, visual composition, photography and model building. The student is given an opportunity to develop his creative as well as his analytical powers by finding solutions to programs employing the requirements of contemporary buildings and paralleling the conditions to be encountered in later practice. Instruction is generally in the form of guidance and suggestion on the part of the instructor to each student individually, accompanied by group discussions, lectures, and demonstrations. Solutions are submitted as drawings or models for review and judgment by a jury of teachers, practicing architects and designers or specialists as the occasion may require. All class work becomes the property of the school and will be retained or returned at the discretion of the faculty.

The Department of Architecture is a full member of the Association of Collegiate Schools of Architecture and is applying for accreditation by the National Architectural Accrediting Board. Most faculty are registered architects and hold individual professional memberships in the American Institute of Architects, American Institute of Planners, or American Society of Planning Officials.

CORE COURSES FOR MAJOR

(Required of all students)

Design & Graphics	ARC	201	(4)
Design & Graphics	ARC	202	(4)
Design & Graphics	ARC	203	(4)
History	ARC	322	(4)
History	ARC	323	(4)
History	ARC	324	(4)
Materials & Const	ARC	241	(4)
Arc Design	ARC	301	(8)
Arc Design	ARC	302	(8)
Architectural Admin	ARC	303	(8)
Environ Cont Syst	ARC	341	(4)
Environ Cont Syst	ARC	342	(4)
Structures	ARC	361	(4)
Structures	ARC	362	(4)
Structures	ARC	363	(4)
Arc Design	ARC	401	(8)
Arc Design	ARC	402	(8)
Arc Design	ARC	403	(8)
or Arc Admin	ARC	404	(8)
Architectural Admin	ARC	421	(3)
The Profession of Arc	ARC	431	(4)
Environmental Des	ENV	101	(7)
Environmental Des	ENV	102	(7)
Environmental Des	ENV	103	(7)
History/Env Des	ENV	221	(4)

SUPPORT AND ELECTIVE COURSES

(Required of all students)

Amer Civ	AMC	201	(4)
Amer Civ	AMC	202	(4)
Prin Economics	EC	201	(4)
Freshman Comp	ENG	104	(4)
Freshman Comp	ENG	105	(4)
Trigonometry	MAT	104	(4)
College Algebra	MAT	105	(4)
PE 100-series			(3)
Log & Semantics	PHL	202	(4)
College Physics	PHY	121	(4)
College Physics	PHY	122	(4)
Gen Psychology	PSY	201	(4)
Prin Urban Plan	UP	301	(4)
Literature			(4)
Dir Electives			(5)
Electives			(10)

Course Descriptions

ARC 200 Special Problems for Lower Division Students (1-2)

Individual or group investigation, research, studies or surveys of selected problems. Total credit limited to 4 units, with a maximum of 2 units per quarter.

ARC 201, 202, 203 Design and Graphics (4) (4) (4)

Architectural design as it relates to geophysical forces; site, sun, wind, ecology and geology, human behavior and materials of construction. Communication techniques. The application and development of design process to the field of architecture. Courses must be taken in sequence. One 1-hour lecture and 3 three-hour laboratories. Prerequisite: ENV 103

ARC 241 Materials and Construction (4)

Study of building construction techniques, systems and components. Properties and application of building materials. 4 one-hour lectures. Prerequisite: ENV 103.

ARC 299 Special Topics for Lower Division Students (1-4)

Group study of a selected topic, the title to be specified in advance. Total credit limited to 8 units, with a maximum of 4 units per quarter. Prerequisite: Permission of instructor.

ARC 301, 302 Architectural Design (8) (8)

Study and application of the interaction of aesthetic, economic, technological and social determinants structuring the form of buildings for human use. Emphasis on quantitative and qualitative analysis of construction technology, human behavior, materials of construction and site conditions as related to multiple living/working units. Architectural design solutions will be carried into development through contract drawings and specifications. Courses must be taken in sequence. Two one-hour lectures, 3 six-hour laboratories. Prerequisites: ARC 203, PHY 122, MAT 105.

ARC 303 Architectural Administration (8)

Preparation of design development and working drawings. 2 one-hour lectures, 3 six-hour laboratories. Prerequisites: ARC 302.

ARC 322 Renaissance and Baroque Architecture (4)

Theory and design of architecture and planning, primarily Italy, France and England, from 1400 in Florence to 1750. 4 one-hour lectures. Prerequisite: ENV 211.

ARC 323 Nineteenth-Century Architecture (4)

Romantic classicism and revival architecture of Europe and the United States together with changes in construction brought about by the industrial revolution. 4 one-hour lectures. Prerequisite: ENV 221.

ARC 324 Twentieth-Century Architecture (4)

Modern architecture and theory in Europe and the United States with emphasis on the contribution of major architects. 4 one-hour lectures. Prerequisite: ENV 221.

ARC 341 Environmental Control Systems (4)

Water; water systems; principles of sanitary drainage; plumbing systems; storm drainage; treatment of sewage and industrial waste; heat loss, heat gain; principles of heating; principles of cooling; space conditioning for houses; space conditioning for large buildings; all-electric space conditioning; air handling; ventilation and ducts; total energy; fire protection. 4 one-hour lectures. Prerequisites: ARC 203, PHY 122.

ARC 342 Environmental Control Systems (4)

Basic electricity; electrical materials and wiring design; sound and signal systems; lighting fundamentals; light source and their characteristics; lighting design and application; elevator and escalator design; acoustics. Prerequisites: ARC 203, PHY 122.

ARC 361, 362, 363 Structures (4) (4) (4)

Fundamental theories of structural design and the creative relationship of structure to form, function, and economics. Analysis of structural systems, including the determination of forces, stresses, deflections, and the use of the common formulas in the design of wood, steel and concrete structsres. Courses must be taken in sequence. Prerequisites: ARC 203, MAT 105, PHY 122.

ARC 400 Special Problems for Upper Division Students (1-2)

Individual or group investigation, research, studies, or surveys of selected problems. Total credit limited to 4 units with a maximum of 2 units per quarter.

ARC 401, 402, 403 Architectural Design (8) (8) (8)

Synthesis of previous design courses; problems of increasing complexity; design of physical environment of urban and suburban areas. 2 one-hour lectures, 3 six-hour laboratories. Prerequisite: ARC 303.

ARC 404 Architectural Administration (8)

During the Spring Quarter of the fourth year, the student has the option of electing to take ARC 403 Architectural Design or ARC 404 Architectural Administration. Advanced courses in contract drawings and specifications, and industrial components and systems. 2 one-hour lectures, 3 six-hour laboratories. Prerequisite: ARC 402.

ARC 421 Architectural Administration (3)

Architectural administrative responsibilities, legal and ethical aspects of architectural practice. 3 one-hour lectures. Prerequisite: ARC 303.

ARC 431 The Profession of Architecture (4)

Methods, developments, ethics, office practice and procedures in the profession of architecture. Discussion of environmental design problems. The role of the architect in a changing society. 2 two-hour seminars. Prerequisite: ARC 303.

ARC 499 Special Topics for Upper Division Students (1-4)

Group study of a selected topic, the title to be specified in advance. Total credit limited to 8 units, with a maximum of 4 units per quarter. Prerequisite: permission of instructor.

Graduate courses are listed in the graduate section of the catalog. See p. 358.

LANDSCAPE ARCHITECTURE

Cameron Man, *Chairman*

Stephen Bochkor	John T. Lyle	D. Rodney Tapp
Jere S. French	Jeffrey K. Olson	Robert W. Tyler
Harold E. Henry	Robert C. Perry, Jr.	Takeo Uesugi
Arthur W. Jokeld	Bruce G. Sharky	Chester A. Volski
Henry Kordus	William E. Sparks	Mark J. von Wodtke

The Bachelor of Science in Landscape Architecture is accredited by the American Society of Landscape Architects and approved by the California Board of Landscape Architects.

A curriculum leading to the Master of Landscape Architecture degree is also offered by the department. Requirements for this degree may be found in the graduate listings.

The program emphasizes two areas—regional landscape design and urban landscape design.

The regional emphasis includes conservation measures and proper use of land for recreational and resource development purposes based on an understanding of natural processes. Employment opportunities for graduates are found with the U.S. Forest Service, National Park Service, state departments of parks and recreation, county agencies, civil systems divisions of aerospace companies, and with consultants doing large scale work.

The urban emphasis is concerned with humanizing man's urban environment and includes exposure to psychological, social, economic, and political forces. The student is involved with complex problems concerning residential, commercial, and industrial developments, recreational and educational facilities planning, and new towns. Employment opportunities are found in private practice, with municipal and county parks departments and planning departments, with industrial and commercial firms, and with residential construction companies.

Laboratory for Experimental Design

The laboratory has been established to carry on research and pilot projects in the application of experimental methods in landscape architecture. Generally, the work is done by faculty members and graduate students working in teams which often include members from other departments. Some assistantships are available to students who have attained a high level of professional skill.

CORE COURSES FOR MAJOR

(Required of all students)

Environmental Design	ENV	101	(7)
Environmental Design	ENV	102	(7)
Environmental Design	ENV	103	(7)
Basic Landscape Design	LA	202	(4)
Basic Landscape Design	LA	203	(4)

Inter Landscape Des	LA	301	(4)
Inter Landscape Des	LA	302	(4)
Inter Landscape Des	LA	303	(4)
Landscape Constr	LA	331	(4)
Landscape Constr	LA	332	(4)
Adv Landscape Construction	LA	333	(4)
Plant Matls & Des	LA	343	(3)
Plant Matls & Des	LA	344	(3)
Adv Landscape Des	LA	401	(4)
Adv Landscape Des	LA	402	(4)
Adv Landscape Des	LA	403	(4)
Senior Seminar	LA	463	(2)
Landscape Arch Practice	LA	464	(2)
Landscape Arch Proj	LA	465	(2)

SUPPORT & ELECTIVE COURSES

(Required of all students)

Surveying Fundls	AE	131	(2)
Surveying Application	AE	132	(2)
American Civilization	AMC	201*	(4)
American Civilization	AMC	202*	(4)
Life Science	BIO	110*	(3)
Plant Environments	BOT	116*	(3)
Fundls of Chemistry	CHM	103*	(4)
Freshman Composition	ENG	104*	(4)
Freshman Composition	ENG	105*	(4)
History of Env Des	ENV	221	(4)
Landscape and Settlement Patterns	LA	422	(3)
The Urban Landscape	LA	423	(3)
World Gardens	LA	424	(3)
Plant Matls & Des	LA	241	(3)
Plant Matls & Des	LA	242	(3)
Plant Materials and Design	LA	243	(3)
Basic Mathematics	MAT	101*	(3)
Basic Mathematics	MAT	102*	(3)
Physical Education	PE	141*	(3)
Fundls of Physics	PHY	102*	(4)
General Psychology	PSY	201*	(4)
General Soils	SS	221	(5)
Humanities			* (8)
Directed Electives			(33)
Electives			(12)

*May be used for the general education requirement. Select unspecified courses from the general education list. General education breadth requirement is an additional four courses from a minimum of two schools outside the School of Environmental Design.

Course Descriptions

LA 200 Special Problems for Lower Division Students (1-2)

Individual or group investigation, research, studies or surveys of selected problems. Total credit limited to 4 units, with a maximum of 2 units per quarter.

LA 202 Basic Landscape Design (4)

Fundamentals of design programming, research and analysis; preparation of design solutions for a variety of environmental problems. 1 lecture, 3 three-hour laboratories. Prererquisite: ENV 103.

LA 203 Basic Landscape Design (4)

A continuation of the fundamental spatial design concepts as they apply in particular to land forms, climate, orientation, and plant material with emphasis on small scale problem solving. 2 lectures, 2 three-hour laboratories. Prerequisite: LA 202.

LA 241, 242, 243 Planting Materials and Design (3) (3) (3)

Trees, shrubs, and vines adaptable or native to southern California and their functional, ecological, and aesthetic use in solving problems in planting design. 1 lecture, 2 three-hour laboratories. Prerequisite: ENV 102, or permission of instructor.

LA 299 Special Topics for Lower Division Students (1-4)

Group study of a selected topic, the title to be specified in advance. Total credit limited to 8 units, with a maximum of 4 units per quarter. Prerequisite: Permission of instructor.

LA 301, 302, 303 Intermediate Landscape Design (4) (4) (4)

The application of design concepts and principles to increasingly more difficult problems involving the total range of physical environment. 1 lecture, 3 three-hour laboratories. Prerequisite: LA 203. Limited to 4 units per quarter.

LA 331, 332 Landscape Construction (4) (4)

Landscape construction problems involving the formulation and preparation of plans for grading, drainage, staking, reference and lighting, planting, irrigation, construction details, structures, and other working drawings; relationship to specifications and contract documents. 1 lecture, 2 three-hour laboratories. Prerequisite: MAT 102, LA 203, AE 131, AE 132.

LA 333 Advanced Landscape Construction (4)

Emphasis on structural design projects, engineering and specifications completed through working drawings. 1 lecture, 2 three-hour laboratories. Prerequisite: LA 332, LA 302.

LA 343, 344 Planting Materials and Design (3) (3)

A continuation of LA 242 with greater emphasis given to organization and composition of plant materials and the development of planting plans and specifications. 1 lecture, 2 three-hour laboratories. Prerequisite: LA 242.

LA 400 Special Problems for Upper Division Students (1-2)

Individual or group investigation, research, studies or surveys of selected problems. Total credit limited to 4 units, with a maximum of 2 units per quarter.

LA 401, 402, 403 Advanced Landscape Design (4) (4) (4)

The analysis, programming, and solution to advanced projects in landscape design. Students must select, as an area of specialization, a section dealing in emphasis of either 1) urban, 2) rural regional projects, or 3) special landscape problems. 1 lecture, 3 three-hour laboratories. Prerequisite: LA 303.

LA 422 Landscape and Patterns (3)

How the landscape has guided human activity and habitat patterns on the regional and global scales, and how these patterns have in turn changed the natural landscape. Emphasis on major periods of urbanization, agricultural expansion, and development of recreation, conservation and open space systems along with projections for the future. 2 lectures, 1 laboratory. Prerequisite: ENV 221.

LA 423 The Urban Landscape (3)

Urban space as traced through history, concentrating primarily on the development of the square and the park from the classic agora to the complexities of public space in modern western cities. The design of the city park is traced from the industrial era to present. Innovations, changing goals and concepts in leisure and recreation are noted. 2 lectures, 1 laboratory. Prerequisite: ENV 221.

LA 424 World Gardens (3)

Garden design as traced into history, emphasizing the Italian Renaissance, 17th Century France and the English Natural Period. Oriental garden design especially Chinese and Japanese, Moorish and Hindu and Mogul gardens are traced in their times of primary development. American gardens are viewed from Colonial times, their era of the great estates and contemporary styles. Construction, form and style in garden design are explained. 2 lectures, 1 laboratory. Prerequisite: ENV 221.

LA 441 Internship (1-3)

On-the-job training in the profession dealing with some aspect of landscape architecture. The experience must involve learning as well as production. Internships must be approved in advance by the departmental internship coordinator. One unit of credit is granted for each 150 hours of training under a licensed professional. May be repeated for a maximum of 9 units. Prerequisite:: Approval of instructor.

LA 461, 462 Senior Project (2) (2)

Selection and completion of a project under faculty supervision. Projects typical of problems which graduates must solve in their fields of employment. Project results are presented in a formal report. Minimum 120 hours total time.

LA 463 Senior Seminar (2)

Discussions of environmental design problems. The role of the landscape architect in society. Two meetings. To be taken in conjunction with LA 402.

LA 464 Landscape Architectural Practice (2)

The practice of landscape architecture, covering professional responsibilities and ethics, client and contractor relationships. Lecture, 2 hours. To be taken in conjunction with LA 401.

LA 465 Landscape Architectural Project (2)

Selection and completion of a project under faculty supervision. Projects typical of problems which graduates must solve in their field of employment. Project results are presented in a formal report. Minimum of 120 hours. Projects to be done in conjunction with LA 403.

LA 499 Special Topics for Upper Division Students (1-4)

Group study of a selected topic, the title to be specified in advance. Total credit limited to 8 units, with a maximum of 4 units per quarter. Prerequisite: permission of instructor.

Graduate courses are listed in the graduate section of the catalog. See p. 407.

URBAN PLANNING

Harry A. Anthony, *Chairman*

David E. Bess
Robert A. Catlin
William R. Dale
John M. Ducey
Peter J. Eng
Sherman W. Griselle
Stephen A. Kaufman
Paul H. Lo
Charles R. Stapleton
Harvey Steinberg
William C. Warner

The goal of the undergraduate urban planning curriculum leading to the Bachelor of Science in Urban Planning degree is to develop planners with imagination and a desire to serve people. The education of urban planners with a problem-solving orientation is a basic aim. The curriculum is designed to meet both present and future requirements of the planning profession. A proper balance among the physical, social, economic, ecological, and political forces necessary for a planner to understand in dealing with urbanization is stressed. The Bachelor of Science in Urban Planning has received recognition by the American Institute of Planners.

The department also offers a curriculum leading to the degree Master of Urban Planning.

CORE COURSES FOR MAJOR

(Required of all students)

Environmental Design	ENV	101	(7)
Environmental Design	ENV	102	(7)
Environmental Design	ENV	103	(7)
History of Env Design	ENV	221	(4)
Prin of Urban Planning	UP	301	(4)
Community Facilities	UP	302	(4)
Land Planning	UP	303	(4)
Research & Analysis	UP	331	(4)
Planning Studies	UP	332	(4)
Evolution of Cities	UP	411	(4)
Plan & Urban Des Thr World	UP	412	(3)
Plan & Urban Des Thr World	UP	413	(3)
General Plan Survey	UP	431	(4)
General Plan Devel	UP	432	(4)
Regional Planning	UP	433	(4)
Community Devel & Renewal	UP	434	(4)
Senior Project	UP	461	(2)
Senior Project	UP	462	(2)
Undergraduate Seminar	UP	463	(2)
Urban Planning Implementation	UP	465	(4)

SUPPORT & ELECTIVE COURSES

(Required of all students)

American Civilization	AMC	201	*(4)
American Civilization	AMC	202	*(4)
Report Writing	COM	216	*(3)
Intro to Computing	DP	110	(4)
Prin of Economics	EC	201	*(4)
Freshman Composition	ENG	104	*(4)
Freshman Composition	ENG	105	*(4)
Physical Geology	ESC	111	*(3)
Basic Mathematics	MAT	101	*(3)
Basic Mathematics	MAT	102	*(3)
Introduction to Statistics	MAT	107	*(3)
Physical Education	PE	141	*(3)
Public Administration	PLS	314	(4)
Interest Group Politics	PLS	325	(4)
Issues in Calif Govt	PLS	480	(4)
Gen Psychology	PSY	201	*(4)
Human Relations	PSY	314	*(4)
Urban Sociology	SOC	401	*(4)
Public Speaking	SP	100	*(4)
Conf Tech & Group Disc	SP	307	(4)
Natural Science			*(3)
Humanities			*(8)
Directed Electives			(20)
Electives			(12)

*May be used for the general education requirement. Select unspecified courses from the general education list.

†Advanced students in mathematics may substitute MAT 104 and MAT 105, or may substitute MAT 108 and MAT 109.

Course Descriptions

UP 200 Special Problems for Lower Division Students (1-2)

Individual or group investigation, research, studies or surveys of selected problems. Total credit limited to 4 units, with a maximum of 2 units per quarter.

UP 299 Special Topics for Lower Division Students (1-4)

Group study of a selected topic, the title to be specified in advance. Total credit limited to 8 units, with a maximum of 4 units per quarter. Prerequisite: Permission of instructor.

UP 301 Principles of Urban Planning (4)

A review of the historical determinants of urban growth and evolution of the modern city. The planning function in government. The planning process. Principles for projecting land requirements and locations for various urban land uses. Ways of implementing the plans. 4 lectures.

UP 302 Community Facilities (4)

The importance of community facilities and services to urban development. Discussion of the planning, construction and operation of a variety of urban facilities. Review of technological advances. 3 lectures, 1 three-hour laboratory.

UP 303 Land Planning (4)

Design of subdivisions and the redesign of urban land. Problems in street, lot, and utility systems design. Review of recent trends in land planning. 1 lecture, 3 three-hour laboratories.

UP 331 Research and Analysis (4)

Problem and methods of urban planning research and analysis. Types of data required, information sources, collection and analysis of basic planning data. Review of important research studies. Emphasis is on individual research, report writing, and presentation. 1 lecture, 3 three-hour laboratories.

UP 332 Planning Studies (4)

Review of typical planning studies from California and elsewhere and advanced methods of research analysis. Study and formulation of new survey and projection techniques. 1 lecture, 3 three-hour laboratories. Prerequisite: UP 331 or chairman's permission.

UP 400 Special Problems for Upper Division Students (1-2)

Individual or group investigation, research, studies or surveys of selected problems. Total credit limited to 4 units, with a maximum of 2 units per quarter.

UP 411 Evolution of Cities (4)

Historical review of cities and of the urbanization movement following the Industrial Revolution. Ecological, social, economic, technological, political and acultural determinants of city location, form, growth or decline. Role of the city as a force of culture and civilization. Urban development of the Los Angeles region. 4 lectures.

UP 412, 413 Planning and Urban Design Throughout the World (3) (3)

Illustrated lectures on contemporary planning and urban design theory and practice currently in evidence in Europe, Latin America, Asia and Africa. Contemporary theories and concepts as related to present social concerns. Relevance of the European and World experience to the solution of America's urban problems. 3 lectures. Prerequisite: upper division standing or permission of instructor.

UP 431 General Plan Survey (4)

General plan research and survey procedures. Programming for a general plan. 1 lecture, 3 three-hour laboratories. Prerequisite: UP 332.

UP 432 General Plan Development (4)

Emphasis on policy planning, synthesis, and formulation of a general plan through individual creative effort. 1 lecture, 3 three-hour laboratories. Must be taken immediately following UP 431.

UP 433 Regional Planning (4)

Review of county, regional, state, and national planning. Emphasis on regional planning. 1 lecture, 3 three-hour laboratories. Prerequisite: UP 432 or permission of the instructor.

UP 434 Community Development and Renewal (4)

The history and legal background of community development and urban renewal. The process of acquisition and redevelopment of urban land and buildings by government action. Study of conservation and rehabilitation practices. Problems involved in federal and local, public and private, renewal efforts. Economic, social, ethnic and racial integration of communities and the dynamics of depressed urban areas. 3 lectures, 1 three-hour laoratory. Prerequisite: UP 301 or permission of instructor or department chairman.

UP 441 Field Work (2-3)

Practical application of urban planning techniques through supervised field work. Written report and evaluation of experience required. (One unit of credit will be allowed for each 60 hours of field work.) May be repeated for a maximum of 6 units. One lecture and 6 to 12 hours of field work. Prerequisite: permission of instructor.

UP 461, 462 Senior Project (2) (2)

Selection completion of a project under faculty supervision. Projects typical of problems which graduates must solve in urban planning field. Project results presented in a formal report. Minimum 60 hours total time per two-unit course. Prerequisite: senior standing.

UP 463 Undergraduate Seminar (2)

Intensive study of the legal, ethical, and professional aspects of urban planning in public and private practice. Review of urban planning problems. 1 two-hour seminar. Prerequisite: Senior standing.

UP 465 Urban Planning Implementation (4)

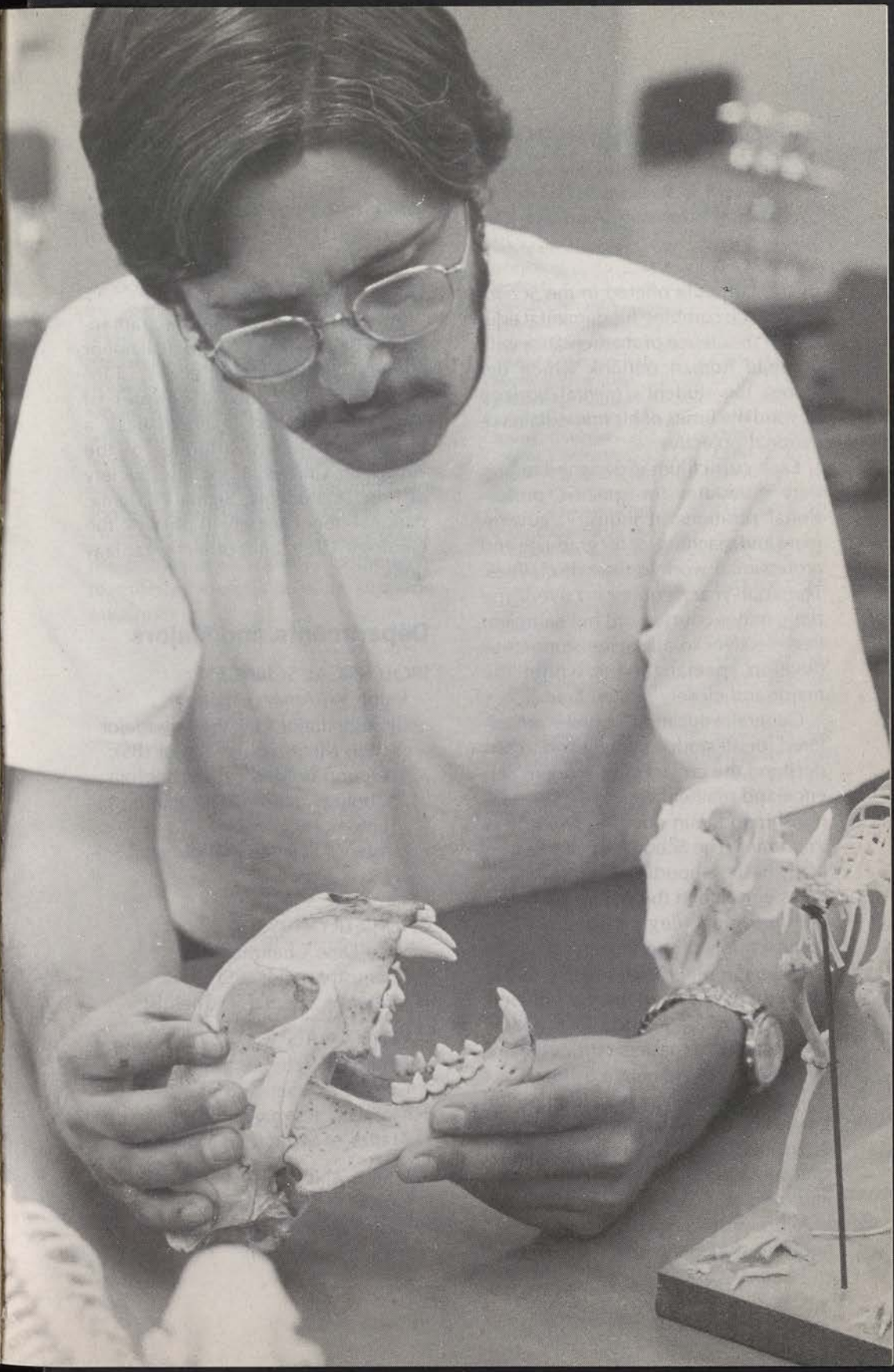
Review of zoning ordinances, subdivision regulations, capital improvement programs, and other devices and techniques used to implement a general plan. 4 lectures. Prerequisite: senior standing or permission of the instructor.

UP 499 Special Topics for Upper Division Students (1-4)

Group study of a selected topic, the title to be specified in advance. Total credit limited to 8 units, with a maximum of 4 units per quarter. Prerequisite: permission of instructor.

Graduate courses are listed in the graduate section of the catalog. See p. 420.





SCHOOL OF SCIENCE

Vincent E. Parker, Dean
Sidney Birnbaum, Associate Dean

The curricula offered in the School of Science combine fundamental education in science or mathematics with a broad human outlook which develops the student's mental horizon beyond the limits of his immediate vocational objective.

Each curriculum is designed to prepare graduates for specific professional positions in industry, government and teaching, or for graduate and professional work in their disciplines. The four-year sequence covers the basic major courses and has sufficient free electives to allow the students to develop specializations within the major and closely related field.

General education courses are offered for all students. The need to understand the concepts of modern science and mathematics and their relationship to life in our present world is important. The School of Science also offers basic supporting courses for students enrolled in the professional and technological degree programs in other schools of the university.

Majors in nine fields leading to the bachelor of science degree are offered by the School of Science. Information concerning the masters curricula may be found in the graduate listings.

The standard teaching credential program is offered for both the elementary specialization and the secondary specialization in a number of majors and minors.

A pre-professional program is offered for students preparing for medical or dental school.

An active co-curricular program includes Beta Beta Beta Biological honor society; Biological Sciences Club; Microbiology Club; a chapter of Kappa Mu Epsilon (mathematics); a chapter of student affiliates of the American Chemical Society; Society of Physics Students; Sigma Pi Sigma, national honor society in physics; the Geology Club and other organizations.

Departments and Majors

BIOLOGICAL SCIENCES
Ralph W. Ames, Chairman
Biology major (BS); Botany major (BS); Microbiology major (BS); Option in Medical Technology; Zoology major (BS); Option in Entomology
Master of Science in Biological Sciences

CHEMISTRY
Vasu Dev, Chairman
Chemistry major (BS)
Master of Science in Chemistry

MATHEMATICS
Emil R. Herzog, Acting Chairman
Computer Science Major (BS)
Mathematics major (BS)
Master of Science in Mathematics

PHYSICS AND EARTH SCIENCES
Johannes Tuul, Chairman
Earth Sciences major (BS); Physics major (BS)

Preprofessional Preparation

Many university majors are suitable for undergraduate preparation for medical, dental and veterinary schools. The list below summarizes the recommendations of the Preprofessional Advisory Committee for premedical students; predental and preveterinary recommendations would vary somewhat from this list, as would requirements for particular professional schools. Students who are interested in preprofessional preparation should consult with their departmental chairman and their departmental pre-professional advisory committee member as soon as possible after admission.

RECOMMENDED COURSES

English Composition	ENG	104	(4)
English Composition	ENG	105	(4)
Basic Biology	BIO	115	(5)
Invertebrate Zoology	ZOO	137	(5)
Vertebrate Zoology	ZOO	138	(5)
Embryology	ZOO	323	(5)
Genetics	BIO	303	(4)
General Chemistry	CHM	111	(3)
General Chemistry	CHM	112	(3)
General Chemistry Lab	CHM	151	(1)
General Chemistry Lab	CHM	152	(1)
Chemical Principles	CHM	113	(4)
Quantitative Analysis	CHM	221	(4)
Organic Chemistry	CHM	211	(3)
Organic Chemistry	CHM	212	(3)
Organic Chemistry	CHM	213	(3)
Organic Chemistry Lab	CHM	251	(1)
Organic Chemistry Lab	CHM	252	(2)
Organic Chemistry Lab	CHM	253	(2)
Analytic Geometry and Calculus	MAT	114	(3)
Analytic Geometry and Calculus	MAT	115	(3)
Analytic Geometry and Calculus	MAT	116	(4)
or Calculus	MAT	140	(4)
or Calculus	MAT	141	(4)
or Calculus	MAT	142	(4)
General Physics	PHY	131	(4)
General Physics	PHY	132	(4)
General Physics	PHY	133	(4)
or College Physics	PHY	121	(4)
or College Physics	PHY	122	(4)
or College Physics	PHY	123	(4)

BIOLOGY

One of the four majors offered in the bilogical sciences department is biology. For other programs in this department see botany, microbiology, and zoology.

Ralph W. Ames, *Chairman*

Edward K. Mercer, *Coordinator*

Jonathan N. Baskin	Bruce L. Firstman	Ronald D. Quinn
Howard S. Brown	Diana R. Garcia	Edward T. Roche
Timothy W. Brown	Marion P. Harthill	Glenn R. Stewart
Peter Castro	Lamar M. Knill	Laszlo J. Szijj
Ronald S. Daniel	Harold L. Lint	Lenard R. Troncale
William D. Edmonds	George W. Martinek	Jia-Hsi Wu

The biology section stresses a balance between the theoretical aspects of biology and actual experience in field and laboratory. The variety of courses offered in a flexible curriculum provides an opportunity for a wide range of experience in both animal and plant sciences.

The offerings of this curriculum provide the student with a preparation for graduate and professional schools in fields ranging from molecular to field biology. Departmental facilities include a molecular biology laboratory, greenhouses, controlled environmental units, a radiation biology laboratory, plant and animal collections, and an electron microscope facility. Ecological studies are facilitated by accessibility to natural habitats on campus and by the university's proximity to desert, mountain, and seashore areas. Courses in marine and fresh water biology provide preparation for teaching, conservation, wildlife management, or graduate research in aquatic biology.

The curriculum prepares prospective teachers for the primary or secondary education credential. Graduate courses enable students to complete requirements for the junior college credential.

The biology section also offers a curriculum leading to the Master of Science in Biology with emphasis in biology.

CORE COURSES FOR MAJOR

(Required of all students)

Basic Biology	BIO	115	(5)
Conservation	BIO	201	(3)
Principles of Evolution	BIO	213	(3)
Genetics	BIO	303	(4)
Biological Systematics	BIO	306	(3)
Principles of Ecology	BIO	325	(4)
Senior Seminar	BIO	490	(1,1)
Plant Structures and Functions	BOT	124	(5)
Plant Morphology	BOT	125	(5)
Basic Microbiology	MIC	201	(5)
Invertebrate Zoology	ZOO	137	(5)
Vertebrate Zoology	ZOO	138	(5)

General Entomology	ZOO	226	(4)
Cellular Physiology	BIO	435	(4)
or Plant Physiology	BOT	322	
or Human Physiology	ZOO	235	
or Animal Physiology	ZOO	324	
Upper Division courses in Biological Sciences			(12)

SUPPORT AND ELECTIVE COURSES

(Required of all students)

American Civilization	AMC	201	*(4)
American Civilization	AMC	202	*(4)
College Chemistry	CHM	104	*(3)
College Chemistry	CHM	105	*(3)
College Chemistry Lab	CHM	141	*(1)
College Chemistry Lab	CHM	142	*(1)
Organic Chemistry	CHM	201	*(3)
Freshman Composition	ENG	104	*(4)
Freshman Composition	ENG	105	*(4)
or Public Speaking	SP	100	
or Technical Writing	COM	219	
Trigonometry	MAT	104	*(4)
College Algebra	MAT	105	*(4)
Physical Education 100-series			*(3)
College Physics	PHY	121	*(4)
College Physics	PHY	121	*(4)
College Physics	PHY	123	*(4)
Courses to complete general education requirements			*(10)
Approved electives			**(24)
Electives			(45)

†Students considering graduate work or professional schools, see recommended courses for preprofessional preparation, page

*May be used for general education requirements. A total of 60 units is required and must include two courses in humanities and four courses from a minimum of two schools other than the School of Science.

**Approved electives include all courses in the biological sciences department not specifically designed for non-majors. See advisor for approval of courses offered by other departments.

Course Descriptions

F, W, Sp and Su notations indicate the quarter(s) each course is normally offered. Unless otherwise specified, the course is offered each year during the indicated quarter(s). Parentheses signify that the course *may* be offered during the quarter(s) they enclose. When appropriate, the names of faculty associated with each course are specified; otherwise, "Staff" is noted.

Bio 100 Fundamentals of Biology (4) FWSp

A lecture-laboratory demonstration and discussion course dealing with various aspects of scientific investigation, environmental problems, population, genetics, evolution, physiology and other student selected topics. Limited to EOP students. 3 lectures, 1 three-hour laboratory. *Staff.*

BIO 110 Life Science (3) FWSpSu

Biological implications in the modern world. The relation of biology and technology to problems in population, reproduction, heredity, evolution, and conservation. Designed for all majors other than Biological Sciences, Agriculture, and Physical Education. 3 lectures. *Castro, Quinn*

BIO 115 Basic Biology (5) FWSpSu

Introduction to living things; basic structure and function of plants and animals and their relationship to the physical world. 3 lectures, 2 three-hour laboratories. *H. Brown, Garcia, Roche*

BIO 200 Special Problems for Lower Division Students (1-2) FWSpSu

Individual or group investigation, research, studies or surveys of selected problems. Total credit limited to 4 units, with a maximum of 2 units per quarter. *Staff*

BIO 201 Conservation of Natural Resources (3) FWSpSu

Fundamental concepts, historical development, problems and practices concerning conservation of natural resources in the United States. 3 lectures. Prerequisite: BIO 110, 115 or equivalent. *Harthill, Lint, Quinn*

BIO 202 History of Biology (3) (F)

Chronological resume of events, inventions, discoveries, and workers contributing to growth of biological sciences. 3 lectures. *Firstman, Roche*

BIO 203 Conservation Laboratory (1) FW

Field and project experience applied to the Conservation of Natural Resources. 1 three-hour laboratory. Prerequisite: Taken concurrently with or after BIO 201. *Harthill, Lint, Quinn*

BIO 213 Principles of Evolution (3) FWSpSu

Introduction to plant and animal evolution. 3 lectures. *Firstman, Troncale*

BIO 225 Microtechnique (3) F 1975

Methods of preparing plant and animal tissues for microscopic study. 1 lecture, 2 three-hour laboratories. Prerequisite: BIO 115. *Erspamer*

BIO 299 Special Topics for Lower Division Students (1-4) (FWSpSu)

Group study of a selected topic, the title to be specified in advance. Total credit limited to 8 units, with a maximum of 4 units per quarter. Prerequisite: Permission of instructor. *Staff*

BIO 300 Heredity and Man (3) FWSp

Nontechnical introduction to hereditary principles with emphasis on man and society. Eugenics, hereditary diseases, blood types, mutation, radiation, and evolution. For non-majors. 3 lectures. Not open to students with credit for BIO 303. Prerequisite: BIO 110 or equivalent. *H. Brown, Martinek*

BIO 301 Biology of Human Sex (4) FWSp

Anatomy, physiology and behavior related to human sexual reproduction including fertility, pregnancy, childbirth, birth control, venereal disease, sexual anomalies and sexual response. 4 lectures. Prerequisite: BIO 110 or BIO 115. *Daniel*

BIO 303 Genetics (4) FWSpSu

Principles of heredity. 4 lectures. Prerequisite: BIO 110 or 115. *Edmonds, Martinek, Troncale*

BIO 305 Ecology for Sanitary Engineers (3) W 1977

The environment as an ecosystem, emphasizing man's role in manipulating such systems. Of particular interest are questions and problems relating to energy flow in natural and man-made environments. 3 lectures. Prerequisite: BIO 110. *T. Brown*

BIO 306 Biological Systematics (3) FWSp

Interpretation of biological variability: kinds and origins of organismic variation, the species and speciation, phylogenetic inference, classification and nomenclature. 3 lectures. Prerequisite: BOT 125, ZOO 137, 138; recommended: BIO 213, 303, 325. *Edmonds, Lint.*

BIO 325 Principles of Ecology (4) FWSpSu

A study of ecosystems; the interactions between organisms and environment. 3 lectures, 1 three-hour laboratory. 3 one-day weekend field trips. Prerequisite: BIO 115. *T. Brown, Szijj*

BIO 328 Natural History of Plants (4) WSp

Characteristics, classification and natural history of the major groups of plants; basic principles of ecology; conservation ethics. Identification of common native plants; field study of natural plant communities and life zones. 3 lectures, 1 three-hour laboratory. Not open to biological sciences majors. Prerequisite: BIO 110 or 115 or consent of instructor. *Harthill*

BIO 329 Natural History of Animals (4) Sp

Characteristics, classification and natural history of the major groups of invertebrate and vertebrate animals; identification and field study of local species. 3 lectures, 1 three-hour laboratory. Not open to biological sciences majors. Prerequisite: BIO 110 or 115 or consent of instructor. *Stewart*

BIO 341 Botanical Techniques (2) Sp

Collection, preservation and preparation of botanical specimens. Strongly recommended for teaching majors. Prerequisite: BOT 124. *H. Brown*

BIO 342 Zoological Techniques (2) W

Collection, preservation and preparation of zoological specimens. Strongly recommended for teaching majors. Prerquisite:ZOO 138. *Staff*

BIO 400 Special Problems for Upper Division Students (1-2) FWSpSu

Individual or group investigation, research, studies or surveys of selected problems. Total credit limited to 4 units, with a maximum of 2 units per quarter. *Staff*

BIO 410 Biophysics (3) W 1977

Concepts and mechanisms involved in the interpretation of biological systems. A description of living processes in physical terms. 3 lectures. (See also PHY 410) Prerequisite:PHY123 or permission of instructor. *Giancoli*

BIO 411 Biometrics (3) FWSp

Application of statistical methods to the analysis and interpretation of biological data. Principles of sampling, the use of means, frequencies, measures of variability, correlation, diversity, and their value to biologists. 3 lectures. Prerequisite: MAT 107 or equivalent. *Knill, Szijj*

BIO 418 Population Ecology (3) F

Factors affecting the abundance and distribution of animal populations in their natural environment. 2 lectures, 1 three-hour laboratory. Prerequisite: BIO 411 and 325. *Szijj*

BIO 421 Advanced Genetics (3) FSp

Continuation of studies in genetics with emphasis at the biochemical level. Further work on mutations, chromosomal aberrations, radiation effects and their use in plant and animal studies. 3 lectures. Prerequisite: BIO 303. *Martinek*

BIO 423 General Cytology (4) W

Ultrastructure of the cell; mechanics of mitosis, meiosis, and fertilization; and the relation of karyotype changes to genetics and evolution. 2 lectures, 2 three-hour laboratories. Prerequisite: BOT 124, ZOO 138, BIO 303. *Daniel*

BIO 430 Fresh Water Biology (5) Sp

Ecology and natural history of major plant and animal groups in various fresh water habitats, and their relationship to fisheries, wildlife management, water-sanitation, and conservation. 3 lectures, 2 three-hour laboratories. Prerequisite: BOT 125, ZOO 137 or consent of instructor. *Mercer*

BIO 431 Radiation Biology (5) FSp

Introduction to radioisotope tracer techniques, radiometric analyses, effects of ionizing radiation, radiation safety and health physics as applied to life sciences and public health. 3 lectures, 2 three-hour laboratories. Prerequisite: 12 units of Biological Sciences, 8 units of Chemistry, 8 units of Physics. *Knill*

BIO 434 Limnology (3) F 1975

Evaluation of physical and biological factors affecting ponds, lakes and streams. 3 lectures. Prerequisite: CE 431 or consent of instructor. *Mercer*

BIO 435 Cellular Physiology (4) FSp

Physical mechanisms at the cellular level. 2 lectures, 2 three-hour laboratories. Prerequisite: CHM 201 or 211. *Wu*

BIO 440 Biology of Symbiosis (4) W 1975

Physiological, ecological, and behavioral aspects of heterospecific associations, including parasitism, mutualism, and commensalism. 2 lectures, 2 three-hour laboratories. Prerequisite: ZOO 324 or BOT 322, or BIO 435, or consent of instructor. *Castro*

BIO 441 Internship in Biology (2) FWSp Su

On-the-job training which relates academic and practical experience in student's area of interest. Written evaluation from job supervisor required upon completion. Total credit limited to 6 units. Prerequisite: Internship coordinator approval of student's application for internship credit (form available from Biological Sciences Department). *Staff*

BIO 442 Marine Ecology (4) S

Structure and function of marine ecosystems with emphasis on littoral environments. 2 lectures, 2 three-hour laboratories. Prerequisite: ESC 335, ZOO 137, BIO 325, or consent of instructor. *Castro*

BIO 450 Techniques and Theories of Molecular Biology (5) FSp

Introduction to the instrumentation, experimental methodologies, and theoretical concepts frequently encountered in current and past research into biological systems at the molecular level. 3 lectures and 2 three-hour labs. Prerequisite: Consent of instructor. *Troncale*

BIO 460 Air Pollution Problems (3) F

Concepts of air pollution; major air pollutants; sources; effects on plants and animals and materials; controls; future problems. 3 lecture-discussions. Prerequisite: senior standing and consent of instructor. *Ames*

BIO 462 Senior Project (2) FW Sp Su

Research conducted under faculty supervision. Written thesis in accordance with professional standards required upon completion of project. Total credit limited to 6 units. Recommended for students in any of the four biological sciences majors contemplating graduate or professional schools. Prerequisite: Written consent of student's research advisor prior to enrolling. *Staff*

BIO 490 Senior Seminar (1) FWSpSu

Oral and written presentation of selected topics in biology. Must be taken twice for graduation in biological sciences majors. Prerequisite: Senior standing. *Staff*

BIO 499 Special Topics for Upper Division Students (1-4) FWSpSu

Group study of a selected topic, the title to be specified in advance. Total credit limited to 8 units, with a maximum of 4 units per quarter. Prerequisite: permission of instructor. *Staff*

Graduate courses are listed in the graduate section of the catalog. See p. 361.

BOTANY

One of the four majors offered in the biological sciences department is botany. For other programs in this department see biology, microbiology, and zoology.

Ralph W. Ames, *Chairman*

Raymond Z. Riznyk, *Coordinator*

Lawrence Blakely
Jerome E. Dimitman
Jack L. Erspamer
Marion P. Harthill
Harold L. Lint
Edward K. Mercer
Martin F. Stoner

The botany curriculum offers a four-year sequence of foundation courses, plus electives to provide the fundamentals of plant sciences as well as the necessary flexibility to permit selection of courses for several lines of study. Such versatility covers the major disciplines of plant science—physiology, morphology and systematics, and also provides for careers in mycology—pathology, ecology, field biology, and similar occupational areas which require a strong background of basic plant studies.

Of considerable advantage to the program are the various distinct plant communities, from the coastal strand through desert regions to sub-alpine meadows, available nearby for field study.

Other centers of botanical study and resources close at hand include the Los Angeles State and County Arboretum, Huntington Botanical Garden, and the Rancho Santa Ana Botanic Garden. In addition, the department maintains one of the largest collections of fungi in the West—the C. J. Humphrey Mycological Herbarium—completely available for study.

The botany section also offers a curriculum leading to the Master of Science in Biology degree with emphasis in botany.

CORE COURSES FOR MAJOR

(Required of all students)

Basic Biology	BIO	115	(5)
Principles of Evolution	BIO	213	(3)
Genetics	BIO	303	(4)
Biological systematics	BIO	306	(3)
Principles of Ecology	BIO	325	(4)
Plant Structures and Functions	BOT	124	(5)
Plant Morphology	BOT	125	(5)
Plant Physiology	BOT	322	(5)
Field Botany	BOT	343	(3)
Phycology	BOT	433	(4)
or Mycology	BOT	425	
or Mycology	BOT	426	
Plant Anatomy	BOT	435	(4)
Senior Seminar	BIO	490	(1,1)
Basic Microbiology	MIC	201	(5)
Invertebrate Zoology	ZOO	137	(5)
Vertebrate Zoology	ZOO	138	(5)
General Entomology	ZOO	226	(4)

SUPPORT AND ELECTIVE COURSES

(Required of all students)

American Civilization	AMC	201	*(4)
American Civilization	AMC	202	*(4)
College Chemistry	CHM	104	*(3)
College Chemistry	CHM	105	*(3)
College Chemistry Lab	CHM	141	*(1)
College Chemistry Lab	CHM	142	*(1)
Organic Chemistry	CHM	201	*(3)
Freshman Composition	ENG	104	*(4)

Trigonometry	MAT	104*	(4)
College Algebra	MAT	105	*(4)
Physical Education 100-series			*(3)
College Physics	PHY	121	*(4)
College Physics	PHY	122	*(4)
College Physics	PHY	123	*(4)
Courses to complete general education requirements			*(14)
Approved Electives			**(34)
Free Electives			(8)

Students considering graduate work or professional schools, see recommended courses for preprofessional preparation, page

*May be used for general education requirements. A total of 60 units is required and must include two courses in humanities and four courses from a minimum of two schools other than the School of Science.

**Approved electives include all courses in the Biological Sciences Department not specifically designed for non-majors. See advisor for approval of courses offered by other departments.

Course Descriptions

F, W, Sp and Su notations indicate the quarter(s) each course is normally offered. Unless otherwise specified, the course is offered each year during the indicated quarter(s). Parentheses signify that the course *may* be offered during the quarter(s) they enclose. When appropriate, the names of faculty associated with each course are specified; otherwise, "Staff" is noted.

BOT 116 Plant Environments (3) FW

Effects of environmental factors on the growth and distribution of plant materials used in landscaping. Not open to majors in the Biological Sciences department. 2 lectures, 1 three-hour laboratory. *Harthill*

BOT 120 Elements of Botany (4) WSp

Principles of structure, function, and classification of seed plants and fungi with special application to agriculture. 3 lectures, 1 three-hour laboratory. Prerequisite: BIO 115. *Ames, Dimitman, Stoner*

BOT 124 Plant Structures and Functions (5) FWSpSu

Structure and function pf plants. 3 lectures, 2 three-hour laboratories. Prerequisite: BIO 115. *Riznyk*

BOT 125 Plant Morphology (5) FWSpSu

Comparative morphology and phylogenetic relationships of plant groups from bacteria to angiosperms. 3 lectures, 2 three-hour laboratories. Prerequisite: BIO 115. *Erspamer*

BOT 200 Special Problems for Lower Division Students (1-2) FWSpSu

Individual or group investigation, research, studies or surveys of selected problems. Total credit limited to 4 units, with a maximum of 2 units per quarter. *Staff*

BOT 223 General Plant Pathology (4) FW

Principles of the nature and control of plant diseases caused by bacteria, fungi, nematodes, viruses, and physiological factors. 2 lectures, 2 three-hour laboratories. Prerequisite: BOT 120 or 125. *Dimitman, Stoner*

BOT 299 Special Topics for Lower Division Students (1-4) (FWSpSu)

Group study of a selected topic, the title to be specified in advance. Total credit limited to 8 units, with a maximum of 4 units per quarter. Prerequisite: Permission of instructor. *Staff*

BOT 307 Plants and Man (3) W

Natural history and uses of plants important to man. Open to all majors. 3 lectures. *Stoner*

BOT 322 Plant Physiology (5) FW

Life processes of plants: water relations; nutrition and metabolism; growth and development. 3 lectures, 2 three-hour laboratories. Prerequisite: CHM 211 or 201; BOT 120 or 124. *Blakely*

BOT 343 Field Botany (3) Sp

Collection, classification, and identification of native California flowering plants. Field identification of plants characteristic of common California plant communities. 1 lecture, 2 three-hour laboratories. Prerequisite: BOT 120 or BOT 124 or consent of instructor. *Lint*

BOT 400 Special Problems for Upper Division Students (1-2) FWSpSu

Individual or group investigation, research, studies, or surveys of selected problems. Total credit limited to 4 units, with a maximum of 2 units per quarter. *Staff*

BOT 421 Plant Ecology (4) Sp

Effects on plant growth and development of environmental factors such as soil, water, temperature, light, atmosphere, topography, organisms and fire. The communities and dynamics of vegetation and the causal phenomena involved. 3 lectures, 1 three-hour laboratory. Prerequisite: BIO 325. *Harthill*

BOT 423 Plant Nematology (3) W

Classification of nematodes associated with economic plants; basic morphology, biology and control of important plant parasitic nematodes. 2 lectures, 1 three-hour laboratory. Prerequisite: BIO 115. *Mercer*

BOT 424 Advanced Plant Pathology (4) Sp 1976

Discussion of current topics in plant pathology; experience in advanced methods for the study of pathological problems. 2 lectures, 2 three-hour laboratories. Prerequisite: BOT 223. *Dimitman.*

BOT 425 Mycology (4) F 1976

Morphology, physiology, culture, pathology, taxonomy, and general biology of Acrasiales, Labyrinthulales, Myxomycetes, Oomycetes, and Zygomycetes. 2 lectures, 2 three-hour laboratories. Prerequisite: BOT 120 or 125 or consent of instructor. Preferably taken before BOT 426. *Stoner*

BOT 426 Mycology (4) W 1977

Morphology, physiology, culture, pathology, taxonomy and general biology of Ascomycetes, Deuteromycetes, and Basidiomycetes. 2 lectures, 2 three-hour laboratories. Prerequisite: BOT 120 or 125 or consent of instructor. Preferably taken after BOT 425. *Stoner*

BOT 433 Phycology (4) W 1976

Morphology, taxonomy, ecology, and physiology of the fresh-water and marine algae. Culture work, collection, and identification emphasized in the laboratory. 2 lectures, 2 three-hour laboratories. Prerequisite: BOT 125, MIC 201. *Riznyk*

BOT 434 Morphology of Embryophytes (5) W 1977

Evolution of the embryophytes as illustrated by the comparative morphology, life patterns and relationships of the liverworts, mosses, and vascular plants. 3 lectures, 2 three-hour laboratories. Prerequisite: BOT 125 or consent of the instructor. *Erspamer*

BOT 435 Plant Anatomy (4) W1976

Microscopic study of representative common plants dealing with origin, development, and structure of cells, tissues and tissue systems in roots, stems, and leaves. 2 lectures, 2 three-hour laboratories. Prerequisite: BOT 124. *Erspamer*

BOT 436 Advanced Plant Taxonomy (4) W 1976

Phylogeny of the vascular plants; recognition of the major orders and families. 2 lectures, 2 three-hour laboratories. Prerequisite: BOT 343. *Lint*

BOT 499 Special Topics for Upper Division Students (1-4) (FWSpSu)

Group study of a selected topic, the title to be specified in advance. Total credit limited to 8 units, with a maximum of 4 units per quarter. Prerequisite: permission of instructor. *Staff*

CHEMISTRY

Vasu Dev, *Chairman*

John L. Abernethy
Charles Bowen
Ruth J. Bowen
Irwin Geller
George Gutnikov
David A. Haner
Paul C. Hiemenz
Yu-Ping Hsia
Esther B. Leffler
Walter Maya
Charles Millner
Gabriel T. Moran
Earl L. Pye
Elmer H. Rice
Dorothy W. Richardson
J. Ernest Simpson
Donald D. Smith
Arnulf Vollmar

The chemistry department offers an undergraduate major in chemistry designed to prepare students either for careers as chemists in private industry and government or for graduate study. Through choices of electives, students may specialize in all the major areas of chemistry. The department is on the approved list of the American Chemical Society. Students may choose to follow the ACS curriculum by taking the prescribed electives listed below, and this degree will be certified as having met the ACS standards. Within the core curriculum students can pursue programs in pre-medicine, predentistry, biochemistry and clinical chemistry by an appropriate choice of electives, worked out with their departmental advisor.

A curriculum leading to the Master of Science degree in Chemistry is also offered in the department. Requirements for this degree may be found in the graduate listings.

CORE COURSES FOR MAJOR

(Required of all students)

General Chemistry	CHM	111	(3)
General Chemistry	CHM	112	(3)
Chemical Principles	CHM	113	(4)
General Chemistry Lab	CHM	151	(1)
General Chemistry Lab	CHM	152	(1)
Organic Chemistry	CHM	211	(3)
Organic Chemistry	CHM	212	(3)
Organic Chemistry	CHM	213	(3)
Quantitative Analysis	CHM	221	(4)
Organic Chemistry Lab	CHM	251	(1)
Organic Chemistry Lab	CHM	252	(2)
Organic Chemistry Lab	CHM	253	(2)
Physical Chemistry	CHM	311	(4)
Physical Chemistry	CHM	312	(3)
Physical Chemistry	CHM	313	(3)
Instrumental Analysis: Optical	CHM	332	(4)
Instrumental Analysis: Electro	CHM	333	(4)
Physical Chemistry Lab	CHM	352	(2)
Physical Chemistry Lab	CHM	353	(2)
Inorganic Chemistry	CHM	401	(3)
and Inorganic Chemistry	CHM	402	(3)
or Biochemistry	CHM	327	(4)
and Biochemistry	CHM	328	(4)
Senior Project	CHM	461	(2)
Senior Project	CHM	462	(2)
Undergraduate Seminar	CHM	463	(2)
**Advanced Chemistry Electives			(6)

SUPPORT AND ELECTIVE COURSES

(Required of all students)

American Civilization	AMC	201	*(4)
American Civilization	AMC	202	*(4)
General Biology	BIO	115	*(5)
Freshman Composition	ENG	104	*(4)
Freshman Composition	ENG	105	*(4)
Calc & Analytic Geom	MAT	140	*(4)
Calc & Analytic Geom	MAT	141	*(4)
Calc & Analytic Geom	MAT	142	*(4)
Differential Equations	MAT	216	(4)
Physical Education	PE	141	*(3)
General Physics	PHY	131	*(4)
General Physics	PHY	132	*(4)
General Physics	PHY	133	*(4)

Two Physics courses 200 level or higher excluding PHY 200, 202, 299, 400, 499	(5)
Humanities	*(8)
Four Courses from Agriculture, Engineering, Business or Arts	*(8)
Electives	(41-43)

*May be used for the general education requirement. Select unspecified courses from the general education list.

**Two 400-level courses excluding CHM 400, 461, 462, 463.

A reading knowledge of a foreign language, especially German, is strongly recommended for students planning advanced study in science.

Course Descriptions

CHM 103 Fundamentals of Chemistry (4)

Atoms, molecules and physical states of matter. Important classes of chemical compounds and chemical reactions. Experimentation as the approach to solving problems of natural phenomena. Not open to students who have credit for CHM 104 or 111. 3 lectures, 1 recitation.

CHM 104 College Chemistry (3)

Principles of atomic structure, periodicity and bonding. Stoichiometry and chemical calculations. Solutions and gases. General chemistry for those who do not require calculus in their major. 3 lecture-discussions. Prerequisite: CHM 103 or one year of high school chemistry with an average grade of B or better. Concurrent: CHM 141.

CHM 105 College Chemistry (3)

Chemical equilibrium. Calculations involving pH and solubility. Coordination compounds, electrochemistry and reaction kinetics. 3 lecture-discussions. Prerequisite: CHM 104. Concurrent: CHM 142.

CHM 111 General Chemistry (3)

Atomic theory, atomic structure, the periodic table, chemical bonding, molecular structure, chemical properties of atoms and molecules. 3 lecture-discussions. Prerequisite: CHM 103 or one year of high school chemistry with an average grade of B or better. Concurrent: CHM 151.

CHM 112 General Chemistry (3)

Oxidation-reduction, kinetic molecular theory of gases, gas laws, solids, liquids, solutions, colligative properties, equilibrium, thermodynamics, and kinetics. 3 lecture-discussions. Prerequisite: CHM 111. Concurrent: CHM 152. Beginning Calculus recommended.

CHM 113 Chemical Principles (4)

Chemistry of the elements, their properties and reactions; nuclear chemistry, and special topics. Laboratory work includes qualitative analysis, chemical preparations. 3 lecture-discussions, 1 three-hour laboratory. Prerequisite: CHM 105 or 112.

CHM 141 College Chemistry Laboratory (1)

Use of analytical balance. Experiments in stoichiometry, acid-base, and redox reactions. Accuracy and precision in experimental measurements. 1 three-hour laboratory. Concurrent: CHM 104.

CHM 142 College Chemistry Laboratory (1)

Measurement of gases, colligative properties, pH titration. Qualitative ionic equilibria. 1 three-hour laboratory. Prerequisite: CHM 141. Concurrent: CHM 105.

CHM 151 General Chemistry Laboratory (1)

Use of the analytical balance and development of laboratory techniques. Experiments in stoichiometry, gas laws, colligative properties. 1 three-hour laboratory. Concurrent: CHM 111.

CHM 152 General Chemistry Laboratory (1)

Experiments in thermochemistry, redox systems, acid-base properties, and ionic equilibria. 1 three-hour laboratory. Prerequisite: CHM 151. Concurrent: CHM 112.

CHM 200 Special Problems for Lower Division Students (1-2)

Individual or group investigation, research, studies or surveys of selected problems. Total credit limited to 4 units, with a maximum of 2 units per quarter.

CHM 201 Elements of Organic Chemistry (3)

The fundamental concepts of organic chemistry with emphasis on practical applications. For students who are requied to take one quarter of organic chemistry. Not open for credit to chemistry majors. 3 lectures. Prerequisite: CHM 105 or 112. Concurrent: CHM 250 for students planning to take CHM 321.

CHM 211 Organic Chemistry (3)

Modern concepts of chemical bonding, molecular structure, basic principles of stereochemistry and conformation; organic reaction intermediates; alkanes, alkenes, and alkynes. 3 lecture-discussions. Prerequisite: CHM 105 or 112. Concurrent: CHM 251 for chemistry majors.

CHM 212 Organic Chemistry (3)

Alicyclic and aromatic hydrocarbons; functionally substituted aliphatic and aromatic hydrocarbons. 3 lecture-discussions. Prerequisite CHM 211. Concurrent: CHM 252 for chemistry majors.

CHM 213 Organic Chemistry (3)

Organic nitrogen compounds, optical isomerism, carbohydrates, amino acids, proteins, terpenes, and steroids. 3 lecture-discussions Prerequisite: CHM 212. Concurrent: CHM 253 for chemistry majors.

CHM 221 Quantitative Analysis (4)

Fundamentals of gravimetric and volumetric analysis. Focus on laboratory work, with class discussion supplying supporting theory. 2 lectures, 2 three-hour laboratories. Prerequisite: CHM 105 or 112.

CHM 250 Elements of Organic Chemistry Laboratory (1)

Introduction to general techniques of the organic laboratory for the separation, purification, and identification of organic substances. Survey of the laboratory preparation and reactions of different functional groups with emphasis on the practical application. 1 three-hour laboratory. For students who are required to take CHM 201. Not open for credit to chemistry majors. Prerequisite: CHM 105 or 112. Concurrent: CHM 201.

CHM 251 Organic Chemistry Laboratory (1)

Introduction to general techniques of the organic laboratory for the separation, purification, and identification of organic substances. 1 three-hour laboratory. Prerequisite: CHM 105 or 112. Concurrent: 211.

CHM 252 Organic Chemistry Laboratory (2)

Syntheses to illustrate reaction mechanisms and reaction sequence. 2 three-hour laboratories. Prerequisite: CHM 251. Concurrent: CHM 212.

CHM 253 Organic Chemistry Laboratory (2)

Qualitative analysis for the elements, reactions of functional groups and preparation of derivatives needed for structural determination of organic molecules supplemented by methods of instrumental analysis. 2 three-hour laboratories. Prerequisite: CHM 252. Concurrent: CHM 213.

CHM 256 Glassblowing (1)

Fundamental techniques of laboratory glassblowing. A practical course to teach students to construct and repair special pieces of glass apparatus used in advanced chemistry courses and senior project work. 1 three-hour laboratory.

CHM 299 Special Topics for Lower Division Students (1-2)

Group study of a selected topic, the title to be specified in advance. Total credit limited to 8 units, with a maximum of 4 units per quarter. Prerequisite: Permission of instructor.

CHM 301 Fundamentals of Physical Chemistry (4)

Thermodynamic properties of chemical species and their application; kinetics and applications; measurements of physical properties of molecules. Not open to students with credit for CHM 311. 3 lectures, 1 recitation. Prerequisite: CHM 105 or 112.

CHM 311, 312, 313 Physical Chemistry (4) (3) (3)

Properties of gases, kinetic molecular theory, chemical thermodynamics, phase equilibria, solutions, electrochemistry, chemical kinetics, atomic and molecular structure, molecular spectroscopy, photo-chemistry, colloids and macromolecules. To be taken in sequence. 4 lecture-discussions for CHM 311 and 3 lectures for CHM 312 and 313. Prerequisite: MAT 216 or the equivalent. CHM 112 and one year of college physics.

CHM 321 Elements of Biochemistry (4)

The fundamental concepts of biochemistry with emphasis on structure-function relationships as they relate to carbohydrates, lipids, proteins, and nucleic acids. Designed for students who are required to take one quarter of biochemistry. Not open for credit to Chemistry majors. 3 lectures, 1 three-hour laboratory. Prerequisite: CHM 201 and 250, or CHM 211, 251 and 212.

CHM 327 Biochemistry (4)

Chemistry of carbohydrates, lipids, proteins, and other classes of substances found in living tissues. Chemical nature of enzymes and their action including digestion and intermediary metabolism. Laboratory work includes test-tube reactions, enzymology, and analytical procedures employing volumetric and colorimetric procedures. 3 lectures, 1 three-hour laboratory. Prerequisite: CHM 251 and 212.

CHM 328 Biochemistry (4)

Chemistry of metabolic processes in plants and animals including respiration, functions of blood, hormones, nitrogen metabolism, energy metabolism, and chemical aspects of nutrition. Laboratory work includes study of live plants and animals as well as surviving tissues. 3 lectures, 1 three-hour laboratory. Prerequisite: CHM 327.

CHM 329 Biochemistry (4)

Amino acid, purine, and pyrimidine metabolism; metabolism of water and electrolytes; biochemistry of toxic materials, immunochemistry. 3 lectures, 1 three-hour laboratory. Prerequisite: CHM 328.

CHM 331 Clinical Methods of Analysis (4)

Fundamentals of instrumental analysis based on biological and biochemical applications. 2 lectures, 2 three-hour laboratories. Prerequisite: CHM 221 and 327 or 321.

CHM 332 Instrumental Analysis: Optical Methods (4)

Modern techniques of chemical analysis based primarily on optical instrumental methods such as UV and IR spectrophotometry, emission spectroscopy, and X-ray diffractometry. 2 lectures, 2 three-hour laboratories. Prerequisite: CHM 221.

CHM 333 Instrumental Analysis: Electrochemical Methods (4)

Analytical chemistry with particular emphasis on electrochemical methods of analysis including potentiometric, conductometric, and amperometric titrimetry and electrodeposition techniques. 2 lectures, 2 three-hour laboratories. Prerequisite: CHM 221 and 311.

CHM 352 Physical Chemistry Laboratory (2)

Physiochemical measurement. Laboratory experiments illustrating principles of physical chemistry. 2 three-hour laboratories. Prerequisite: CHM 221, 311. Concurrent: CHM 312.

CHM 353 Physical Chemistry Laboratory (2)

Advanced laboratory applications of physical chemistry. 2 three-hour laboratories. Prerequisite: CHM 352. Concurrent: CHM 313.

CHM 400 Special Problems for Upper Division Students (1-2)

Individual or group investigation, research, studies or surveys of selected problems. Total credit limited to 4 units, with a maximum of 2 units per quarter.

CHM 401 Inorganic Chemistry (3)

Detailed study of theories of bonding in inorganic compounds, with emphasis on coordination complexes, inorganic stereochemistry; uncommon oxidation states; study of relationship of properties to electronic structure. 3 lecture-problems. Prerequisite: CHM 312.

CHM 402 Inorganic Chemistry (3)

Mechanisms of inorganic reactions with special emphasis on coordination chemistry. Isomerization and racemization reactions. Free radical reactions. Catalytic effects of coordination compounds. 3 lecture-problems. Prerquisite: CHM 401.

CHM 405 Physical Organic Chemistry (3)

The application of physico-chemical principles to organic chemistry with emphasis on the kinetic approach to the postulation of reaction mechanisms. 3 lectures. Prerequisites: CHM 213 and 313.

CHM 409 Macromolecular Chemistry (3)

Types of polymers and polymerization reactions; properties of polymer solutions and the determination of molecular weights; elasticity and other bulk properties. 3 lectures. Prerequisite: CHM 201 or equivalent.

CHM 411 Reaction Kinetics (3)

Kinetics and mechanisms of chemical reactions. Transition state theory, collision theory, photochemical excitation and dissociation, homogeneous and heterogeneous catalysis. Analysis and solution of problems. 3 lectures. Prerequisite: CHM 313.

CHM 413 Introduction to Colloid and Surface Chemistry (3)

Gas-liquid, gas-solid and solid-liquid interfaces. Adsorption and surface area determination. Application to flotation, catalysis and detergency. 3 lectures. Prerequisite: CHM 313.

CHM 415 Chemical Thermodynamics (3)

Fundamental aspects of chemical thermodynamics, including the first, second, and third laws. Studies of chemical and phase equilibria, enthalpy, entropy, work, and free energy. Relationship to molecular structure and statistical mechanics. 3 lectures. Prerequisite: CHM 313.

CHM 421 Chemical Separation Methods (4)

Emphasis on the various chromatographic methods of separation, including gas, liquid, paper, thin-layer electro, ion exchange and gel chromatographics. Solvent extraction, precipitation, and distillation are also included. Three lectures, 1 three-hour laboratory. Prerequisite: CHM 332, 333.

CHM 422 Chemical Synthesis (4)

Systematic study of the preparation, properties, analysis, and reactions of inorganic and organic compounds. 2 lecture-problems, 2 three-hour laboratories. Prerequisites: CHM 253, 313.

CHM 436 Nuclear Chemistry (4)

Principal types of nuclear radiation and their properties. Detection of radiation, dosimetry and safety. Radioisotope tracing. Decay laws, precursor-product relationships. Statistical aspects of decay and detection. 2 lectures, 2 three-hour laboratories. Prerequisite: MAT 142, CHM 221 or equivalent.

CHM 442 X-ray Methods of Analysis (4)

Introduction to X-ray spectrometric and diffraction methods of chemical analysis. 2 lectures, 2 three-hour laboratories. Prerequisite: CHM 313 and 353 or consent of instructor.

CHM 446 Corrosion Chemistry (4)

The basic principles of theoretical and applied electrochemistry as it pertains to corrosion. Thermodynamics and kinetics of oxidation. Aqueous corrosion, stress corrosion, hydrogen cracking, fatigue. Corrosion testing, inhibition, and design. Cathodic and anodic protection, metal and chemical coatings. 3 lectures, 1 three-hour laboratory. Prerequisite: CHM 313 or instructor's consent.

CHM 461, 462 Senior Project (2) (2)

Selection and completion of a project under faculty supervision. Independent study and introduction to research. A formal report is required. Minimum of 120 hours total time.

CHM 463 Undergraduate Seminar (2)

A study of current developments in chemistry and a discussion of periodical literature at an appropriate level. 2 lecture-discussions.

CHM 499 Special Topics for Upper Division Students (1-4)

Group study of a selected topic, the title to be specified in advance. Total credit limited to 8 units, with a maximum of 4 units per quarter. Prerequisite: permission of instructor.

Graduate courses are listed in the graduate section of the catalog. See p. 373.

COMPUTER SCIENCE

This major is offered in the Department of Mathematics, School of Science, with the cooperation of the Department of Electrical and Electronics Engineering, School of Engineering and the Department of Data Processing. School of Business.

Emil R. Herzog, Chairman

Kenneth B. Kriege, CS-coordinator

Robert A. Bruns	Bruce Hillam	Ward D. Testerman
David L. Clark	Peter A. Laszlo	Gustav N. Wassel
Theodore J. Cullen	Kenneth A. MacDonald	William T. Wootton
Ronald W. Eaves	Daniel J. Nesin	Carol A. Ziegler
Alan P. Felzer	Robert V. Stumpf	

The student who completes the curriculum in computer science should be able to perform in a computer scientist position, being able to adapt quickly to a rapidly changing technology. He should be able to enter a graduate program in computer science.

The emphasis of the curriculum will be placed on developing a general competence in the areas of computer architecture, software, and applications.

Transfer students should complete as much of the calculus sequence as possible before entering Cal Poly. A high school student planning a major in computer science should complete one year of physics, one year of chemistry, and mathematics to include thorough preparation in trigonometry and algebra.

CORE COURSES FOR MAJOR

Fortran	CS	205	(4)
Intro Applied Logic	CS	210	(4)
Discrete Math	CS	230	(4)
Data Structures	CS	231	(4)
Numerical Methods	CS	301	(4)
ALGOL Programming	CS	320	(4)
or			
COBOL Programming	DP	231	(4)
Assembly Lang Prog	CS	330	(4)
or	DP	330	(4)
Applied Algebra	CS	410	(8)
Th & Des of Trans	CS	430	(4)
Th & Des of Op Sys	CS	431	(4)
Senior Project	CS	461	(2)
Senior Project	CS	462	(2)
Ungr Seminar	CS	463	(2)
Intro Computing	DP	110	(4)
Digital Elec	EEE	255	(4)
Digital Elec	EEE	256	(4)
Linear Algebra	MAT	208	(4)
Stat Meth in Engr & Phys Science	MAT	309	(3)
Upper Division CS Electives			16
CS Electives			8

SUPPORT AND ELECTIVE COURSES

Am Civilization	AMC	201*	(4)
Am Civilization	AMC	202*	(4)
Com Arts	COM	219*	(4)
Com Prog Lang	DP	431*	(4
Digital Systems	EEE	404	(4)
Design		444*	
Freshman Comp	ENG	104*	(4)
An Geom & Calc	MAT	140*	(4)
An Geom & Calc	MAT	141*	(4)
An Geom & Calc	MAT	142*	(4)
An Geom & Calc	MAT	240	(4)
An Geom & Calc	MAT	241	(4)

P.E., 100-level		*	(3)
General Physics	PHY	131*	(4)
General Physics	PHY	132*	(4)
General Physics	PHY	133*	(4)
Humanities (2 courses)		*	8
One Course from School of Arts		*	(4)
Electives (unrestricted)			34

Course Descriptions

CS 205 Fortran (4)

Fortran programming for the digital computer. Execution of numerical algorithms; interpolation, integration, solution of linear systems, approximation of roots of nonlinear equations. 4 lectures. Prerequisite: MAT 104 and MAT 105 or equivalent.

CS 210 Introduction to Applied Logic (4)

Boolean Algebra and propositional calculus with applications to computers and logic design. 4 lectures. Prerequisite: MAT 105, CS 110 or consent of instructor.

CS 230 Discrete Mathematics (4)

Set theory, elements of the theory of semigroups and groups Boolean algebra, graph theory, basic combinatorics. 4 lectures. Prerequisite: MAT 109 or MAT 115 or MAT 141.

CS 231 Data Structures (4)

Linear lists, sequential and linked storage allocation. Representation of trees and graphs. Traversing algorithms. Multilinked structures. Sorting techniques. Dynamic storage allocation. 4 lectures. Prerequisite: CS 230 and CS 205.

CS 301 Introduction to Numerical Analysis (4)

Elementary discussion of errors. Finite difference calculus. Polynomial interpolation. Solution of nonlinear equations. Linear systems of equations. Numerical intergration and differentiation. 4 lectures. Prerequisite: CS 205, and MAT 208.

CS 320 Algorithmic Languages (4)

Formal analysis of algorithmic languages with emphasis on Algol. 4 lectures. Prerequisite: CS 110, and CS 205, or consent of instructor.

CS 330 Assembly Language Programming (4)

Addressing techniques, symbolic coding, macro definition and generation, program segmentation and linkage, systems and utility programs, assembly programming techniques. Structure of the assembler. 4 lectures and programming projects. (See also DP 330) Prerequisite: CS 205 or DP 221, or permission of instructor.

CS 410, 411 Applied Algebra (4) (4)

Partial order, lattices, boolean algebra, applications to computer design. Groups and rings with application to codes. Introduction to finitestate machines and computability. 4 lectures. Prerequisite: CS 210 or consent of instructor.

CS 430 Theory and Design of Translators (4)

Modern compiler structures. Symbol tables, lexical and syntactic scans, object code generation and optimization techniques. Run-time organization, error diagnostics. Evaluation of commercially available assemblers and compilers. 4 lectures. Prerequisite: CS 231 and CS 330 (or DP 330).

The course descriptions of all courses with DP AND EEE prefixes and required in the CS program are listed under the respective major.

CS 431 Theory and Design of Operating Systems (4)

Modern operating systems. Mapping and binding of addresses. Analysis of file structures and file management. Job control and system management, system acconting. System measurement techniques. 4 lectures. Prerequisite: CS 231 and CS 330 (or DP 330).

CS 461, 462 Senior Project (2) (2)

Selection and completion of a project under faculty supervision. Projects typical of problems which graduates must solve in their fields of employment. Project results are presented in a formal report. Minimum of 120 hours total time.

CS 463 Undergraduate Seminar (2)

Discussions through seminar methods of new developments in the fields of student's particular interests. 2 lecture-discussions. Prerequisite: Senior standing in computer science.

EARTH SCIENCES

One of the two majors offered in the physics and earth sciences department is earth sciences. For the other program in this department see physics.

Gerald V. Henderson, Coordinator, Earth Sciences

Lawrence J. Herber Bernard O. Lane Donald W. Tarman

Walter H. Hesse

The curriculum in earth science is designed for students who desire a broad background in geology and related sciences. It prepares students for careers as geologists with state and federal geologic agencies, in industry and for graduate work. Students interested in geology should be well-versed in math, physics and chemistry.

CORE COURSES FOR MAJOR

(Required of all students)

Physical Geology	ESC	111	(3)
Historical Geology	ESC	112	(3)
Physical Geology Lab	ESC	151	(2)
Historical Geology Lab	ESC	152	(1)
Crystallography	ESC	221	(3)
Mineralogy	ESC	222	(4)
Optical Mineralogy	ESC	223	(4)
Invertebrate Paleontology	ESC	331	(4)
Stratigraphy	ESC	332	(3)
Structural Geology	ESC	333	(4)
Igneous and Metamorphic Petrology	ESC	421	(4)
Sedimentary Petrology	ESC	422	(4)
Economic Geology	ESC	433	(4)
Field Methods	ESC	455	(4)
Senior Project	ESC	461	(2)
Senior Project	ESC	462	(2)
Undergraduate Seminar	ESC	463	(2)
Summer Field Geology	ESC	490	(8)

SUPPORT AND ELECTIVE COURSES

(Required of all students)

American Civilization	AMC	201	*(4)
American Civilization	AMC	202	*(4)
Basic Biology	BIO	115	*(5)
General Chemistry	CHM	111	*(3)
General Chemistry	CHM	112	*(3)
Chemical Principles	CHM	113	*(4)
General Chemistry Lab	CHM	151	*(1)
General Chemistry Lab	CHM	152	*(1)
Principles of Economics	EC	201	*(4)
Freshman Composition	ENG	104	*(4)
Freshman Composition	ENG	105	*(4)
Engineering Graphics	ESG	121	*(2)
Descriptive Geometry	ESG	125	(2)
Analytic Geom & Calc	MAT	114	*(3)
Analytic Geom & Calc	MAT	115	*(3)
Analytic Geo & Calc	MAT	116	*(3)
Physical Education	PE	141	*(3)
General Physics	PHY	131	*(4)
General Physics	PHY	132	*(4)
General Physics	PHY	133	*(4)
General Psychology	PSY	201	*(4)
Public Speaking	SP	100	*(4)
Basic Soil Science	SS	231	(4)
Soil Physics	SS	432	(4)
Invertebrate Zoology	ZOO	137	(5)
Humanities			*(8)
Electives			**(43)

*May be used for the general education requirement. Select unspecified courses from the general education list.

**Must include four courses from a minimum of two schools other than the School of Science for fulfillment of the breadth requirement.

Course Descriptions

ESC 101 Fundamentals of Earth Science (4)

The earth's place in the solar system. Geological processes involving the atmosphere, oceans and the earth's crust. 3 lectures, 1 recitation. Not open to students who have credit for ESC 111, 321.

ESC 111 Physical Geology (3)

Fundamental geologic processes, general surface features and the earth's interior. Minerals, rocks and structures. ESC 151 must be taken concurrently. 3 lectures.

ESC 112 Historical Geology (3)

Changes in continents and ocean basins, fossil populations during successive geological ages. 3 lectures. May be taken without lab by non-majors.

ESC 115 Introduction to Astronomy (3)

A descriptive course dealing with the history of astronomy and the development of the basic laws of planetary motion and gravity. Discusses origin and properties of planets in the solar system. Examines properties of the sun in detail. 3 lecture-discussions.

ESC 116 Introduction to Astronomy (3)

Methods, principles and instruments used in astronomical investigations. Examination of physical and chemical properties of stars. Theories as to origin, state and future of the universe. A consideration of man's place in the cosmos. 3 lecture-discussions.

ESC 151 Physical Geology Lab (2)

Classification of minerals and rocks. Reading topographic and geologic maps. 1 three-hour laboratory and a minimum of 3 full-day field trips. Must be taken concurrently with ESC 111.

ESC 152 Historical Geology Lab (1)

Classification of fossil invertebrates. Paleogeogrphic maps, problems in structural geology, geologic maps. Required of majors. One three-hour laboratory. ESC 112 concurrent.

ESC 200 Special Problems for Lower Division Students (1-2)

Individual or group investigation, research, studies or surveys of selected problems. Total credit limited to 4 units, with a maximum of 2 units per quarter.

ESC 219 Hand Specimen Petrology (3)

Emphasis on rock collecting and field relationships. Rock identification based largely on magascopic properties. Students will be required to make field collections. 2 lectures, 1 three-hour laboratory. Prerequisites: ESC 111, 151.

ESC 221 Crystallography (3)

Prerequisite for Mineralogy, ESC 222. Formation of crystals: seven crystal classes, 32 crystal systems; symmetry operations related to point groups, space groups, bravia lattices, translation rows, nets and lattices; crystal projections (stereo nets), introduction to x-ray crystallography. 2 lectures, 1 three-hour laboratory. Prerequisite: ESC 111, 151 or consent of instructor.

ESC 222 Mineralogy (4)

Identification, occurrence, and origin of the common rock-forming minerals. Introduction to crystal physics and crystal chemistry. Application of petrographic and x-ray powder diffraction techniques to mineralogic problems. 2 lectures, 2 three-hour laboratories. Prerequisites: ESC 111 and ESC 151. CHM 111 and CHM 151 may be taken concurrently.

ESC 223 Optical Mineralogy (4)

The chemistry (primarily phase relationships) of the common rock-forming minerals. The description, composition, texture and origin of the common rock-forming minerals according to their optical properties as determined with the petrographic microscope. Two lectures, 2 three-hour labs. Prerequisite: ESC 222. CHM 112 concurrently.

ESC 224 Geology of California (4)

Physiography, structure, and geological evolution of California. Origin, occurrence, and uses of metallic and non-metallic ores including oil and water. Problems related to landslides, earthquakes, subsidence, and flood control. 3 lectures, and a minimum of 3 full-day field trips. Prerequisite: ESC 111, or consent of instructor.

ESC 250 Environmental Geology (3)

Geologic problems related to environment; geologic hazards (landslides, earthquakes, floods); groundwater development, pollution and depletion; natural resources; soil erosion and conservation; human interference with geologic processes; geothermal power. 3 lectures.

ESC 299 Special Topics for Lower Division Students (1-4)

Group study of a selected topic, the title to be specified in advance. Total credit limited to 8 units, with a maximum of 4 units per quarter. Prerequisite: Permission of instructor.

ESC 303 Climatology (3)

Introduction to the weather-producing processes. The earth's heat budget, thermodynamics of the atmosphere, cloud and precipitation mechanisms and the cause of atmospheric circulation. 3 lectures. Prerequisite: PHY 122 or 132.

ESC 321 Engineering Geology (4)

Fundamentals of geology applied to engineering problems. Emphasis on rock types, structure, erosion, sedimentation, and soil movements. 3 lectures, 1 three-hour laboratory. For junior engineering majors. Prerequisite: CE 135.

ESC 323 Geomorphology (3)

Various landforms and interpretation of forces resulting in these landforms. 2 lectures, 1 three-hour laboratory. Prerequisite: ESC 101 or 111.

ESC 331 Invertebrate Paleontology (4)

Morphology and evolution of fossil invertebrates. Includes discussions of ancient environments and changes in life forms with time. 3 lectures, 1 three-hour laboratory. Prerequisite: ESC 112, ZOO 137.

ESC 332 Stratigraphy (3)

Stratigraphic procedures; correlation, classification and origin of stratigraphic units, index fossils. 3 lectures. Prerequisite: ESC 112, 152.

ESC 333 Structural Geology (4)

Structural features and deformation of the earth's crust. Solution of geologic field problems. 3 lectures, 1 three-hour laboratory. Prerequisites: Trignometry, ESG 125, ESC 111.

ESC 334 Exploration Geophysics (4)

Geophysical techniques. Gravity, magnetic, electrical and seismic methods applied to the solution of geologic problems. 3 lectures, 1 three-hour laboratory. Prerequisites: ESC 111, 151, PHY 132 or 122.

ESC 335 Oceanography (3)

Physical dimensions, geologic structure of the ocean floor, properties of sea water. Ocean currents, tides, wave action. Influence of the sea on weather. Resources, pollution and influence on life. 3 lectures.

ESC 351 Petroleum Geology (3)

Origin and occurrence of petroleum and related products. Study of the geologic structure and stratigraphy of major oil and gas fields. 3 lectures.

ESC 400 Special Problems for Upper Division Students (1-2)

Individual or group investigation, research, studies or surveys of selected problems. Total credit limited to 4 units, with a maximum of 2 units per quarter.

ESC 421 Igneous and Metamorphic Petrology (4)

Descriptive, chemical, mineralogic and textural studies of igneous and metamorphic rocks using primarily petrographic techniques. Theory of the classification of these rocks. Field trips required. 2 lectures, 2 three-hour laboratories. Prerequisite: ESC 223.

ESC 422 Sedimentary Petrology (4)

Descriptive, chemical, mineralogic and textural studies of sedimentary rocks, using primarily petrographic, sieve and sedimentation techniques. Theory of the classification and origin of these rocks. A continuation of ESC 421. Field trips required. 2 lectures, 2 three-hour laboratories. Prerequisite: ESC 421.

ESC 433 Economic Geology (4)

Geochemistry and economic aspects of ore deposits, occurrence and distribution of metallic and nonmetallic ores. Laboratory examination of ore suites and common rock materials. Field trips to selected mineral locations required. 3 lectures, 1 three-hour laboratory. Prerequisite: ESC 222 and consent of instructor.

ESC 455 Field Methods (4)

Techniques of recognizing, plotting, collecting and interpreting geologic structures and earth features. Surveying with plane table, alidade, Brunton compass and tape. 1 lecture, 3 three-hour laboratories. Prerequisite: Consent of instructor.

ESC 461, 462 Senior Project (2) (2)

Selection and completion of a project under faculty supervision. Independent study and introduction to research. A formal report is required. Minimum of 120 hours total time.

ESC 463 Undergraduate Seminar (2)

A study of current developments in earth science and a discussion of periodical literature at an appropriate level. 2 lecture-discussions.

ESC 490 Summer Field Geology (8)

A six-week course in geological field methods. Preparation of geological maps of igneous and sedimentary areas and a report on areas mapped. Field-lalaboratory work. Prerequisite: ESC 455.

ESC 499 Special Topics for Upper Division Students (1-4)

Group study of a selected topic, the title to be specified in advance. Total credit limited to 8 units, with a maximum of 4 units per quarter. Prerequisite: permission of instructor.

MATHEMATICS

Emil R. Herzog, *Chairman*

Laure I. Abu-Haydar
Charles Amelin
Sidney Birnbaum
Cameron C. Bogue
Demetrios Brizolis
Hasan Celik
Yu Chang
Tsu-yee Chen
Theodore J. Cullen
Hsin Ya Fan
John R. Fisher
Carlos Ford-Livene
Samuel Gendelman
Frank Glaser
Simon Green
Bruce Hillam
Jack E. Hofer
Donald Hook
David A. Horwitz
Alice A. Huffman
Larry D. Irwin
Martha Janson
Joseph Kachun
Thomas M. King
Kenneth B. Kriege
Peter A. Laszlo
Kei A. Lee
Esther Lowy
Kenneth A. MacDonald
Henryka Maslowski
William McIntosh
James McKinney
Judy McKinney
William C. Paugstat
Alan Radnitz
Richard A. Robertson
Lydia M. Ross
Harold F. Simmons
V. Merriline Smith
Harry A. Wilson
Carol A. Ziegler

The mathematics department offers a flexible major program which may be adapted to serve a variety of needs and interests. The student may develop elective patterns which will prepare him for entry into employment in industry and government.

However, each student is urged to develop an elective pattern which will also prepare him for graduate study either in mathematics or in some quantitative discipline in the sciences, engineering, economics or business. Courses at the 500-level are available as part of a graduate program.

The mathematics department recommends that each student use several of his free electives to develop depth in some discipline other than mathematics.

Students who plan to enter a credential program should make their desires known as early as possible in order to make effective use of the special counseling available in this area.

Transfer students should complete as much of the calculus sequence as possible before entering Cal Poly. Chemistry and physics courses to be transferred should be those which require calculus concurrently or as a prerequisite.

A high school student planning a major in mathematics should complete one year of physics, one year of chemistry, and four years of mathematics to include thorough preparation in trigonometry and advanced algebra.

CORE COURSES FOR MAJOR

(Required of all students)

Calculus & Anal Geometry	MAT	141	(4)
Calculus & Anal Geometry	MAT	142	(4)
Linear Algebra	MAT	208	(4)
Calculus & Diff Equation	MAT	240	(4)
Calculus & Diff Equation	MAT	241	(4)
Calculus & Diff Equation	MAT	242	(4)
Intermediate Analysis	MAT	314	(4)
Intermediate Analysis	MAT	315	(4)
Modern Algebra	MAT	417	(4)
Modern Algebra	MAT	418	(4)
Mathematics Electives (300-400 level)			(20)

SUPPORT AND ELECTIVE COURSES

(Required of all students)

American Civilization	AMC	201	*(4)
American Civilization	AMC	202	*(4)
General Chemistry	CHM	111	*(3)
General Chemistry	CHM	112	*(3)
General Chemistry Lab	CHM	151	*(1)
General Chemistry Lab	CHM	152	*(1)
Fortran	CS	205	(4)
Freshman Composition	ENG	104	*(4)
Freshman Composition	ENG	105	*(4)
Calculus & Analytical Geometry	MAT	140	*(4)
Introduction to Probability	MAT	236	(4)
Physical Education	PE	141	*(3)
General Physics	PHY	131	*(4)
General Physics	PHY	132	*(4)
General Physics	PHY	133	*(4)
Humanities			*(8)
Courses to complete general education requirements			(5)
Unrestricted electives			(74)

*May be used for the general education requirement. Select appropriate courses from the general education list.

Course Descriptions

MAT 1 Preparatory Mathematics (3)

Fundamentals of arithmetic, denominate numbers, introduction to algebra, percentage, exponents, simultaneous linear equations. 3 lectures.

MAT 101 Basic Mathematics (3)

Graphs, charts, ratio, proportion, variation, basic algebraic operations, linear and quadratic equations, logarithms. Not open to any student whose major requires the MAT 114 or 140 sequence or to any student with college credit for any previous math course. 3 lectures. Prerequisite: high school algebra and geometry or MAT 1.

MAT 102 Basic Mathematics (3)

Elements of trigonometry, analytic geometry, statistics. Not open to any student whose major requires the MAT 114 or 140 sequence. 3 lectures. Prerequisite: MAT 101 or MAT 112.

MAT 104 Trigonometry (4)

The circular functions, general reduction formulas, inverse functions, graphs, exponential and logarithmic functions, Law of Sines, Law of Cosines, identities and complex numbers. Not open to any student with credit for MAT 115 or MAT 141. 4 lectures. Prerequisite: MAT 101 or MAT 112.

MAT 105 College Algebra (4)

Real numbers, inequalities, absolute value, coordinate systems, functions, progressions, linear and quadratic systems, polynomials and mathematical induction. Not open to any student with credit for MAT 115 or MAT 141. 4 lectures. Prerequisite: MAT 101 or MAT 112.

MAT 107 Introduction to Statistics (3)

Collection and summarization of data; measures of central tendency and dispersion, probability, binomial and normal distributions, sampling theory. Not open to Mathematics or Engineering majors. 3 lectures. Prerequisites: MAT 101 or MAT 112.

MAT 108, 109 Introduction to Mathematical Analysis (3) (3)

For economics, business administration, agriculture, biological and social science majors. Selected topics from analytic geometry and the calculus of functions of one variable, including applications of differentiation and integration. Not open to any student whose major requires the MAT 114 or 140 sequence. 3 lectures. Prerequisite: MAT 101 or MAT 112 or equivalent.

MAT 110, 111, 112 Introductory Mathematics (3) (3) (3)

A course sequence designed for two purposes. The complete three quarter sequence will equip the student to pursue other mathematics courses, such as MAT 104, MAT 105, MAT 107, MAT 108, as required by his major department. The first two quarters will satisfy general education requirements with regard to mathematics. Enrollment requires approval of the Mathematics Department. 3 lectures.

MAT 114, 115, 116 Analytic Geometry and Calculus (3) (3) (4)

Introduction to analytic geometry, elementary functions, limits. Theory and technique of differential and integral calculus of one variable. 3 lectures. Prerequisite: MAT 104 and 105 or equivalent.

MAT 130, 131 Technical Calculus (4) (4)

Survey of Analytic Geometry, Calculus of rational, exponential, logarithmic, and trigonometric functions. Basic ordinary and partial differentiation. 4 lectures. Prerequisite: MAT 104.

MAT 140, 141, 142 Calculus and Analytic Geometry (4) (4) (4)

Introduction to analytic geometry. Theory, technique and application of the calculus of a single variable, including limits, differentiation, integration. 4 lectures. Prerequisite: MAT 104 and MAT 105, or equivalent.

MAT 150 Great Ideas in Mathematics (4)

Exploration of seminal ideas in mathematics and their consequences for mathematics, science, technology, and philosophy. Significant concepts of number, algebra, geometry, set theory, the infinite and infinitesimal, computing models of the real (and other) world. 4 lectures.

MAT 200 Special Problems for Lower Division Students (1-2)

Individual or group investigation, research, studies or surveys of selected problems. Total credit limited to 4 units, with a maximum of 2 units per quarter.

MAT 205 Basic Concepts of Elementary Mathematics (4)

Development of systems of numeration; evolution of the logical basis of the number systems of arithmetic; elementary concepts in logic and set theory; introduction to number theory. 4 lectures. Prerequisite: High school algebra and geometry.

MAT 206, 207 Concepts of Elementary Mathematics (3) (3)

Rational and real number systems, probability and statistics; informal metric and nonmetric geometry; selected topics from algebra and analysis. 3 lectures. Prerequisite: MAT 205.

MAT 208 Introduction to Linear Algebra (4)

Introduction to linear transformations of the plane, vector space of n-tuples, matrix algebra, determinants, systems of linear equations. 4 lectures. Prerequisite: MAT 214 or 240.

MAT 211 Basic Set Theory and Logic (4)

Basic set theory and logic, relations, functions, mathematical induction, elementary cardinal number arithmetic. Emphasis on how to present and understand mathematical proof. 4 lectures. Prerequisite: MAT 116 or MAT 142.

MAT 214, 215, Calculus of Several Variables (4) (4)

Vector analysis applied to three dimensional analytic geometry. Theory and technique of multivariable calculus, power series, 4 lectures. Prerequisite: MAT 116.

MAT 216 Differential Equations (4)

The theory of ordinary differential equations with emphasis on the linear case. 4 lecture-discussions. Prerequisite: MAT 116 or MAT 142.

MAT 236 Introduction to Probability (4)

Set-theoretic approach to probability in finite sample spaces. Conditional probability, independence, the binomial distribution. 4 lectures. Prerequisite: MAT 105.

MAT 237 Elements of Statistics (4)

Descriptive Statistics. Ungrouped and grouped data. Statistical distributions. Sampling techniques, confidence limits. Analysis of variance. Regression and correlation. 4 lectures. Prereuisite: MAT 236.

MAT 240, 241, 242 Calculus and Differential Equations (4) (4) (4)

Infinite series and sequences; analytic geometry of quadric surfaces and space curves; partial differentiation; multiple integration; standard techniques and theory of ordinary differential equations to include series solutions and operator methods. 4 lectures. Prerequisite: MAT 142 or equivalent.

MAT 299 Special Topics for Lower Division Students (1-4)

Group study of a selected topic, the title to be specified in advance. Total credit limited to 8 units, with a maximum of 4 units per quarter. Prerequisite: Permission of instructor.

MAT 306 History of Mathematics (4)

Development of mathematics over four millenia. Recommended for students preparing to teach mathematics. 4 lectures. Prerequisite: MAT 215 or 241.

MAT 309 Statistical Methods in Engineering and the Physical Sciences (3)

Use of statistical methods in experimentation, testing, inspection and production. Measurement errors, comparison of two or more variances; correlation; design or engineering experiments. Not open to mathematics majors. 3 lectures. Prerequisite: MAT 214 or 240.

MAT 312 Introduction to Topology (4)

Topology of the line and plane, topological spaces, continuity and topological equivalence, and topics selected from the following: bases and subbases, metric and normed spaces, countability axioms, separation axioms, compactness, connectedness, product spaces, completeness, and function spaces. 4 lectures. Prerequisite: MAT 116 or MAT 142.

MAT 314, 315 Intermediate Analysis (4) (4)

Metric spaces and continuity. Analysis of functions of a single variable. Sequences, limits, continuity, differentiation, integration, introduction to function spaces. 4 lectures. Prerequisite: MAT 216 or MAT 242.

MAT 317 Laplace Transforms and Fourier Series (3)

Introduction to Fourier Series and Integrals with applications. Elementary theory of Laplace transformation with applications including the solution of differential equations. 3 lecture. Prerequisite: MAT 216 or 242.

MAT 318 Mathematical Analysis of Engineering Problems (3)

Introduction to the algebra and calculus of vectors including the divergence and Stokes' theorem. Introduction to analytic functions of a complex variable. Not open to mathematics majors. 3 lectures. Prerequisite: MAT 216 or 242.

MAT 325 Introduction to the Theory of Numbers (4)

Fundamentals of the system of integers, divisibility, congruences, theorems of Fermat and Wilson, power residues and indices, quadratic reciprocity, factorization techniques, diophantine equations, theorems of Euler, Gauss and Lagrange. Elementary results concerning the distribution of primes. 4 lectures. Prerequisite: Junior standing or consent of instructor.

MAT 400 Special Problems for Upper Division Students (1-2)

Individual or group investigation, research, studies or surveys of selected problems. Total credit limited to 4 units, with a maximum of 2 units per quarter.

MAT 401, 402 Numerical Analysis (4) (4)

The basic methods of numerical mathematics with special emphasis on error analysis. Topics will include non-linear systems of equations, differentiation and integration techniques, practical solutions of ordinary and partial differential equations, introduction to approximation theory. 4 lectures. Prerequisites: CS 205, or consent of instructor.

MAT 403 Numerical Methods in Linear Algebra (4)

Treatment of numerical methods for determinants, systems of linear equations, matrix inversion, eigen values and eigen vectors. 4 lectures. Prerequisite: MAT 208.

MAT 413 Advanced Calculus (4)

Differential and integral calculus of functions and transformations in several real variables. 4 lectures. Prerequisite: MAT 315.

MAT 415 Foundations of Geometry (4)

Axiomatic development of selected topics from euclidean and neutral geometries; introduction to non-euclidean geometry with emphasis on the hyperbolic case. 4 lectures. Prerequisite: MAT 208 and 241.

MAT 416 Projective Geometry (4)

Synthetic and analytic treatment of selected topics from projective geometry; classical theorems, conics, polarities; quadratic and bilinear forms. 4 lectures. Prerequisite: MAT 208 and 241.

MAT 417, 418 Modern Algebra (4) (4)

Introduction to algebraic structures; groups, rings, integral domains, fields; mappings with emphasis on morphisms. 4 lectures. Prerequisite: MAT 208.

MAT 419 Abstract Linear Algebra (4)

Vector spaces and dimension, linear transformations, dual spaces, adjoints of transformations, multilinear forms, eigenvectors, the Cayley-Hamilton theorem, inner product spaces, orthogonality, similarity transformations, the spectral theorem, Jordan form. 4 lectures. Prerequisite: MAT 208.

MAT 420, 421 Differential Geometry (4) (4)

The Frenet formulas, covariant derivatives, frame fields, the structure equations, differential forms on a surface, normal curvature, Gaussian curvatures; intrinsic geometry of surfaces in E_3, the Gauss and Bonnet theorem. 4 lectures. Prerequisite: MAT 208 and MAT 216 or MAT 242.

MAT 428, 429 Functions of a Complex Variable (4) (4)

Algebra and geometry of complex numbers; analyticity, mappings of elementary functions; Cauchy integral formula, Taylor and Laurent series, the residue theorem; conformal mapping with applications. 4 lectures. Prerequisite: MAT 314 or consent of instructor.

MAT 431, 432 Differential Equations (4) (4)

Partial differential equations with applications to wave otion, heat transfer and fluid flow. Ordinary differential equations: linear with variable coefficients, linear systems; stability and qualitative behavior of solutions. 4 lectures. Prerequisite: MAT 216 or 242, and 208 or consent of instructor.

MAT 440, 441 Mathematical Statistics (4) (4)

Discrete and continuous probability distributions; moments, moment generating functions; transformations of random variables; limiting distributions, sampling distributions; point and interval estimations, tests of hypotheses. 4 lectures. Prerequisite: MAT 236 and either MAT 204 or MAT 216 or MAT 242.

MAT 442 Design of Experiments (4)

Latin-square, split-plot, simple and partially confounded factorial design; incomplete block designs, treatment of missing data, techniques of experimentations. Introduction to development of sampling systems. 4 lectures. Prerequisite: MAT 441.

MAT 444, 445 Vector and Tensor Analysis (4) (4)

An integrated course in the algebra and calculus of vectors and tensors: topics in differential geometry; applications to mechanics of deformable media, hydrodynamics, general relativity. 4 lectures. Prerequisite: MAT 208, and 216 or 242. PHY 321 is recommended.

MAT 450, 451 Foundations of Mathematics (4) (4)

Major problems in set theory and logic from both the classical and intuitionistic viewpoints. Transfinite arithmetic; well-ordering and its equivalents; the continuum hypotheses; recursive functions; metatheory of logic and arithmetic with emphasis on consistency, independence, satisfiability, completeness, and decidability. 4 lectures. Prerequisite: MAT 211 or consent of instructor.

MAT 461, 462 Senior Project (2) (2)

Selection and completion of a project under faculty supervision. Projects typical of problems which graduates must solve in their fields of employment. Project results are presented in a formal report. Minimum of 120 hours total time.

MAT 463 Undergraduate Seminar (2)

Discussions through seminar methods of new developments in the fields of student's particular interests. 2 lecture-discussions. Prerequisite: Senior standing in mathematics.

MAT 470 Topics in Contemporary Mathematics (2-3)

Individual or group investigations of topics of increasing or unusual significance in the application, development, or understanding of mathematics. May be repeated for a maximum of 6 units. 2 or 3 lecture-discussions. Prerequisite: Senior standing or consent of instructor.

MAT 480 Mathematical Programming (4)

Treatment of linear inequalities, duality, general algorithms, application of linear programming. Introduction to discrete and nonlinear programming. 4 lectures. Prerequisite: MAT 208 and CS 205, or consent of instructor.

MAT 499 Special Topics for Upper Division Students (1-4)

Group study of a selected topic, the title to be specified in advance. Total credit limited to 8 units with a maximum of 4 units per quarter. Prerequisite: permission of instructor.

Graduate courses are listed in the graduate section of the catalog. See p. 410.

MICROBIOLOGY

One of the four majors offered in the Biological Sciences department is microbiology. For other programs in this department, see biology, botany, and zoology.

Ralph W. Ames, *Chairman*

Brigitte H. Goehler, *Coordinator*

Jill P. Adler
James O. Jackson
Fred Shafia
Robert L. Barlet

The microbiology major chooses one of the options offered by the section, Microbiology or Medical Technology. The core courses of the major provide a strong background in various areas of biology to better prepare students for their chosen field. The program offered in the microbiology section constitutes excellent undergraduate training and can also be oriented toward the preprofessional fields.

Completion of the medical technology option satisfies the eligibility requirements established by the California State Department of Health and the Registry of Medical Technologists of the American Society of Clinical Pathologists (ASCP) for acceptance into a one year clinical traineeship at an approved School of Medical Technology.

The microbiology section also offers a curriculum leading to the Master of Science in Biology with an emphasis in microbiology.

CORE COURSES FOR MAJOR

(Required of all students)

Basic Biology	BIO	115	(5)
Genetics	BIO	303	(4)
Plant Morphology	BOT	125	(5)
Basic Microbiology	MIC	201	(5)
Microbial Structures and Functions	MIC	300	(5)
Pathogenic Bacteriology	MIC	410	(5)
Immunology-Serology	MIC	415	(5)
General Virology	MIC	430	(5)
Senior Seminar	BIO	490	(1,1)
Invertebrate Zoology	ZOO	137	(5)
Vertebrate Zoology	ZOO	138	(5)

OPTION COURSES FOR MAJOR

(Required for specific option)

MICROBIOLOGY

Advanced Genetics	BIO	421	(3)
Cellular Physiology	BIO	435	(4)
Plant Structures and Functions	BOT	124	(5)
Applied Microbiology	MIC	310	(5)
Upper division courses in the biological sciences to be chosen in consultation with advisor			(16)

MEDICAL TECHNOLOGY

Medical Mycology	MIC	425	(4)
Hematology	MIC	444	(4)
Immunohematology	MIC	445	(4)
Human Anatomy	ZOO	234	(4)
Human Physiology	ZOO	235	(4)
Medical Parasitology	ZOO	425	(4)
Radiation Biology	BIO	431	(5)
Clinical Methods of Analysis	CHM	331	(4)

SUPPORT AND ELECTIVE COURSES

(Required of all students)

American Civilization	AMC	201	*(4)
American Civilization	AMC	202	*(4)
College Chemistry	CHM	104	*(3)
College Chemistry	CHM	105	*(3)
College Chemistry Lab	CHM	141	*(1)
College Chemistry Lab	CHM	142	*(1)
Chemical Principles	CHM	113	*(4)
Quantitative Analysis	CHM	221	(4)
Organic Chemistry	CHM	211	*(3)
Organic Chemistry	CHM	212	(3)
Organic Chemistry	CHM	213	(3)
Organic Chemistry Lab	CHM	251	(1)
Biochemistry	CHM	327	(4)
Biochemistry	CHM	328	(4)
Biochemistry	CHM	329	(4)
Freshman Composition	ENG	104	*(4)
Trigonometry	MAT	104	*(4)
College Algebra	MAT	105	*(4)
Physical Education 100 series			*(3)
College Physics	PHY	121	*(4)
College Physics	PHY	122	*(4)
College Physics	PHY	123	*(4)
Courses to complete general education requirements			*(10)
Approved Electives			**(6)
Free Electives			(25)

*Students considering graduate work or professional schools, see recomended courses for preprofessional preparation, page

* *May be used for general education requirements. A total of 60 units is required and must include two courses in humanities and four courses from a minimum of two schools other than the School of Science.

**For list of approved electives, see advisor.

Course Descriptions

F, W, Sp and Su notations indicate the quarter(s) each course is normally offered. Unless otherwise specified, the course is offered each year during the indicated quarter(s). Parentheses signify that the course *may* be offered during the quarter(s) they enclose. When appropriate, the names of faculty associated with each course are specified; otherwise, "Staff" is noted.

MIC 100 Elements of Microbiology (3) FWSp(Su)

Microorganisms and man's existence. Elements of microbiology and applications to daily life. For nonbiological science majors. 3 lecture-discussions. *Barlet, Jackson*

MIC 200 Special Problems for Lower Division Students (1-2) FWSpSu

Individual or group investigation, research, studies or surveys of selected problems. Total credit limited to 4 units, with a maximum of 2 units per quarter. *Staff*

MIC 201 Basic Microbiology (5) FWSpSu

Morphology, classification, physiology, and cultivation of bacteria; relation of bacteria to health of man, animals, and plants. 3 lectures, 2 three-hour laboratories. Prerequisite: BIO 110 or 115; CHM 111, 151 or CHM 104, 141. *Staff*

MIC 299 Special Topics for Lower Division Students (1-4) (FWSpSu)

Group study of a selected topic, the title to be specified in advance. Total credit limited to 8 units, with a maximum of 4 units per quarter Prerequisite: Permission of instructor. *Staff*

MIC 300 Microbial Structures and Functions (5) FWSp

Advanced aspects of general microbiology with emphasis upon structure and function of cell components, nutritional types of bacteria, and growth and enumeration of bacteria. 3 lectures, 2 three-hour laboratories. Prerequisite: MIC 201, CHM 201, and 250 or 211, 212 and 251. *Goehler, Shafia*

MIC 310 Applied Microbiology (5) Sp

The microbiology of foods, air, water, and sewage, stressing the utilization of microbial activities in manufacturing processes of foods, types and prevention of food spoilage, aims and methods of water treatment and sewage disposal. 3 lectures, 2 three-hour laboratories. Prerequisite: MIC 201, CHM 201, and 250 or 211, 212, and 251. *Goehler*

MIC 320 Food Microbiology (4) F

The microbiology of foods as related to storage, transit, human consumption, and health. For foods and nutrition majors. 2 lectures, 2 three-hour laboratories. Prerequisites: MIC 201, CHM 201 and 250. *Goehler*

MIC 400 Special Problems for Upper Division Students (1-2) FWSpSu

Individual or group investigation, research, studies or surveys of selected problems. Total credit limited to 4 units, with a maximum of 2 units per quarter. *Staff.*

MIC 410 Pathogenic Bacteriology (5) FSp

Characteristics of disease-producing bacteria, their means of transmission, host-parasite interactions, and laboratory methods of diagnosis. 3 lectures, 2 three-hour laboratories. Prerequisite: MIC 300. *Jackson*

MIC 415 Immunology-Serology (5) WSp

Principles of serology and immunology with emphasis on mechanisms of evaluating resistance to pathogens, and on mechanism of response to antigens on the molecular and cellular level. 3 lectures, 2 three-hour laboratories. Prerequisite: MIC 300. *Adler*

MIC 422 Clinical Laboratory Procedures (4) W 1977

Principles and methods in clinical analysis and evaluation of fluids, cells, tissues, and other body components, waste products, or chemical derivatives. 2 lectures, 2 three-hour laboratories. Prerequisie: CHM 328, ZOO 235. *Barlet*

MIC 425 Medical Mycology (4) F

Characteristics, habitats and laboratory identification of fungi inciting human and animal diseases. 2 lectures, 2 three-hour laboratories. Prerequisite: MIC 201. *Adler*

MIC 430 General Virology (5) WSp

Chemical composition and physical structure of viruses; their mechanism of reproduction; relationship to man, animals, and plants. Introduction to diagnostic techniques used in the isolation and identification of viruses. 3 lectures, 2 three-hour laboratories. Prerequisite: MIC 300. *Shafia*

MIC 444 Hematology (4) FSp

Anatomy and physiology of the normal hematopoietic system. Most frequently encountered blood dyscrasies with emphasis on their morphological characteristics as manifested in both bone marrow and peripheral blood. 3 lectures, 1 three-hour laboratory. Prerequisite: ZOO 138 or permission of instructor. *Barlet*

MIC 445 Immunohematology (4) WSp

Immunologic characteristics of human red blood cells; immunologic basis for isosensitization, general characteristics of blood group antibodies, plant hemagglutinin and inheritance of blood agglutinogens. 3 lectures, 1 three-hour laboratory. Prerequisite: MIC 415, 444. *Barlet*

MIC 499 Special Topics for Upper Division Students (1-4) (FWSpSu)

Group study of a selected topic, the title to be specified in advance. Total credit limited to 8 units, with a maximum of 4 units per quarter. Prerequisite: permission of instructor. *Staff*

ZOOLOGY

One of the four majors offered in the biological sciences department is zoology. For other programs in this department see biology, microbiology, and botany.

Ralph W. Ames, *Chairman*

Glenn R. Stewart, *Coordinator*

Jonathan N. Baskin
Timothy W. Brown
Peter Castro
William D. Edmonds
Bruce L. Firstman
Don C. Force
Diana R. Garcia
Edward K. Mercer
Edwart T. Roche
David F. Steele
Laszlo Szijj

Qualified zoology majors are well prepared for employment in a variety of state and federal agencies dealing with fishand game, wildlife management and related areas. An entomology option offered under the zoology major prepares the student for work in many areas of insect control and research.

The curriculum in zoology provides strong pre-medical, pre-dental, and pre-veterinary preparation, as well as preparing the student for graduate studies in zoology.

Facilities include a large animal colony, a representative collection of living local reptiles and amhibians and an extensive study collection of bird, mammal, amhibian and fish specimens. Unique and extensive wild areas are available on the campus for animal studies.

CORE COURSES

(Required of all students)

Basic Biology	BIO	115	(5)
Principles of Evolution	BIO	213	(3)
Genetics	BIO	303	(4)
Principles of Ecology	BIO	325	(4)
Biometrics	BIO	411	(3)
Plant Structures and Functions	BOT	124	(5)
Plant Morphology	BOT	125	(5)
Basic Microbiology	MIC	201	(5)
Invertebrate Zoology	ZOO	137	(5)
Vertebrate Zoology	ZOO	138	(5)
General Entomology	ZOO	226	(4)
Animal Physiology	ZOO	324	(4)
Senior Seminar	BIO	490	(1)(1)

OPTION COURSES

(Required for specific option)

ENTOMOLOGY

Insect Classification	ZOO	327	(4)
Insect Ecology	ZOO	412	(3)
Structure and Function in Insects	ZOO	423	(5)
Immature Insects	ZOO	434	(3)
Upper division courses in the Biological Sciences to be chosen in consultation with advisor			(9)

ZOOLOGY

Each student will complete at least 5 upper division zoology courses			(24)

SUPPORT AND ELECTIVE COURSES

(Required of all students)

American Civilization	AMC	201	*(4)
American Civilization	AMC	202	*(4)
College Chemistry	CHM	104	*(3)
College Chemistry	CHM	105	*(3)
College Chemistry Lab	CHM	141	*(1)
College Chemistry Lab	CHM	142	*(1)
Organic Chemistry	CHM	201	*(3)
Organic Chemistry Lab	CHM	250	(1)
Elements of Biochemistry	CHM	321	(4)
Freshman Composition	ENG	104	*(4)
Trignometry	MAT	104	*(4)
College Algebra	MAT	105	*(4)
Physical Education 100-series			*(3)
College Physics	PHY	121	*(4)
College Physics	PHY	122	*(4)
College Physics	PHY	123	*(4)

Courses to complete general education requirements	*(14)
Approved Electives	**(16)
Free Electives	(39)

††Students considering graduate work or professional schools, see recommended courses for preprofessional preparation, page

*May be used for general education requirements. A total of 60 units is required and must include two courses in humanities and four courses from a minimum of two schools other than the School of Science.

**Approved electives include all 300 and 400 level courses taught in the Biological Sciences Department not specifically designed for non-majors. See advisor for approval of courses offered by other departments.

Course Descriptions

F, W, Sp and Su notations indicate the quarter(s) each course is normally offered. Unless otherwise specified, the course is offered each year during the indicated quarter(s). Parentheses signify that the course *may* be offered during the quarter(s) they enclose. When appropriate, the names of faculty associated with each course are specified; otherwise, "Staff" is noted.

ZOO 137 Invertebrate Zoology (5) FWSpSu

Evolution and general biology of major phyla of invertebrate animals, Protozoa to Chordata; introduction to the structure and function of invertebrate organ systems. 3 lectures, 2 three-hour laboratories. Prerequisite: BIO 115. *Mercer, Roche*

ZOO 138 Vertebrate Zoology (5) FWSpSu

Evolution and general biology of animals within the phylum Chordata; introduction to the structure and function of vertebrate organ systems. 3 lectures, 2 three-hour laboratories. Prerequisite: BIO 115. *Baskin, T. Brown, Stewart*

ZOO 200 Special Problems for Lower Division Students (1-2) FWSpSu

Individual or group investigation, research, studies or surveys of selected problems. Total credit limited to 4 units, with a maximum of 2 units per quarter. *Staff*

ZOO 226 Introduction to Entomology (4) FWSp(Su)

General aspects of insect structure and function, development, behavior and influence on human activity; includes a survey of the principal insect groups. 3 lectures, 1 three-hour laboratory. Prerequisite: BIO 115, ZOO 137. *Bath, Edmonds, Force.*

ZOO 234 Human Anatomy (4) FWSp(Su)

Lectures devoted to a description of human anatomy. Laboratories involved with cat anatomy dissection with reference and comparison to human structure. 2 lectures, 2 three-hour laboratories. Prerequisite: BIO 115. *Bath, Steele*

ZOO 235 Human Physiology (4) FWSpSu

Functions of the major organ systems of the human body with emphasis on the homeostatic mechanisms. 3 lectures, 1 three-hour laboratory. Prerequisite: BIO 115. *Steele*

ZOO 299 Special Topics for Lower Division Students (1-4) (FWSpSu)

Group study of a selected topic, the title to be specified in advance. Total credit limited to 8 units, with a maximum of 4 units per quarter. Prerequisite: Permission of instructor. *Staff*

ZOO 323 Embryology (5) FWSp

Embryonic development of the vertebrate body. 2 lectures, 3 three-hour laboratories. Prerequisite: ZOO 138. *Firstman, Steele*

ZOO 324 Animal Physiology (4) FW

Introduction to functions of vertebrate and invertebrate organ systems. 2 lectures, 2 three-hour laboratories. Prerequisite: ZOO 137, 138. *Garcia*

ZOO 326 Comparative Anatomy of Vertebrates (5) FSp

Comparative structure of vertebrate organ systems. 3 lectures, 2 three-hour laboratories. Prerequisite: ZOO 138. *Baskin*

ZOO 327 Insect Classification (4) Sp 1977

Aspects of taxonomic procedure and study of classifications of the Class Insecta. Collection, identification and recognition of significant insect families. 2 lectures, 2 three-hour laboratories. Prerequisie: ZOO 226. *Edmonds*

ZOO 329 Ornithology (3) F

The evolution, anatomy and physiology of birds with special emphasis on behavior and ecological relationships of species of the Pacific Coast Region. 2 lectures, 1 three-hour laboratory, or field exercises, or projects. Two weekend field trips are required for credit in this course. Prerequisite: ZOO 138 or consent of instructor. *Szijj*

ZOO 341 Mammalogy (3) W

Morphology, classification, distribution, ecology, behavior and economic importance of mammals; identification, life histories, and field study of local species. 2 lectures, 1 three-hour laboratory. Prerequisite: ZOO 138 or equivalent. *Stewart*

ZOO 350 Advanced Invertebrate Zoology (5) Sp

A systematic and comparative survey of all invertebrate groups, including the minor phyla, with emphasis on morphology and phylogeny. 2 lectures, 3 three-hour laboratories. Prerequisite: ZOO 137. *Firstman*

ZOO 400 Special Problems for Upper Division Students (1-2) FWSpSu

Individual or group investigation, research, studies or surveys of selected problems. Total credit limited to 4 units with a maximum of 2 units per quarter. *Staff*

ZOO 412 Insect Ecology (3) F

Principles of ecology as they apply to insects and other invertebrates. 3 lectures. Prerequisite: ZOO 226, BIO 325. *Force*

ZOO 419 Animal Behavior (3) Sp

Biological, physiological, genetic and anatomical principles of animal behavior. Ethnology and experimental psychology involving wild and laboratory animals. 2 lectures, 1 three-hour laboratory. Prerequisite: ZOO 138 or consent of instructor. *Szijj*

ZOO 422 Histology (4) FSp

Microscopic study of vertebrate tissues; organology and correlation of form with function. 2 lectures, 2 three-hour laboratories. Prerequisite: ZOO 138. *Roche*

ZOO 423 Structure and Function in Insects (5) F 1976

Comparative functional morphology of insects; aspects of insect physiology, 3 lectures, 2 three-hour laboratories. Prerequisites: ZOO 226, junior standing. *Edmonds*

ZOO 425 Medical Parasitology (4) F

Study of protozoan and helminth parasites of man: diagnosis, life cycles, pathology, epidemiology and control. 2 lectures, 2 three-hour laboratories. Prerequisite: ZOO 137. *Castro*

ZOO 429 Herpetology (3) Sp

Morphology, classification, distribution, ecology, behavior and economic importance of amphibians and reptiles; identification, life histories, and field study of local species. 2 lectures, 1 three-hour laboratory. Prerequisite: ZOO 138 or equivalent. *T. Brown, Stewart*

ZOO 431 Insect Pathology (4) W 1976

Study of insect mortality and population size regulation caused by microorganisms, parasitic insects and physiological-genetic factors. 3 lectures, 1 three-hour laboratory. Prerequisites: ZOO 226, MIC 201. *Force*

ZOO 434 Immature Insects (3) Sp 1977

Study of the development, biology and classification of immature insects. 1 lecture, 2 three-hour laboratories. Prerequisites: ZOO 226, 326. *Force*

ZOO 435 Public Health Entomology (4) W

Role of insects, mites, ticks and other arthopods in the causation and transmission of human disease. 3 lectures, 1 three-hour laboratory. Prerequisite: ZOO 226. *Force*

ZOO 436 Applied Entomology (4) Sp 1976

Study of economic problems caused by insects and approaches to their solution. 3 lectures, 1 three-hour laboratory. Prerequisite: ZOO 226, 326. *Force.*

ZOO 441 Ichthyology (4) W 1977

The structure, relationships, classification, general biology and zoogeography of fishes. Collection, identification and field study of local species, and laboratory work with preserved and living material. 2 lectures and 2 three-hour laboratories. Prerequisite: ZOO 138 and permission of instructor. *Baskin*

ZOO 442 Acarology (3) Sp 1976

Identification, biology, ecology and importance of injurious and benefical mites and ticks; methods of preparation for study. 1 lecture, 2 three-hour laboratories. Prerequisite: ZOO 137. *Firstman*

ZOO 450 Physiology of Marine Animals (4) W 1976

Physiological adaptations of invertebrates and vertebrates to the marine environment. Emphasis on littoral forms. 2 lectures, 2 three-hour laboratories. Prerequisite: ZOO 324. *Castro*

ZOO 499 Special Topics for Upper Division Students (1-4) (FWSpSu)

Group study of a selected topic, the title to be specified in advance. Total credit limited to 8 units, with a maximum of 4 units per quarter. Prerequisite: permission of instructor. *Staff*

SCIENCE

SC 120 Science of the Sea (3) W

A nontechnical introduction to the problems of the sea as they relate to Man. With worldwide interest and concern being directed toward the sea, this is a timely addition for non-science students. *Castro, Hesse*

SCI 210, 211, 212 Physical Science (4) (4) (4)

The basic elements of physics, chemistry, and the earth sciences taught in an interdisciplinary manner. Laboratory sessions emphasize fundamental experiments that will be particularly useful for elementary school teachers. 3 lectures, 1 three-hour lab. Courses must be taken in sequence.

SCI 450 Philosophic Implications of Science (3)

Reading and discussion of works of eminent scientists and philosophers concerning those results of science that have a bearing on philosophic problems. Readings may be from authors such as Schrodinger, Russell, Huxley, Chardin, Kuhn. 3 lectures. Prerequisite: senior standing in one of the natural or physical sciences, mathematics or consent of the instructor.

PHYSICS

One of the two majors offered in the Physics and Earth Sciences department is physics. For the other program offered in this department see Earth Sciences.

Johannes Tuul, *Chairman*

Keith H. Brown
Robert T. Bush
Robert D. Eagleton
Horace G. Ferris
Douglas Giancoli
Edward M. Kelly
James D. Kerwin
John Macropol
Barton Palatnick

The major in physics prepares students for careers as physicists with industry, government, in university laboratories and in teaching. The program also qualifies as a subject matter major for the standard teaching credential-secondary specialization through fifth year courses offered in physics for the credential program. By suitably chosen electives, students may emphasize the interdisciplinary areas of biophysics or geophysics.

CORE COURSES FOR MAJOR

(Required of all students)

General Physics	PHY	131	(4)
General Physics	PHY	132	(4)
General Physics	PHY	133	(4)
Waves	PHY	234	(4)
Elem Modern Physics	PHY	235	(4)
Physics of Elec & Mag	PHY	313	(3)
Physics of Elec & Mag	PHY	314	(3)
Physics of Elec & Mag	PHY	315	(3)
Mechanics	PHY	321	(4)
Mechanics	PHY	322	(4)
Modern Physics	PHY	401	(4)
Quantum Mechanics	PHY	402	(4)
Spec. Prob. in Exp. Phy	PHY	430	(1)
Spec. Prob. in Exp. Phy	PHY	431	(1)
Spec. Prob. in Exp. Phy	PHY	432	(1)
Undergraduate Seminar	PHY	463	(2)

SUPPORT AND ELECTIVE COURSES

(Required of all students)

American Civilization	AMC	201	*(4)
American Civilization	AMC	202	*(4)
Basic Biology	BIO	115	(5)
General Chemistry	CHM	111	*(3)
General Chemistry	CHM	112	*(3)
General Chemistry Lab	CHM	151	*(1)
General Chemistry Lab	CHM	152	*(1)
Freshman Composition	ENG	104	*(4)
Freshman Composition	ENG	105	*(4)
†Calc & Analytical Geom	MAT	140	*(4)
†Calc & Analytical Geom	MAT	141	*(4)
†Calc & Analytical Geom	MAT	142	*(4)
†Calc & Diff Equa	MAT	240	*(4)
†Calc & Diff Equa	MAT	241	*(4)
†Calc & Diff Equa	MAT	242	*(4)
Physical Education	PE	141	*(3)
One additional course from Social Sciences from the General Education List			*(4)
Humanities: Min. of two courses...			*(8)
Four courses from at least two schools outside the School of Science			
‡Advanced Electives			(28)
Free Electives			(40)
†or MAT 114, 115, 116, 214, 215, 216			*(12)

‡To be chosen from upper division courses in physics or related fields in consultation with the faculty advisor.

Course Descriptions

PHY 102 Fundamentals of Physics (4)

Various theories of matter and energy and the principles and laws that describe their behavior and applications. Some special knowledge of modern science that will function in a socially desirable manner in the lives of students. 3 lectures, 1 recitation. Prerequisite: A college math course. PHY 102 is not open to students who have credit for PHY 121 or 131.

PHY 121, 122, 123 College Physics (4) (4) (4)

Principles of mechanics, vectors, force, motion, momentum, work and energy, gravity; heat and kinetic theory; wave motion, sound, light; electricity, magnetism; theory of special relativity, quantum theory, atomic structures, the nucleus and radioactivity. 3 lectures, 1 three-hour laboratory. Not for students majoring in physics or engineering. To be taken in sequence. Prerequisite: MAT 102 or MAT 104 or equivalent.

PHY 131 General Physics (4)

Fundamental principles of mechanics. Vectors, statics, uniform motion, accelerated motion, work and energy, and rotational motion. 3 lectures, 1 three-hour laboratory. Prerequisite: MAT 114 or MAT 140; MAT 115 or MAT 141 must be taken concurrently.

PHY 132 General Physics (4)

Fundamental principles of harmonic motion, waves, fluid mechanics, thermodynamics, kinetic theory, and geometrical optics. 3 lectures, 1 three-hour laboratory. Prerequisite: MAT 115 or MAT 141, PHY 131; MAT 116 or MAT 142 must be taken concurrently.

PHY 133 General Physics (4)

Fundamental principles of electricity and magnetism. Coulomb's law, electric fields, potential, properties of dielectrics, capacitance, Ohm's law, magnetism and magnetic fields, measuring instruments, magnetic field of moving charges, induced emf, AC circuits. 3 lectures, 1three-hour laboratory. Prerequisite: PHY 131; MAT 116 or MAT 142 (or may be taken concurrently).

PHY 200 Special Problems for Lower Division Students (1-2)

Individual or group investigation, research, studies or surveys of selected problems. Total credit limited to 4 units, with a maximum of 2 units per quarter.

PHY 202 Today's Physics (4)

For non-science majors. A layman's view of modern physics; relativity, elementary particles, quantum theory, radioactivity, lasers, space physics, etc. Not open to students who have taken PHY 121, or PHY 131, or the equivalent. 3 lectures, 1 recitation.

PHY 213 Introduction to Nuclear Physics (3)

Elementary theory of nuclear structure, including a study of nuclear reactions, particle accelerators, and nuclear instruments. Application in atomic energy and nuclear engineering. 3 lectures. Prerequisite: PHY 235 or consent of instructor.

PHY 234 Waves (4)

Fundamentals of wave motion, including electromagnetic waves, light, sound and particle waves. 3 lectures, 1 three-hour laboratory. Prerequisite: PHY 133, MAT 214.

PHY 235 Elementary Modern Physics (4)

Theory of special relativity; origin of the quantum theory; Bohr theory; wave mechanics and atomic structure; introduction to nuclear physics. 3 lectures, 1 three-hour lab. Prerequisite: PHY 234 or consent of instructor.

PHY 240 Electronics for Scientists (3)

Basic concepts of electrical circuits, vacuum tubes, and solid state devices. Circuit analysis and operation of instruments commonly encountered in science lab. 2 lectures, 1 three-hour laboratory. Prerequisite: PHY 123 or 133 or consent of instructor.

PHY 299 Special Topics for Lower Division Students (1-4)

Group study of a selected topic, the title to be specified in advance. Total credit limited to 8 units, with a maximum of 4 units per quarter. Prerequisite: Permission of instructor.

PHY 302 Geometrical Optics (3)

Reflection, refraction, mirrors, lenses, and optical instruments. Lab includes experiments in both geometrical and physical optics. 2 lectures, 1 three-hour lab. Prerequisite: PHY 132.

PHY 306 History of Physics (3)

History of physics from Thales of Miletus to the present with special emphasis on 19th and 20th Century developments. 3 hours lecture.

PHY 313, 314, 315 Physics of Electric and Magnetic Phenomena (3) (3) (3)

Electrostatics, magnetostatics, circuit theory, time-varying fields, Maxwell's equations, and electromagnetic waves. 3 lectures. Prerequisites: PHY 133 and MAT 216.

PHY 321, 322 Mechanics (4) (4)

Vector algebra, principles of Newtonian mechanics, conservative forces, harmonic motion, central-force motion, the two-body problem, center of mass coordinates, statics and dynamics of rigid bodies, accelerated coordinate systems, normal coordinates, and Lagrange's equations. 4 lectures. Prerequisite: PHY 133 and MAT 216.

PHY 333 Thermal Physics (4)

Fundamental principles of thermodynamics and kinetic theory of gases. 4 lectures. Prerequisite: PHY 133 and MAT 215.

PHY 340 Physics of Environmental Problems (3)

Physical aspects of environmental problems are analyzed quantitatively. Topics include transportation, the internal combustion engine, electric energy production, natural resources, air pollution, thermal pollution of water, and nuclear radiation hazards. 3 one-hour lectures. Prerequisite: PHY 123 or 133; CHM 105 or 112.

PHY 400 Special Problems for Upper Division Students (1-2)

Individual or group investigation, research, studies or surveys of selected problems. Total credit limited to 4 units, with a maximum of 2 units per quarter.

PHY 401 Modern Physics (4)

Theory of special relativity; quantum mechanics; Schrödinger wave equation and its solution; hydrogen atom. 4 lectures. Prerequisites: MAT 216; PHY 235, 315 (may be taken concurrently), 322, or CHM 313, or consent of instructor.

PHY 402 Quantum Mechanics (4)

Schrödinger theory; identical particles; the Pauli exclusion principle; perturbation theory; multielectron atoms and coupling; scattering theory; matrix mechanics; angular momentum. 4 lectures. Prerequisite: PHY 401 or consent of instructor.

PHY 403 Advanced Nuclear Physics (4)

Nuclear disintegration and nuclear reactions, fusion, fission, nuclear models. Elementary particle and high energy physics. 4 lectures. Prerequisite: PHY 401.

PHY 406 Solid State Physics (4)

Geometry of perfect crystals, crystal imperfections, diffusion of atoms, electronic states in solids. The basic solid types: metals, ionic crystals, covalent crystals, molecular crystals. Transport properties and specific heat of metals. Physical properties of semiconductors, theory of semiconductor devices. Behavior of dielectrics, diamagnetism and paramagnetism, ferromagnetism (domain theory). 4 lectures. Prerequisite: PHY 133 and MAT 216.

PHY 407 Statistical Physics (4)

Study of the statistical behavior of physical systems composed of large numbers of similar particles. Derivation and application of the distribution functions for the cases of Maxwell-Boltzmann statistics, Bose-Einstein statistics and Fermi-Dirac statistics. 4 lectures. Prerequisite: PHY 235, 333 and MAT 216.

PHY 410 Biophysics (3)

Concepts and mechanisms involved in the interpretation of biological systems. A description of living processes in physical terms. (See also BIO 410) 3 lectures. Prerequisite: PHY 123 or permission of instructor.

PHY 412, 413 Mathematical Methods of Physics (4) (4) (4)

Solutions of problems in physics by mathematical methods such as differential equations, calculus of variations, complex variables. 4 lectures. Prerequisite: MAT 216, PHY 315, 322 or consent of instructor.

PHY 417 Physical Optics (3)

Interference, diffraction, polarization, elements of spectroscopy, lasers, and holography. 3 lectures. Prerequisite: PHY 234 or consent of instructor.

PHY 420 Sonics (3)

Wave motion, acoustics and ultrasonics. Transverse waves, longitudinal waves, vibration of bars. Application to the production, transmission and reception of sound. Study of the acoustic wave equation in two and three dimensions. 3 lectures. Prerequsite: PHY 234 or consent of instructor.

PHY 424 Astrophysics (4)

Elements of spectroscopy, the sun, solar wind, cosmic rays, classification of stars, stellar atmospheres, stellar interiors, novae and supernovae, stellar evolution, neutron and hyperon stars, galaxies, cosmological theories. Prerequisite: PHY 235.

PHY 425 Space Physics (3)

Topics such as: Naturally-occurring plasmas, upper atmosphere phenomena, solar emissions, cosmic rays, planetary investigations, models for planet formation, physics of interplanetary regions, comets. 3 lectures. Prerequisite: PHY 235, 315, 322 or consent of instructor.

PHY 430, 431, 432 Special Problems in Experimental Physics (1) (1) (1)

Selected topics in advanced experimental physics. One three-hour laboratory. Prerequisite: consent of the instructor. May be taken in any order.

PHY 460, 461, 462 Senior Project (2) (2) (2)

Selection and completion of a project under faculty supervision. Projects typical of problems which graduates must solve in their fields of employment. Project results presented in a formal report. The project is subject to written approval by the advisor and the department chairman.

PHY 463 Undergraduate Seminar (2)

Study of current developments in physics and discussion of periodicals of an appropriate level. 2 lecture-discussions. Required for graduation.

PHY 499 Special Topics for Upper Division Students (1-4)

Group study of a selected topic, the title to be specified in advance. Total credit limited to 8 units with a maximum of 4 units per quarter. Prerequisite: permission of instructor.

PHY 550 Seminar in Physics (1-3)

Special problems in selected areas of physics. Seminar, 1 to 3 hours. Maximum of 6 units may be earned.

TEACHER PREPARATION CENTER

Alvin H. Thompson, Director

The Teacher Preparation Center serves as the university's planning and coordinating office for all teacher credential programs and the Master of Arts Degree in Education. Teacher preparation is a university-wide function. Faculty members from each credential major department and designated university personnel are appointed to serve on the Teacher Education Advisory Committee. Members of this committee advise on matters of programs, teacher candidates, and credentials. They also serve as department advisors to credential and degree candidates in program planning.

Credential Majors Offered

Multiple Subjects Credentials
Liberal Studies major
Single Subjects Credential

Agriculture, Art, Business, English, Government, History, Home Economics, Life Science, Mathematics, Music, Physical Education, Physical Science, Social Science.

Drama, journalism, and speech majors may qualify for a Single Subject Credential if they meet the requirements set by the English department.

The Teacher Preparation Center offers approved programs leading to a credential in multiple subject, single subject, and the reading specialist. Programs are being submitted for 1975-76 approval for early childhood education and bilingual-cross cultural specialist credential programs.

Courses Required for Credential Programs

The courses listed below are required to gain University recommendation for the multiple subjects or single subjects credential:

	Multiple Subjects	Single Subjects
Teaching Found. TEP 301	3	3
Philosophical Found. TEP 392	3	3
Psychological Found. TEP 393	3	3
Prac and Proc for MS TEP 405	3	
Instr Analysis for MS TEP 406	3	
Prac and Proc for SS TEP 407		3
Instr Analysis for SS TEP 408		3
Found in Read Instr TEP 411	3	3
Read Instr for Young Readers TEP 412	3	
Read Instr for Adoles		3
St. Teach in MS, Block 1, TEP 441	6	
St. Teach in MS, Block 2, TEP 442	12	
Synthesis of MS St. Teach TEP 443	3	
St. Teach in SS, Block 1 TEP 444		6
St. Teach in SS, Block 2, TEP 445		12
Synthesis of SS St. Teach TEP 446		3
	42	42

Teacher Preparation

TEP 201 Lab and Field Methods for Prospective Teachers (2-3)

Study of materials and methods in laboratory and fieldwork in the schools. Includes studies in methodology and development of curricular approaches for the prospective teacher. 1 lecture 2-3 two-hour activities. May be taken for nine units with no more than three per quarter with director's permission.

TEP 391 Teaching Foundations (3)

A course exploring institutional, sociological, and cultural foundations of public school education. 2 lectures, 1 two-hour activity.

TEP 392 Philosophical Foundations in Education (3)

An in-depth study of the development of educational thought with emphasis on epistemology, axiology, and ontology. 3 lectures.

TEP 393 Psychological Foundations in Education (3)

An overview of psychological implications for education. Human behavior, theoretical bases of thinking and learning, and techniques for assessing performance. 2 lectures, 1 two-hour activity

TEP 405 Practices and Procedures for Multiple Subjects Classrooms (3)

Activities designed for the identification and development of diverse technical and methodological teaching skills and materials, program development and implementation, state course of study framework, fieldwork. 2 lectures, 1 two-hour activity. Prerequisite: Admission to credential program.

TEP 406 Instructional Analysis for Multiple Subjects Classrooms (3)

Analysis of the instruction, process, evaluation of curriculum structures, and the development of support skills for effective teaching and application of foundations and methods of teaching, field work. 2 lectures, 1 two-hour activity. Prerequisite: Admission to credential program.

TEP 407 Practices and Procedures for Single Subjects Classrooms (3)

Activities designed for the identification and development of diverse technical and methodogical teaching skills and materials, program development and implementation, state course of study framework. Instruction by single subjects department specialist. 2 lectures, 1 two-hour activity. Prerequisite: Admission to credential program.

TEP 408 Instructional Analysis for Single Subjects Classrooms (3)

Analysis of the instruction process, evaluation of curriculum structures, and the development of support skills for effective teaching, and application of foundations and methods of teaching. Field work. 2 lectures, 1 two-hour activity. Prerequisite: Admission to credential program.

TEP 411 Foundations in Reading Instruction (3)

Reading principles, procedures, program organization, and instructional designs. Includes socio-economic, multi-cultural, and dialectal dimensions. Analysis of developmental and functional reading skills. 3 lectures.

TEP 412 Reading Instruction for Young Readers (3)

Analysis of developmental reading skills with emphasis on readiness, phonic and structural analysis, word recognition, use of the basal reader, and various programs. Lesson planning, execution, and evaluation. 2 lectures, 1 two-hour activity. Prerequisite: TEP 411.

TEP 413 Reading Instruction for the Adolescent (3)

Analysis of developmental skills as they relate to functional reading in content areas and to reading for various purposes to develop versatility. 2 lectures, 1 two-hour activity.

TEP 441 Student Teaching in Multiple Subjects, Block 1 (6)

Supervised teaching in University-approved classroom. The teacher candidate will experience initial teaching responsibilities in culturally diverse public school settings. Concurrent enrollment in TEP 405, 406, 411 and admission to program required.

TEP 442 Student Teaching in Multiple Subjects, Block 2 (12)

Supervised teaching in University-approved schools. Concurrent enrollment in TEP 443. Prerequisite: Admission to student teaching.

TEP 443 Synthesis of Multiple Subjects Student Teaching (3)

A synthesis of knowledge and experiences provided in the multiple subjects program: organization, management, methodology, materials, and the professional rights and relations of teachers. Includes preparation for employment. 2 lectures, 1 two-hour activity. Concurrent enrollment in TEP 442.

TEP 444 Student Teaching in Single Subjects, Block 1 (6)

Supervised teaching in University-approved classroom. The teacher candidate will experience initial teaching responsibilities in culturally diverse public school settings. Prerequisite: Completion of concurrent enrollment in TEP 407, 408, 413 and admission to program required.

TEP 445 Student Teaching in Single Subjects, Block 2 (12)

Supervised teaching in University-approved schools. Concurrent enrollment in TEP 446. Prerequisite: Admission to student teaching.

TEP 446 Synthesis of Single Subjects Student Teaching (3)

A synthesis of knowledge and experiences provided in the single subjects program: organization, management, methodology, materials, and the professional rights and relations of teachers. Includes preparation for employment. 2 lectures, 1 two-hour activity. Concurrent enrollment in TEP 445.

TEP 450 Topics in Education (1-3)

Emphasis on discussion and analysis of selected topics in education. 3 lectures. Prerequisite: consent of instructor.

TEP 451 Minority Group Children (3)

Foundational study of ethnic minority cultures as they relate to the teaching-learning process. Research, principles, and practices. 3 lectures.

TEP 452 Public School Curriculum (3)

An in-depth study of the fundamentals and theory of public school curriculum practices. Special emphasis given to curriculum planning for the classroom teacher. 3 lectures.

TEP 453 Perspectives of Reading (3)

In-depth study of selected reading approaches, the reading process, and investigation of the interrelationships of the reading act to cognitive processes and language development. Practical analysis of classroom practices and procedures. 3 lectures. Prerequisite: TEP 411.

TEP 454 The Exceptional Child (3)

An introduction to the understanding of children classed as exceptional for educational purposes. 3 lectures.

TEP 455 Field Work in Early Childhood Education (2)

Field experience in early childhood programs with consultation with University supervisor. Exposure to an overall view of the teaching-learning activities in early childhood program. 1 lecture, 2 activities.

TEP 456 Early Childhood Education Foundations (3)

The stages of personal and social development of children with particular focus upon the pre-school years and the primary grades. Concepts of human growth with implications for classroom practices, and for developing school programs. 3 lectures.

TEP 457 Instructional Media for The Classroom (3)

Introduction to instructional media for classroom use. Familiarization with equipment. Production of materials. Curriculum integration. 2 lectures, 1 two-hour activity.

Graduate courses are listed in the graduate section of the catalog. See p. 383.

UNIVERSITY PROGRAMS

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International Programs

IPC 199 Foreign Study Topics: (Course Title) (1-6)

Study undertaken in a foreign university under the auspices of the California State Colleges International Programs.

IPC 399 Foreign Study Topics: (Course Title) (1-6)

Study undertaken in a foreign university under the auspices of the California State Colleges International Programs.

IPC 599 Foreign Study Topics: (Course Title) (1-6)

Graduate study undertaken in a foreign university under auspices of the California State University and Colleges International Programs. Maximum credit 9 units.

Learning Resources Center

The Learning Resources Center, located in the University Library Building, provides a University-wide student service devoted to further developing students' academic proficiencies by a variety of methods. It is a facility which provides students with specialized personnel, equipment, and materials. Programs at the Center emphasize developmental reading (including speed reading), study skills, and writing. Tutoring in most subject areas is usually available by arrangement.

The Learning Resources Center encourages all students to further refine their academic competencies by arranging for personalized programs designed to meet individual needs. Each student proceeds at his own pace, and receives periodic evaluationf of his progress.

Another purpose of the Learning Resources Center is to provide extensions of academic departmental programs by placing in the Center materials prepared by faculty members which pertain to their own courses.

Library

LIB 103 Library and Bibliographical Techniques (3)

Fundamentals of finding information in the library and of obtaining information from government and commercial sources. General and specialized bibliographical citations. 3 lectures, 1 workshop.

INSTITUTE FOR ADVANCED SYSTEMS STUDIES

Lenard R. Troncale, *Coordinator*

The institute program gives students the tools to organize solutions to complex environmental and other systems problems. Course work emphasizes innovations such as independent study, video-taping, internships, discussion groups and self-pacing through audio-tutorial instruction. Many societal problems have become too complex to be understood and solved by single specialists. Institute courses develop skills and knowledge needed to coordinate the efforts of teams of experts. Large and small firms from business, industry, and government have indicated interest in hiring graduates trained in environmental problem solving. Students enrolled in institute courses have the opportunity to earn credit by joining task forces working on design of an eco-house. The eco-house may become a self-contained living unit which applies high technology to reduce resource consumption.

The Institute for Advanced Systems Studies has three major objectives: (1) training students in interdisciplinary methodology, (2) organizing students and faculty members into task forces for designing a new type of dwelling, and (3) conducting basic research in general systems theory. The institute is staffed by 25 faculty fellows from many departments and all schools of the university. Associate Fellows from business, industry and government also participate in institute activities.

Course Descriptions

MDT 101 Man and Environment—Resources (4)

The dynamic relationships between man and earth's resources: a multidisciplinary approach to theory with problem-oriented activities. 2 lecture-discussions, 2 two-hour activities.

MDT 102 Man and Environment—Organization (4)

How political, economic and cultural organizations affect man and the environment, particularly in relationship to earth's resources: a multidisciplinary approach to theory with problem-oriented activities. 2 lecture-discussions, 2 two-hour activities.

MDT 103 Man and Environment—Values (4)

Development of man's value systems in relation to social organizations, technology and the environment: a multidisciplinary approach to theory with problem-oriented activities. 2 lecture/discussions, 2 two-hour activities.

MDT 150 General Morphology (4)

General principles of morphology and their application to various fields. Dimensionless morphology in mathematics and the natural sciences. Mathematical structures and concepts developed morphologically to illustrate the method. 4 lectures. Prerequisite: approval of instructor.

MDT 210 Techniques for Analysis of Meetings for Action (4)

Analysis of meeting parameters which inhibit effective multidisciplinary information transfer and decision-making. Emphasis on multidimensional approaches for overcoming these obstacles. Activity provides practice in application of newly-developed techniques. 2 lectures, 2 two-hour activities including internship. Prerequisite: sophomore standing or instructor's approval.

MDT 220 Active Forces in Culture (4)

Investigation of cultural forces in change. Interrelationship of societal art forms and technology. Influence of aesthetics on attitudes and behavior in societal systems. Emphasis on the detection and utilization of current cultural trends for environmental improvement. 3 lectures, 1 two-hour activity.

MDT 230 Survey of Organizational Special Interests (4)

Survey of organizations active in systems problems. Analyses of their special interests. Description, categorization and evaluation of organizational structures. Case studies and potential use of existing special interest groups as a resource for solving multidisciplinary problems. 3 lecture/discussions, 1 two-hour activity, including internship. Prerequisite: requires instructor's approval.

MDT 240 Law as an Active Force (4)

Law applied to optimizing and correcting systems; survey of legislation and case law dealing with environmental problems. Emphasis on the special difficulties in writing laws of a multidisciplinary nature. 2 lectures, 2 two-hour activities including internship.

MDT 250 Multimetrics (4)

Techniques and methods of measurement systems; comparative uses of metrics; design and application of metrics to human and environmental problems. Emphasis on exploration of the application of metric principles to the evaluation of qualitative differences. 3 lectures, 1 two-hour activity. Prerequisite: Statistics.

MDT 311 General Systems Theory: Hierarchies (4)

Introduction to hypothesis of natural systems evolution and optimization. Origins of hierarchical structure underlying established sciences on the astronomical, physical, chemical, biological, social and artificial levels. 3 lectures, 1 two-hour activity. Prerequisite: BIO 115, SCI 213, and MAT 109.

MDT 312 General Systems Theory: Testing Hypotheses (4)

Identification of trends observable in level-to-level evolution of natural hierarchies; emphasizes rigorous testing of the validity of the general systems field axioms abstracted from these trends. 3 lectures, 1 two-hour activity. Prerequisite: MDT 311.

MDT 313 General Systems Theory: Man-Made Systems (4)

Applications of systems field axioms to the study of man-made systems malfunctions. Use of axioms to engineer optimal societal system. 3 lectures, 1 two-hour activity. Prerequisite: MDT 312.

MDT 350 Introduction to Systems Theory (4)

Evolution of systems approach to problem solving; comparative overview of systems methodology. Case studies illustrating successful versus unsuccessful applications of the systems approach to governmental, biological, social, economic, and technological problems. 4 lectures. Prerequisite: MAT 236 and 259.

MDT 351 Techniques of Systems Analysis (4)

Modeling of complex systems; analog and digital simulation; critical path methods; optimization methods; case studies illustrating applications of systems analysis techniques and design of new techniques. 3 lectures, 1 three-hour laboratory. Prerequisite: MDT 350.

GRADUATE PROGRAM ANNOUNCEMENTS

1975-76



CALIFORNIA STATE POLYTECHNIC UNIVERSITY, POMONA

the california state university and colleges

GRADUATE PROGRAM ANNOUNCEMENTS

This section of the catalog provides information to prospective and continuing graduate and post-baccalaureate students. Included in this section is information regarding admission criteria, graduate and post-baccalaureate academic requirements, and programs leading to master's degrees offered by the academic schools and the Teacher Preparation Center. It includes descriptions of all graduate-level courses offered by the university in those departments and schools with master's degree programs.

The Graduate Council

The Graduate Council consists of two representatives of the faculty from each of the academic schools and the Teacher Preparation Center and ex-officio members from appropriate areas of the university. The council is advisory to the graduate dean in matters dealing with curriculum, graduate student affairs, graduate studies policy, and other areas related to the university's graduate and post-baccalaureate programs.

(Term expires at the end of the academic year shown in parentheses.)

Harry A. Anthony (1974-75)
School of Environmental Design

Stanley L. Bassin (1975-76)
School of Arts

John R. Biddle (1976-77)
School of Engineering

Charlotte A. Bray
Graduate Office, *Secretary*

George Gutnikov (1975-76)
School of Science

Eugene K. Keating (1975-76)
School of Agriculture

Robert D. Marshall
University Library, *ex officio*

Robert L. Maurer
Dean of Graduate Studies and Research, *Chairman*

Gilbert J. McKee, Jr. (1974-75)
School of Business Administration

Paul Peterson (1976-77)
School of Agriculture

Ruth Petit (1976-77)
Teacher Preparation Center

George M. Platner (1974-75)
Teacher Preparation Center

Martin F. Stoner (1974-75)
School of Science

Mark J. von Wodtke (1975-76)
School of Environmental Design

Gustav N. Wassel (1975-76)
School of Engineering

(1976-77)
School of Business Administration

Lillian Wilds (1974-75)
School of Arts

MASTER'S DEGREES AND CREDENTIALS OFFERED BY THE UNIVERSITY

All graduate study in the university is under the general direction of the Dean of Graduate Studies and Research. The advanced programs are the products of the faculties of the academic schools and the Teacher Preparation Center. The graduate and post-baccalaureate programs offered at the university are as follows:

Master of Architecture
Master of Science in Biological Sciences
Master of Business Administration
Master of Science in Business Administration
Master of Science in Chemistry
Master of Science in Economics
Master of Arts in Education
Master of Engineering
Master of Arts in English
Master of Landscape Architecture
Master of Science in Mathematics
Master of Science in Physical Education
Master of Urban Planning
Multiple Subject Teaching Credential
Single Subject Teaching Credential
Reading Specialist Credential
***Early Childhood Education Specialist Credential**
***Bi-lingual/Cross Cultural Specialist Credential**

*These programs have been submitted to the Commission for Teacher Preparation and Licensing, but as of the date of publication of this catalog **have not been approved.**

Graduate and Post-Baccalaureate Admissions

Admission as a Graduate or Post-Baccalaureate Student

In order to register for post-baccalaureate or graduate study, an applicant must file complete application forms and be accepted by the admissions office. In addition, two sets of official transcripts must be *received* by the university no later than two weeks preceding the last day for payment of fees. The opening of the application period for each quarter is indicated in the calendar.

Applicants must request the registrars of all colleges or universities attended to forward official transcripts to the admissions office. Transcripts will not be accepted directly from the applicant. The student should carry his own copies of his transcripts to show to the department faculty when requesting advice concerning either an advanced degree or a credential.

Post-Baccalaureate Standing: Unclassified

For admission to unclassified post-baccalaureate standing, an applicant must: (a) hold an acceptable baccalaureate degree from an institution accredited by a regional accrediting association or have completed equivalent academic preparation as determined by an appropriate campus authority; (b) have attained a grade-point average of at least 2.5 (on a five-point scale) in the last 60 semester (90 quarter) units attempted; and, (c) have been in good standing at the last college attended. Admission to this University with post-baccalaureate unclassified standing does not constitute admission to graduate degree or credential curricula.

Post-Baccalaureate Standing: Classified

An applicant who is eligible for admission to the University in unclassified standing may be admitted to classified post-baccalaureate standing for the purpose of enrolling in a particular post-baccalaureate credential or certificate program, provided that such additional professional, personal, scholastic, and other standards, including qualifying examinations, as may be prescribed for the particular

program by the appropriate campus authority are satisfied.

Graduate Standing: Conditionally Classified

An applicant who is eligible for admission to the University under the unclassified post-baccalaureate standard above, but who has deficiencies in prerequisite preparation which in the opinion of the appropriate campus authority can be met by specified additional preparation, including qualifying examinations, may be admitted to an authorized graduate degree curriculum with conditionally classified graduate standing.

Graduate Standing: Classified

An applicant who is eligible for admission to the University in unclassified or conditionally classified standing may be admitted to an authorized graduate degree curriculum as a classified graduate student if s/he satisfactorily meets the professional, personal, scholastic, or other standards for admission to the graduate degree curriculum, including qualifying examinations, as the appropriate campus authority may prescribe. Only those applicants who show promise of success and fitness will be admitted to graduate degree curricula, and only those who continue to demonstrate a satisfactory level of scholastic competence and fitness shall be eligible to proceed in such curricula.

Limitations on Admissions

The admission of post-baccalaureate students with no degree or credential objective may be limited or suspended because of limitations in facilities or staff . Master's degree or credential programs may be limited in enrollment whenever the lack of facilities and/or staff warrants.

Second Bachelor's Degree

Admission to seek an additional bachelor's degree for holders of such degrees is processed by the admissions office in the same way as other undergraduate admissions.

Continuing Baccalaureate Students

A student who holds a baccalaureate degree from this university and plans to continue as a post-baccalaureate or graduate student must apply for readmission. This should be done no later than the final quarter of the senior year. The necessary transcripts will generally be on file, but it is the student's responsibility to be sure he has met requirements for re-admission. Such students must meet departmental admission criteria and are subject to the same enrollment quotas and application fees as are new applicants.

Former Students

A former student returning to the university after an absence of more than one year must file a complete application for admission and pay the application fee.

Admission from Non-Accredited Schools

An applicant who is a graduate of a nonaccredited school who gives evidence of unusual promise and superior background may petition the department concerned for conditional graduate student status, and if the petition is granted he may proceed in the graduate program.

Foreign Applicants

An applicant from a foreign country should contact the office of admissions or the graduate office at least one year in advance of the quarter in which he seeks admission so that all required materials can be supplied.

Students whose native language is not English must submit the results of the Test of English as a Foreign Language (TOEFL) prior to admission. Foreign nationals who are not graduates of the university will be accepted as graduate students only if they hold a baccalaureate degree from an accredited institution in the United States or Canada or have comparable academic credentials. The admission of foreign students to graduate status may be limited or suspended due to facility or staff limitations.

Test Requirements

Some departments require new graduate students enrolling at this university with a degree objective to take the Aptitude Test of the Graduate Record Examination before or during the first quarter of residence. In some cases, admission will depend upon test scores.

The Admission Test for Graduate Study in Business is required for those who seek the Master of Business Administration degree or the degree of Master of Science in Business Administration. Some departments also require the Advanced Test of the Graduate Record Examination in their subject matter areas. Other departments require a locally developed qualification examination. See the respective departmental sections of this catalog and the chart following.

REQUIRED ADMISSION TESTS

Program	GRE Apt.	GRE Adv.	ATGSB
Master of Architecture			
M.S. in Biological Sci.			
Master of Bus. Adm.			X
M.S. in Bus. Adm.			X
M.S. in Chemistry			
M.S. in Economics	X	X	
M.A. in Education			
Master of Engineering			
M.A. in English			
Master of Land. Arch.	X[1]		
M.S. in Mathematics			
M.S. in Phys. Educ.			
Master of Urban Planning	X[1]		

[1]Under 3.0 undergraduate GPA.

GRADUATE AND POST-BACCALAUREATE SCHOLASTIC REQUIREMENTS

Graduate Studies Program

STANDARDS OF GRADUATE STUDY

Graduate study deals with more complex ideas and demands more sophisticated techniques, searching analysis, creative thinking and time than undergraduate study. The research required is extensive in both primary and secondary sources and a high quality of writing is expected.

A student seeking a graduate degree enjoys certain privileges not available to other students and is obligated to follow some procedures not required of those pursuing other objectives. Careful and prompt attention to required procedures should be followed in pursuing a master's degree program to prevent unnecessary confusion and delay. Although advisory services are provided to assist students, *the student alone is responsible for following the procedures and completing the steps required in his program.* Failure of an adviser to remind a student of a requirement or deadline date is not acceptable as a basis for waiver of the requirement. Requirements for advanced degrees, both procedural and substantive, may be waived only upon a written request of the student and/or committee concerned and approved by the Dean of Graduate Studies and Research, and by the academic school dean, if required by school policy. Petition forms are available in department offices and the Graduate Office.

A student who wishes to enroll in post-graduate courses before his transcripts or test scores have been transmitted to the department concerned may receive unofficial advisement by making an appointment with a graduate adviser at the appropriate department or school office. If the student brings his own copies of transcripts with him to the conference, his adviser can be specific in his suggestions, but the adviser can make no formal decisions on the basis of hand-carried transcripts.

REQUIREMENTS FOR MASTER'S DEGREES

Graduate programs are based upon adequate preparation at the undergraduate level. A student who plans to become a candidate for a master's degree must hold a bachelor's degree substantially equivalent to that of California State Polytechnic University, Pomona in the discipline in which he intends to do his advanced work, or he must be prepared to undertake ad-

ditional work to make up any deficiency.

A student seeking a master's degree at this university will generally submit an acceptable thesis or project or successfully pass a comprehensive examination.

GENERAL REQUIREMENTS

The requirements for graduation depend upon the master's degree program undertaken and upon the major field. The following requirements apply to all master's degrees offered by the university.

1. The program for the one-year master's degree must consist of not less than 45 units in courses numbered 300 and above with a minimum of 24 units of 500- and 600-level courses completed at the university consistent with departmental requirements. Work unacceptable for graduate credit in the institution where it was taken is not acceptable for graduate credit at this university.
2. At least 32 units of upper-division and graduate-level offerings must be completed in residence at this university.
3. Two-year master's degrees have higher unit requirements than specified above. See detailed information in the appropriate sections in this catalog.
4. A candidate for the master's degree must earn a 3.0 (B) average in all graduate work taken at this university and in his degree program. No course with a grade lower than "C" may apply toward the fulfillment of degree requirements.
5. A thesis or project or a comprehensive examination is required in most programs.
6. A favorable vote of the department, school, or center faculty is required before the degree may be conferred.
7. A graduate student who expects to receive a degree at the end of any quarter must complete an application for graduation in the Evaluations Office prior to the deadline listed in the academic calendar. Graduates will not be permitted to participate in commencement ceremonies until all degree requirements have been met. Degree requirements are outlined in departmental sections of this catalog. Each student seeking a master's degree will be held responsible for meeting requirements applicable to the program of his choice and to fulfilling general master's degree requirements.

DEGREE PROGRAM

At the time a student is admitted to a master's degree curriculum, he should arrange with his adviser to prepare an official program. If he is admitted as a classified graduate student, he should accomplish this step as early in the first quarter of attendance as possible. A program must be prepared and submitted for approval no later than the date the student applies for advancement to candidacy.

When the program has been approved, a copy is sent to the student and to the adviser who has approved it. The original is retained in the Evaluations Office and is used as the official record of the student's progress toward the degree. It will be updated at least once a quarter, by means of a computer printout of the complete record.

The program must meet the following specifications:

1. It must comply with the general requirements outlined above and with departmental requirements listed in this catalog.
2. The complete program may be chosen from within the offerings of the major department or it may include offerings drawn from other fields acceptable to the major adviser or committee. In developing the program, the student and adviser will seek to plan a meaningful pattern of courses focused upon the objectives of the major and the student. If the candidate has deficiencies or lacks prerequisites to enroll in certain courses necessary to his program, he will be expected to complete them in addition to the minimum requirements of his approved master's degree program. Advisers will permit the use of already completed courses in a master's degree program only if they clearly fit into the requirements of the student's curriculum.
3. No course in teaching methods or directed teaching may be included in a master's degree program.
4. No more than nine quarter units of credit for thesis or project may be included. The master's degree program must be approved by the candidate's departmental adviser and verified by the Dean of Graduate Studies. The approved program is an official agreement between the institution and the candidate.

ELECTION OF REGULATIONS

Regulations governing requirements for a master's degree become effective when classified graduate student status is achieved.

A graduate student remaining in continuous attendance after achieving classified status may elect to meet the degree requirements in effect either at the time of his classifiction or at the time he completes the last requirement for the degree, except that substitutions for discontinued courses may be authorized or required by the department offering the degree.

GRADUATE ENROLLMENT PRIORITIES

Departments with high graduate enrollments may assign priorities to students wishing to enroll in graduate-level courses. Applicants for a master's degree who are in the last quarter of residence have first priority; other classified graduate and post-baccalaureate students, degree or credential, have second priority; conditional and unclassified graduate and post-baccalaureate students have third priority. Nonobjective unclassified graduate students are admitted on a space-available basis.

MAXIMUM UNIT LOAD

The normal maximum load for graduate students is 16 units. Exceptions may be made through the advance approval of a Petition to Carry an Excess Load by the dean of the school in which the student is registered. Maximum program limits will be waived only upon presentation of evidence of the student's ability to successfully complete such a group of courses.

THESIS OR PROJECT

If a thesis or project is included in the degree program, the student may register for 695 (project) or 696 (thesis) only after he has been advanced to candidacy. Before registration for thesis, the student shall confer with his thesis adviser and have an officially appointed thesis committee and a tentative subject. Each student registering for thesis or project is required to register each succeeding regular quarter until the work is complete in order to receive university services. During any break in residence, either nonenrollment or leave of absence, a student may not use university facilities or receive faculty assistance. When a student has failed to maintain resident status through registration or leave of absence after commencing a thesis or project, his readmission to the program will require departmental approval.

A thesis or project in the official master's degree program will carry not less than three nor more than nine units of credit depending upon departmental policy. When the thesis has been completed, the committee has signed the approval page, and there has been library clearance of the thesis, the credit for course 696 will be submitted by the professor to be recorded on the official transcript. Deadline dates for submission of the thesis to the Graduate Office can be found in the academic calendar. Projects must be completed on the same time schedule but may have separate departmental rules for approval and submission.

The student must submit the approved original copy of the thesis to be deposited in the library. Arrangements for binding are made through the Graduate Office. Further information is contained in the thesis instructional manual available at the Graduate Office and in department offices.

The Cal Poly Kellogg Unit Foundation, Inc., has made available a loan fund for students who find it impossible to finance master's degree thesis and project costs. Up to $100 may be borrowed on a short-term basis. The loan is limited to direct costs for this purpose including research or other materials and reproduction and binding. Applications may be made through the university financial aids office.

FOREIGN LANGUAGE

A reading knowlege of a foreign language may be required by some departments. A student should consult his adviser or the section of this catalog in which requirements for his degree field are given.

TIME LIMIT

The graduate degree program of not less than 45 units shall be completed within five to seven years from the time the first course which applies to the degree requirements is started. This time limit, at the option of the university, may be extended for students who pass a comprehensive examination in the entire subject field.

ADVANCEMENT TO CANDIDACY

Requesting advancement to candidacy is the responsibility of the student. The following qualifications and procedures are necessary:

1. Scholarship—At the time the student applies for candidacy, his grade point average for all graded degree program courses must be at least 3.0 (B). In addition, his grade-point average for all graded courses taken at this university subsequent to receipt of his bachelor's degree must be at least 3.0 (B). Courses not within the degree time limit will not be included when computing this average. A student may not be advanced to candidacy before he has completed at least nine units of work, including at least one graduate level course, which are acceptable to the school, department, or center in which the advanced degree is sought. Application should be made no later than the quarter in which a student completes 18 units of credit in his degree program or 40 percent of the required credit in a professional program.
2. The student should initiate an application for advancement to candidacy. Forms are available at the Graduate Office and in departmental offices.
3. Along with the completed request for candidacy, the student will submit an official master's degree program form if one is not already on file.
4. When action has been taken on a graduate student's application for advancement to candidacy, the student will receive a letter from the Dean of Graduate Studies and Research informing him of the action. If the application is denied the reasons for denial will be stated.

Academic Policies

SCHOLARSHIP REQUIREMENTS

Graduate students, classified or conditional, may be disqualified from the university if their postgraduate grade-point average on work attempted falls below 3.0 after one quarter of attendance.

Post-baccalaureate classified students may be disqualified from the university if their post-baccalaureate grade-point average on work attempted falls below 2.75 after one quarter of attendance.

MINIMUM GRADE POINT AVERAGE

If a graduate student completes his master's degree approved program with less than a 3.0 (B) average, the student's major department may (1) terminate his program, or (2) require him to take additional courses in an attempt to raise his program grade point average to the minimum 3.0. When the student's major department recommends that he be allowed to do the latter, the additional courses selected must:

1. Be at least two courses at the 500-699 level and total not less than six quarter units.
2. Apply directly to the student's master's degree objective, although they need not be drawn from offerings in the student's major department.
3. Be new courses (courses previously completed but not originally

listed in the master's degree program may not be used).

If the student fails to earn the minimum 3.0 grade point average on completion of the revised master's degree program as outlined above, his program will be terminated without award of the master's degree.

Grades earned at another institution may not be used to offset grade point deficiencies in courses taken at this university.

TRANSFER CREDIT

If accepted by the faculty of the discipline involved, graduate credit from another accredited institution may be applied toward the master's degree.

Correspondence courses may not be used to satisfy degree requirements. Extension course work may be used to satisfy prerequisites or degree requirements when such work is acceptable to the department or school offering the master's degree. See the appropriate sections for special regulations applying to professional master's degrees (more than 45 units).

COURSES TAKEN BY UNCLASSIFIED STUDENTS

Courses taken in non-objective, unclassified post-baccalaureate standing will be accepted in fulfillment of degree requirements only if the department and graduate adviser accept them on an advanced program. Such work taken when the student is not enrolled in a program must average "B" or better with no grades below "C" if the student wishes consideration for classified status for an advanced degree.

ENROLLMENT IN A NEW MASTER'S DEGREE PROGRAM

In special instances, a disqualified graduate student may be permitted to enroll in a different graduate program. All cases involving the reinstatement of disqualified graduate students must have the approval of the graduate committee in the new department.

A student in good standing in a master's degree program may transfer to another program with the approval of the new department. The amount of credit transferred from one program to another will be determined by the new department. Credit earned at this university in one master's degree program may be carried from that program to another.

CONCURRENT DEGREES

A student may not enroll for a bachelor's and a master's degree or for two master's degrees concurrently.

CHANGES IN OBJECTIVE

A change of objective may be one or more of the following:

1. Changing from one major field to another for the master's degree.
2. Adding a credential objective to an existing master's degree objective.
3. Adding a master's degree objective to a credential objective.
4. Changing from no objective to some stated objective as listed in this catalog.

The evaluation of credits transferred to the university is based primarily upon the student's objective. Thus, a change in objective may affect the ac-

ceptance of transfer credits. A candidate who wishes to change his objective from that indicated on his original application must follow these procedures:

1. Obtain a graduate student academic petition from the Graduate Office or department office.
2. Obtain the signature of the graduate coordinator in the department to which he plans to transfer.
3. Submit a new graduate program in the new discipline.

A student who discontinues working for a mster's degree in one department to undertake master's work in another department shall replace the first master's program, if he has one, by one in the new field. Degree credit may be transferred from the original program, but the transfer of credits must be approved by the new department.

GRADING SYSTEM

The university employs the following grading system for graduate courses:

A—Outstanding work, representing effective representation, unusual competence, and high skill.

B—Excellent work, meeting full requirements for performance at the graduate level.

C—Meets minimum requirements of the course; acceptable for graduate credit.

F—Fail; below minimum requirements of graduate courses. "D" work in a graduate course is assigned a grade of "F".

I—Incomplete.

AU—Audit (no credit).

SP—Satisfactory Progress.

W—Withdrawal.

RD—Report Delayed.

See undergraduate section on grades for an explanation of I, SP, RD, and W.

Grade points are assigned as follows:

A—4 points	I—0 points
B—3 points	F—0 points
C—2 points	SP—0 points

When a grade of "D" is assigned for undergraduate course work taken by a graduate student, neither the credit nor the content of that course shall apply to a master's degree.

ARCHITECTURE

Master of Architecture

In the Department of Architecture, School of Environmental Design

Richard Chylinski, *Chairman*

Architecture Graduate Studies Coordinator

Richard Chylinski

The Department of Architecture offers a two-year program of study which leads to the primary professional degree, Master of Architecture. This program provides an opportunity to focus one's graduate study on the professional concerns of contemporary architecture while exploring the research areas that are molding the future. The department accepts students from three different backgrounds into the master's degree program (see below). Depending on a student's prior studies and experiencs the emphasis, requirements, and prerequisites will vary. Course scheduling patterns are provided to guide students with varying backgrounds and interest.

One pattern is planned for students holding a five-year Bachelor of Architecture degree. Such a student is given an opportunity to specialize in architectural design, urban design, or architectural construction administration. This pattern of courses encourages an innovative, self-directed approach and is therefore best suited for those students who have demonstrated in their undergraduate work the self-discipline, initiative, and creativity necessary to accomplish specialized study.

The second pattern is for students holding a four-year Bachelor's degree with a major in Architecture. This student, who has completed the general foundation work of architecture, is given an opportunity to undertake two years of concentrated study in architecture. This pattern of courses is designed for those who exhibit qualities of leadership and concern for the environment required of a professional architect.

The third pattern is planned for students holding a four-year Bachelor's degree with a major in a field other than architecture. This pattern gives an opportunity to broaden one's education to include professional training in architecture. The pattern of courses is planned to guide those who have proved their capacity in undergraduate study as well as showing potential ability to adapt their knowledge to architecture. As a transition into the master's degree program the non-architecture background student is generally required to take a minimum of four quarters of undergraduate ar-

chitecture course work at this university. This work is taken prior to entry in the two-year master's program. Such a student is generally required to commence study in the summer quarter.

These three patterns of courses are flexible and are intended as guides to help graduate students reach objectives as efficiently as possible. In all cases the patterns are sub-groupings of the courses within the single Master of Architecture program.

Admission to the Program

For admission to the Master of Architecture program as a classified graduate student an applicant must have received a baccalaureate degree and have an overall undergraduate grade point average of at least 2.80 and have attained at least a 3.00 grade point average in the last 90 quarter or 60 semester hours of work. An applicant who does not meet these criteria can be considered on a conditional basis if one can demonstrate compensating qualifications.

In addition to the application which must be submitted to the University Admissions Office, the Department of Architecture requires the following: (1) a statement of purpose, (2) three letters of recommendation, (3) a portfolio of creative work and (4) a personal interview, if distance permits. Applicants should contact the Department of Architecture for the dates by which the above material must be submitted. Decision on acceptance or non-acceptance shall be mailed on or before April 15. Admission is for the ensuing fall quarter only, with the exception that those with a non-architecture background may be required to commence study in the summer quarter.

Following admission, the student and his or her advisory committee will plan a program of study listing all courses and other requirements which the student must fulfill to earn the Master of Architecture degree. The curriculum specified in the program may be altered only by written petition which shall be submitted in accordance with university regulations.

Requirements

1. A minimum of 72 quarter units of graduate work must be completed in the graduate degree program; of these, at least 60 units shall be at the graduate level. No work below the 400 level and no more than 6 quarter units of 400-level work will receive graduate credit.
2. No more than eight quarter units of graduate credit, graded "B" or better, earned prior to entering the graduate program and not applied to a previous degree, may be transferred toward the degree.
3. No more than eight quarter units of graduate credit, graded "B" or better, earned at other accredited institutions may be used toward the degree.
4. The minimum grade in architecture courses which will be accepted for credit toward the degree is "C". Any course in which a lower grade is received must be retaken. An

overall average of "B" (3.0) or better must be maintained.

5. A student must be enrolled in a minimum of 6 and a maximum of 12 quarter units of work per quarter.

6. A final project or thesis is required. It may be in the form of a design project or a written thesis. Three faculty members will be chosen to serve as the project or thesis committee. The student will submit a written proposal to this committee as well as to the departmental Graduate Studies Committee and receive approval of it before enrolling in the thesis or project course.

Curriculum

Required Courses

ARC 511	Architectural Design	6
ARC 512	Architectural Design or	
ARC 591	Directed Study	6
ARC 513	Architectural Design or	
ARC 592	Directed Study	6
ARC 531	Architectural Admin. or Approved Elective	4
ARC 561	Architectural Seminar	2
ARC 562	Architectural Seminar	2
ARC 563	Architectural Seminar	2
ARC 611	Architectural Design	6
ARC 622	Individual Studio	4
ARC 623	Individual Studio	4
ARC 661	Architectural Seminar	2
ARC 662	Architectural Seminar	2
ARC 663	Architectural Seminar	2
ARC 671	Topics in Architecture	4
ARC 672	Topics in Architecture	4
ARC 695	Project or	
ARC 696	Thesis	4
Approved	Electives	12
		72

Electives

Elective courses will be selected with the approval of the student's adviser and related to particular areas of specialization.

Graduate Course Descriptions

ARC 511, 512, 513 Architectural Design (6) (6) (6)

The interaction of design methods, user needs, and site constraints explored in design projects. Lecture-discussimn, 2 hours, laboratory, 12 hours. Prerequisites: ARC 511 for ARC 512; ARC 512 or ARC 591 for ARC 513.

ARC 531 Architectural Administration (4)

Work experience in the office of a registered architect chosen to teach the varied aspects of professional practice. 10 hours per week.

ARC 561, 562, 563 Architectural Seminar (2) (2) (2)

Seminar programs developed to discuss relevant environmental, planning, architectural, administrative, and technological issues. Seminar, 2 hours.

ARC 591, 592 Directed Study (6), (6)

Directed study on a subject of interest to the student and important to the understanding of architecture. Prerequisites: Prior approval of proposal and ARC 511 for ARC 591; ARC 512 or ARC 591 for ARC 592.

ARC 611 Architectural Design (6)

The interaction of design methods, user needs, and site constraints explored in design projects. Lecture-discussion, 2 hours, laboratory, 12 hours. Prerequisite: ARC 513 or ARC 592.

ARC 622, 623 Individual Studio (4) (4)

Studio work on a subject of interest to the student demonstrating acquired stills and knowledge. Laboratory, 12 hours. Prerequisite: ARC 611.

ARC 661, 662, 663 Architectural Seminar (2) (2) (2)

Seminar programs developed to discuss relevant environmental, planning, architectural, administrative, and technological issues. Seminar, 2 hours.

ARC 671, 672 Topics in Architecture (4) (4)

Topics of importance to architecture explored in readings, lectures, and discussions. Lecture-discussion, 4 hours.

ARC 695 Project (1-4)

Development of a concluding project demonstrating the student's skills and knowledge. Maximum credit 8 units. Prerequisite: ARC 611.

ARC 696 Thesis (1-4)

Development of a concluding thesis demonstrating the student's skills and knowledge. Maximum credit 8 units. Prerequisite: ARC 611.

ARC 699 Master's Degree Continuation (0)

Registration required in any quarter following final assignment of SP in continuing work in which student intends to use facilities of the university. Registration permitted instead of leave of absence when student plans to use university facilities. Prerequisite: Advancement to candidacy for master's degree.

Upper-division (400-level) courses applicable to the master's degree will be found in the Departments of Architecture, Landscape Architecture, and Urban Planning undergraduate sections of the catalog. See pp. 285, 288, and 292.

BIOLOGICAL SCIENCES

Master of Science in Biological Sciences

In the Department of Biological Sciences, School of Science

Ralph W. Ames, *Chairman*

Departmental Graduate Committee

Martin F. Stoner, *Chairman, Botany*

Ronald S. Daniel, *Biology*

Don C. Force, *Zoology*

Brigitte H. Goehler, *Microbiology*

George W. Martinek, *Biology*

Raymond Z. Riznyk, *Botany*

Fred Shafia, *Microbiology*

Timothy W. Brown, *Zoology*

The Master of Science degree program in the Biological Sciences will enhance the knowledge and competence of the candidate in his field of specialization as well as develop his potential for continuing self-directed study and research. The curriculum is planned to provide theoretical, technical, and practical studies which will increase the student's knowledge of his discipline, educate him in research techniques, and promote his familiarity with and critical evaluation and use of the scientific literature. Graduate study specializations may be elected in the disciplines of the Biological Sciences: biology, botany, microbiology, and zoology.

Admission to the Program

Applicants for admission to this program must have a bachelor's degree with a major in one of the disciplines of the biological sciences or a bachelor's degree in a related field with 45 quarter units of upper division courses in biological sciences. These courses must be comparable to those required for a baccalaureate major at this university.

An undergraduate grade point average of 2.5 or better with a 3.0 average in all upper division work is required for admission to the master's degree program in biological sciences. An applicant not meeting these standards may be admitted on condition with the approval of the departmental graduate committee. He must gain the committee's approval to be admitted to the degree program by meeting the requirements of his conditional admission in the time stipulated.

The student with his advisory committee will develop a program in his selected discipline of biology based upon his interests and preparation. The student's approved program will include required core courses, a selection of additional formal courses in a

specialization, independent study, and an appropriate thesis. It will normally constitute 45 to 50 quarter units of credit.

To be advanced to candidacy for a master's degree in this department, a student must apply to the departmental graduate committee through his major professor. When the student's candicacy has been approved by the departmental graduate committee, he will be notified in writing by the Dean of Graduate Studies.

Requirements

1. The degree program must include a minimum of 45 quarter units, including no more than 9 acceptable units transferred from another graduate institution. No more than 21 units may be in approved 400-level courses.
2. All requirements specified by the university and by the student's thesis committee must be met.
3. The student must complete his program based upon the curriculum outlined below.
4. An acceptable thesis must be completed and a final copy submitted for binding in accordance with university regulations.
5. A final oral examination must be successfully completed.

Curriculum

Required Courses

	Units
Seminar in Biology (BIO 680)	3
Research in Biological Sciences (BIO 690)	6
Thesis (BIO 696)	3
	12

Courses in a Specialization

To be selected with consent of the student's thesis committee from 500 and 600-level courses, 33-38 units with not to exceed 21 units of approved 400-level courses.

Total	45-50

Graduate Course Descriptions

BIO 510 Cytogenetics (3) F

Nuclear and cytoplasmic structures and phenomena as related to inheritance. Lecture-discussion, 2 hours, laboratory, 3 hours. Prerequisites: BIO 303; BIO 423 recommended. *Martinek.*

BIO 520 Endocrinology (4) Sp

Study of the endocrine glands and their role in growth development, metabolic regulation, and reproduction in animals. Lecture-discussion, 3 hours, laboratory, 3 hours. Prerequisites: CHM 327, ZOO 324 and/or consent of instructor. *Garcia.*

BIO 525 Ecology of Fungi (4) Sp 1976

Autecology and synecology of fungi in soil, water, atmosphere, living and dead tissues, and other environments; saprophytism; commensualism, mutualism, and parasitism; methods of collection, isolation, and ecological study; some independent study required. Lecture-discussion, 2 hours, laboratory, 6 hours. Prerequiste: BOT 425, BOT 426; BIO 325 or BOT 421 recommended; or consent of instructor. *Stoner.*

BIO 530 Mechanisms of Speciation (3) W

Principles and concepts of evolutionary mechanisms in plants and animals. Lecture-discussion, 3 hours. Prerequisites: BIO 213, BIO 303, BIO 325. *Szijj, Edmonds.*

BIO 535 Advanced Cell Biology (4) W 1976

Molecular, ultrastructural and functional approach to cell biology. Lecture-discussion, 4 hours. Prerequisites: BIO 435, CHM 327, or consent of instructor. *Wu.*

BIO 540 Biogeography (3) W

Principles and concepts of the distribution of plants and animals throughout the world. Origins and dispersal of modern floras and faunas as related to environmental and historical factors. Lecture-discussion, 3 hours. Prerequisites: BIO 213 and BIO 325. *Lint, Szijj.*

BIO 542 Graduate Laboratory (1-3) FWSpSu

Advanced laboratory experience, individually arranged or concurrent with other graduate courses. May be repeated for a maximum of 10 units. Prerequisite: Consent of instructor. *Staff.*

BIO 545 Physiology of Plant Disease (4) Sp 1977

Physiological bases of infectious and non-infectious plant diseases, including aspects of disease development and host-parasite interaction. Lecture-discussion, 2 hours, laboratory, 6 hours. Prerequisites: BOT 322, CHM 327, and BOT 223. *Stoner.*

BIO 548 Advanced Plant Physiology (4) Sp 1976

Selected major aspects of plant water relations, metabolism, and growth. Emphasis on experimental investigations. Lecture-discussion, 2 hours, laboratory, 6 hours. Prerequisite: BOT 322. *Blakely.*

BIO 550 Plant Growth and Development (4) Sp 1977

Hormonal and Environmental control of plant morphogenesis. Lecture-discussion, 2 hours, laboratory, 6 hours. Prerequisite: BOT 322. *Blakely.*

BIO 560 Bacterial Physiology (4) Sp 1977

Physiological characteristics of bacteria with emphasis upon growth, biosynthetic capabilities and regulation of enzyme formation and function. Lecture-discussion, 3 hours, laboratory, 3 hours. Prerequisite: MIC 300 and CHM 327. *Goehler.*

BIO 575 Advanced Topics in Biology (2) FWSpSu

Discussion of advanced topics in biology. Topics selected to correspond with the changes in the field or needs of advanced students. Total credit limited to 6 units with a maximum of 2 units per quarter. Lecture-discussion, 2 hours. *Staff.*

BIO 576 Advanced Immunology (3) W 1976

Principles of immunoglobulin structure and of allotypy and other isoantigenic concepts. Laboratory exercises in the fractionation and purification of serum globulins and in their use to study cytoantigens. Lecture-discussion. 2 hours, laboratory, 3 hours. Prerequisite: MIC 415. *Barlet.*

BIO 577 Electron Microscope Techniques (5) FSp

Techniques in biological electron microscopy including preparation of tissues, shadowing, sectioning, operation of the transmission electron microscope, and darkroom techcniques. Material of particular interest to the student may be studied. Lecture-discussion, 2 hours, laboratory 9 hours. Prerequisite: BI0 423 or consent of instructor. *Daniel.*

BIO 578 Recent Advances in Ultrastructure Research (3) W

Current developments in major fields of ultrastructure research. Lecture-discussion, 3 hours. Prerequisite: consent of instructor. *Daniel.*

BIO 590 Experimental Biology (3) FWSpSu

Lecture series concerning recent research in selected fields of biology; each series to have a subtitle identifying the field. Lecture-discussion, 3 hours. Total credit limited to 9 units. *Staff.*

BIO 680 Seminar in Biology (1-3) FWSpSu

Arrangements to be made with faculty. Topics in disciplines of biology offered according to interests and needs of students. Each seminar to have a subtitle identifying the discipline. 1-3 units in one quarter, maximum of 9 units. *Staff.*

BIO 690 Research in Biological Sciences (1-2) FWSpSu

Selection and completion of a research project under supervision of faculty member. Total credit limited to 6 units with a maximum of 2 units per quarter. Laboratory, 6 hours. *Staff.*

BIO 691 Directed Study (1-3) FWSpSu

Independent study in an area chosen by the student under the supervision and direction of a graduate faculty member. *Staff.*

BIO 696 Thesis (1-3) FWSpSu

Compilation, evaluation, interpretation, and report of research for thesis. Completion of approved, bound thesis. Prerequisite: BIO 690.

BIO 699 Master's Degree Continuation (0)

Registration required in any quarter following final assignment of SP in continuing work in which student intends to use facilities of the university. Registration permitted instead of leave of absence when student plans to use university facilities. Prerequisite: Advancement to candidacy for master's degree or admission to a credential program.

Upper-division courses applicable to the master's degree will be found in the Biology, Botany, Microbiology, and Zoology undergraduate sections of the catalog. See pp. 299, 304, 324, and 327.

BUSINESS ADMINISTRATION

Master of Business Administration

In the School of Business Administration

David G. Foley, *Graduate Program Coordinator*

Graduate Programs Committee

John T. Fleishans, III, *Chairman, Business Management*

Rajinder Arora, *Marketing Management*

Alvin C. Ruppert, *F.I.R.E.*

Koichiro Isshiki, *Data Processing*

Alan R. Senn, *Accounting*

The Master of Business Administration curriculum is designed to provide a two-year program of broad professional development. The objectives are to develop a better understanding of the role of the professional manager and his responsibilities within the firm and society; to assist the student in developing a critical approach to decision making and the ability to speak and write effectively and professionally; to develop skill in interpersonal relations; to develop a sound theoretical understanding of organizations and a management perspective for considering problems and making decisions from the viewpoint of the entire firm, industry, and economy; to develop an increased understanding and awareness of the world in which he lives; and to give him the capability of acquiring additional education by himself.

Admission to the Program and Requirements

After a prospective student has submitted his application for admission to the MBA program to the Office of Admissions, the procedure will be as follows:

1. Admission to the MBA program will be granted on recommendation of the School of Business Administration Graduate Programs Committee to the school dean. Selection will be on the basis of evidence of ability to perform at a high academic level. Minimum requirements for admission to the program are a 3.0 GPA in the last 90 quarter units of courses completed for a bachelor's degree from an accredited college or university and a minimum score of 475 on the Admission Test for Graduate Study in Business. Exceptions may be granted on petition of the applicant, recommendation of the Graduate Programs Committee, and approval by the school dean.
2. The Dean of the School of Business Administration will notify applicants of their selection or rejection.
3. The Graduate Programs Coordinator will serve as adviser to all selected applicants.

4. First year program courses may be waived if equivalent courses have been successfully completed by the student. Waiver will be granted on recommendation of the coordinator and approval of the Graduate Programs Committee.
5. Transfer credits not exceeding nine quarter units completed in a graduate school of an accredited college or university may be accepted for second-year program courses upon recommendation of the coordinator and approval of the Graduate Programs Committee.
6. An advisory program study worksheet for the guidance of the student will be prepared by the Graduate Programs Coordinator when the student is admitted to the MBA degree program. An official degree program will be finalized prior to the student's advancement to candidacy. It will be approved by the Graduate Programs Coordinator and verified by the Dean of Graduate Studies.
7. A grade-point average of B (3.0) or better must be maintained in all course work taken to satisfy degree requirements and in all graduate-level course work taken at this university.
8. Students will be required to show proficiency in elementary calculus prior to enrolling in second-year program courses by completing a course or courses in differential and integral calculus.
9. Candidates for the MBA degree will be required to pass a comprehensive examination before the degree is awarded.

Curriculum

First Year

		Units
GBA 510	Managerial Accounting	4
GBA 511	Managerial Accounting	4
GBA 517	Marketing Strategy	4
GBA 519	Survey of Data Processing	4
GBA 530	Legal Environment of Business	4
GBA 532	Business Statistics and Probability	4
GBA 534	Introduction to Quantitative Methods	4
GBA 535	Management Principles and Policies	4
GBA 546	Fundamentals of Financial Management	4
	Total, First Year	36

Second Year

Required Courses

EC 521	Business Economics	4
GBA 551	Accounting for Executive Administration	4
GBA 561	Seminar in Organization Theory	4
GBA 564	Quantitative Business Analysis	4
GBA 643	Management Information Systems	4
GBA 646	Advanced Financial Management	4
GBA 652	Marketing Seminar	4
GBA 671	Management Seminar	4
	Sub-total	32

Elective Courses

Sixteen elective units may be selected from:

GBA 563	Executive Development	4
GBA 568	Programming for Business Systems	4
GBA 591	Systems Approach	4
HST 610	History of American Business	4
GBA 617	Industrial Dynamics	4
GBA 626	Instructional Development in Higher Education for Business	4
GBA 627	Communications in Management	4
GBA 631	Management of Marketing Channels	4
GBA 633	Marketing information and Communications Systems	4
GBA 635	Motivation and Marketing Behavior	4
GBA 645	Methods in Operations Analysis	4
GBA 659	Seminar in Current Accounting Theory	4
GBA 675	Theory of the Firm	4
GBA 689	Accounting Research	4
GBA 691	Directed Study in Business	4
GBA 692	Independent study	4
GBA 695	Business Research Project	4
GBA 696	Thesis	4
	Total, Second Year	48

With consent of the Graduate Programs Coordinator up to 12 units of approved 400-level courses in business or economics may be selected as electives.

Master of Science in Business Administration

In the School of Business Administration

The Master of Science degree in Business Administration with an option in business education is intended primarily for individuals with an interest in teaching business subjects in secondary schools, junior colleges, or four-year colleges. The objectives of the program are to develop an understanding of the role and scope of business education and its relationship to the total educational program; to develop the ability to read, interpret, and conduct research in business education; to prepare students for secondary, junior college, and college positions as professional classroom teachers, supervisors of instruction, and department heads; to prepare students to teach in or supervise a business education program in a business college, an adult education school, or in the training department of a business firm; and to provide the necessary background for doctoral study and for continued, self-directed study.

Admission to the Program

1. To be admitted to the Master of Science program an applicant shall have a bachelor's degree with a major in business or business education from an accredited college or university; an undergraduate

grade-point average of 3.0 or higher in the last 90 quarter units attempted, and a minimum score of 475 on the Admission Test for Graduate Study in Business (ATGSB). Exceptions to these requirements may be granted on petition of the applicant, recommendation of the Graduate Programs Committee, and approval by the school dean.

2. The Dean of the School of Business Administration will notify applicants of their selection or rejection by the School of Business Administration Graduate Programs Committee.
3. The Graduate Programs Coordinator will serve as adviser to all selected applicants.
4. An advisory program study worksheet for the guidance of the student will be prepared for him by the Graduate Programs Coordinator when the student is admitted to the program. An official degree program will be finalized prior to the student's advancement to candidacy. It will be approved by the Graduate Programs Coordinator and verified by the Dean of Graduate Studies.

Requirements

1. The degree program must include a minimum of 45 quarter units. Transfer credits not exceeding nine quarter units completed in a graduate school of an accredited college or university may be accepted upon approval of the Graduate Programs Coordinator.
2. A grade-point average of B (3.0) or better must be maintained in all course work taken to satisfy degree requirements and in all graduate-level course work taken at this university.

CURRICULUM

The program of study for a candidate for the Master of Science degree in Business Administration will consist of 16 required units and 29 approved elective units. At least 20 elective units must be selected from Group A.

Required Courses

GBA 540	Foundations of Business Education	4
GBA 541	Review of Research in Business Education	4
GBA 550	Seminar in Business Education	4
GBA 695	Business Research Project (or)	
GBA 696	Thesis	4
	Total	16

Elective Courses—Group A

BUS 403	Records Management	3
GBA 542	Problems in Business Education	4
GBA 543	Innovations and Trends in Business Education	4
HST 610	History of American Business	4
GBA 551	Accounting for Executive Administration	4
GBA 561	Organization Theory	4

GBA 564	Quanitative Business Analysis	4
GBA 591	Systems Approach	4
GBA 626	Instructional Development in Higher Education for Business	4
GBA 627	Communications in Management	4
GBA 643	Management Information Systems	4
GBA 652	Marketing Seminar	4

Elective Courses—Group B

With the approval of the Graduate Programs Coordinator, up to 9 units may be selected from approved 400, 500, and 600-level courses in business, economics or teacher preparation.

Graduate Course Descriptions

GBA 510 Managerial Accounting (4)

Accounting principles used in the collection, interpretation, and use of financial data from the standpoints of creditors, investors, and management. Lecture-discussion, 4 hours.

GBA 511 Managerial Accounting (4)

Principles of financial analysis, costing concepts, the interpretation of costed data, and decision making. Lecture-discussion, 4 hours. Prerequisite: GBA 510.

GBA 517 Marketing Strategy (4)

Development of marketing strategy to identify, sense, serve, and satisfy an organization's specific markets and publics. Concepts relating to the analysis, planning, implementation, and control of marketing programs. Lecture-discussion, 4 hours.

GBA 519 Survey of Data Processing (4)

Examination of data processing vocabulary, concepts, and devices. Introduction to computer programming in batch and time-sharing modes using the FORTRAN language. Tools and techniques of systems analysis. Lecture-discussion, 4 hours. Prerequisite: Admission to MBA program.

GBA 530 Legal Environment of Business (4)

Analysis of the essential legal aspects of the business environment dealing with contracts, business related torts, agency, employment law, and corporations. Function and operation of the courts and administrative agencies. Risk analysis and preventative law approach. Lecture-discussion, 4 hours.

GBA 532 Business Statistics and Probability (4)

Decision making using classical techniques, non-parameter tests, Bayesian analysis, utility theory, index numbers, and time-series analysis. Sampling and sampling distributions, estimation, hypothesis testing, variance analysis, regression, correlation, and multiple regression. Lecture-discussion, 4 hours.

GBA 534 Introduction to Quantitative Methods in Business (4)

Quantitative tools for management decision making. Mathematical techniques of matrix algebra and linear programming applied to business problems. Introduction to games and strategies, Markov chains, and queuing problems. Lecture-discussion, 4 hours.

GBA 535 Management Principles and Policies (4)

Theoretical managerial concepts, principles, and policies as they relate to management of the total enterprise. Case studies. Lecture-discussion, 4 hours.

GBA 540 Foundations of Business Education (4)

Principles, philosophy, and history of business education. Principles of curriculum development and evaluation; the role and scope of business education and its relationship to the total educational program. Lecture-discussion, 4 hours.

GBA 541 Review of Research in Business Education (4)

Criteria for the evaluation of research in business education. Survey of methods employed in research; review and evaluation of reported research; areas of needed research. Development of a research proposal. Lecture-discussion, 4 hours. Prerequisite: GBA 540.

GBA 542 Problems in Business Education (4)

Departmental and classroom problems related to curricula, equipment, guidance, community relations, governmental regulation of programs, and personnel. Lecture-discussion, 4 hours.

GBA 543 Innovations and Trends in Business Education (4)

Study of current trends and innovations in business education on the secondary and collegiate levels. Seminar discussions, demonstrations, observations. Seminar 4 hours. May be taken in two of the following fields:

a. Bookkeeping and Accounting
b. Business-Economic Education
c. Data Processing for Teachers
d. Distributive Education
e. Office-Secretarial Subjects

GBA 546 Fundamentals of Financial Management (4)

Theoretical and conceptual framework for financial decision making stressing analytical and quantitative techniques. Analysis of controversial and sophisticated methods of allocating resources and raising funds both internally and externally within the corporate context. Lecture-discussion, 4 hours. Prerequisite: GBA 510.

GBA 550 Seminar in Business Education (4)

Discussion of selected areas in business education. Seminar, 4 hours. Prerequisite: GBA 540 or consent of instructor.

GBA 551 Accounting for Executive Administration (4)

Control systems, responsibility in profit planning and control, capital investment decisions, and federal income tax aspects of decisions. Lecture-discussion. 4 hours. Prerequisite: GBA 511.

GBA 561 Seminar in Organization Theory (4)

Analysis of organizations from a theoretical, behavioral, and structural point of view. Current research in organization dynamics and development. Seminar 4 hours. Prerequisite: GBA 535.

GBA 563 Executive Development (4)

Analysis of the factors endemic to the successful executive and how these skills and traits can be acquired. Seminar, 4 hours. Prerequisite: GBA 561.

GBA 564 Quantitative Business Analysis (4)

Quantitative theory and techniques. Linear, integer, non-linear, and dynamic programming, transportation and assignment algorithms, replacement problems, game theory and Markov processes; introduction to computer solutions. Lecture-discussion 4 hours. To be taken during first quarter of the second year of the MBA program. Prerequisite: GBA 534.

GBA 568 Programming for Business Applications (4)

File structures for information storage and retrieval. Programming problems related to file maintenance and report generation. Analysis of commercially available data management products. Lecture-discussion, 4 hours. Prerequisite: GBA 519.

GBA 591 Systems Approach (4)

Analysis of business systems from a systems approach. Information gathering, analysis, design, and implementation of effective systems. Analysis and critique of alternative approaches to solution of practical management problems. Lecture-discussion 4 hours.

GBA 617 Industrial Dynamics (4)

Interaction of supervisors and employees within the social system of the plant. Resolutions of problems and tensions through communication. First-line supervisor as a member of management. The union, collective bargaining, and arbitration. Labor legislation. Cultural differences as they affect group dynamics. Lecture-discussion, 4 hours.

GBA 626 Instructional Development in Higher Education for Business (4)

Examination and appraisal of the development, scope, and diversity of schools of business administration; varieties of institutions, purposes and programs; trends and current issues. Seminar, 4 hours.

GBA 627 Communications in Management (4)

Communications as a process affecting the management function. Development and improvement of advanced techniques of writing for business. Lecture-discussion, 4 hours.

GBA 631 Management of Marketing Channels (4)

Historical development, functions, and management of marketing channels. Channel relationships and funds. Lecture-discussion, 4 hours. Prerequisite: GBA 571.

GBA 633 Marketing Information and Communications Systems (4)

Generation and analysis of marketing information. Research, theory and methods of market stimulation and mass communications. Use of marketing information in communications to all of the firm's publics, with emphasis on the consumer. Lecture-discussion, 4 hours. Prerequisite: GBA 571.

GBA 635 Motivation and Market Behavior (4)

Theory and application of the findings of the behavioral sciences to the ultimate consumer in a relatively affluent society to give the decision maker effective bases for making and implementing product, price, promotion, distribution and public policy. Lecture-discussion, 4 hours. Prerequisite: GBA 571.

GBA 643 Management Information Systems (4)

Analysis of the problems involved in the design of automated systems to provide managers with the accurate, timely, and adequate information required for decision making. Lecture-discussion, 4 hours. Prerequisite: GBA 519.

GBA 645 Methods in Operations Analysis (4)

Applications of electronic computers to management techniques. Formulating linear programming for use on a computer; simulation using FORTRAN, Simscript, or GPSS computer languages; random number generation; solving regression and sales forecasting problems on a computer. Lecture-discussion, 4 hours. Prerequisite: GBA 564 and 643.

GBA 646 Advanced Financial Management (4)

Fundamental issues of financial management; short-term asset management; evaluation of long-term assets, capital structure models, and sources of capital. Lecture-discussion, 4 hours.

GBA 652 Marketing Seminar (4)

Marketing decision making. Application of marketing concepts and implementation of effective marketing programs. Analysis of marketing decision-making techniques. Present and future marketing trends. Lecture-discussion, 4 hours. Prerequisite: GBA 517.

GBA 659 Seminar in Current Accounting Theory (4)

Evolution of accounting theory. Current problems, reasons, and causes for controversy, and future developments. Seminar, 4 hours. Prerequisite: GBA 551.

GBA 671 Management Seminar (4)

The development and evaluation of alternative corporate strategies, drawing upon the functional areas within business and the outside environmental factors which affect business. Seminar, 4 hours. To be taken in last quarter of the MBA program. Prerequisite: GBA 561.

GBA 675 Theory of the Firm (4)

Examination of model-building techniques which aid in predicting the behavior of business organizations. Seminar, 4 hours. To be taken in last quarter of the MBA program. Prerequisites: GBA 564 and 643.

GBA 689 Accounting Research (4)

Application of selected theory concepts in model construction. The determination of changes in reported operating results arising from changes in accounting theory. Seminar, 4 hours. Prerequisite: GBA 564.

GBA 691 Directed Study in Business (1-4)

Independent, directed study of advanced topics in the field. Individual conferences with the instructor.

GBA 692 Independent Study (1-4)

Individual investigation or original study to be conducted in a field of interest selected by the student with approval of the professor. Intensive personal research under initiative of the student with general guidance and advice from the professor. Seminar.

GBA 695 Business Research Project (4)

A written research project concerning a significant problem in the field of business. Prerequisite: GBA 691 for all candidates. GBA 541 for MS candidates.

GBA 696 Thesis (4)

A formal thesis concerning a significant problem in the field of business. Prerequisite: GBA 691 for all candidates. GBA 541 for MS candidates.

GBA 699 Master's Degree Continuation (0)

Registration required in any quarter following final assignment of SP in continuing work in which student intends to use facilities of the university. Registration permitted instead of leave of absence when student plans to use university facilities. Prerequisite: Advancement to candidacy for master's degree or admission to a credential program.

Upper-division courses applicable to the master's degree will be found in the section of the catalog describing undergraduate courses in the School of Business Administration. See p. 211.

CHEMISTRY

Master of Science in Chemistry

In the Department of Chemistry, School of Science

Vasu Dev, *Chairman*

Graduate Program Committee

J. Ernest Simpson, *Chairman, Organic Chemistry*

Charles E. Bowen, *Biochemistry*

George Gutnikov, *Analytical Chemistry*

David A. Haner, *Chemical Physics*

Yu-Ping Hsia, *Physical Chemistry*

The Master of Science degree in Chemistry provides a comprehensive understanding of the principles of chemistry and application in detail to advanced problems. This understanding will be gained through course work, seminars, independent study, and research. The program is designed to provide the student with the necessary skills and techniques to reach his particular objective, whether it be for a successful career in teaching or industry or to pursue further graduate work. The student in this program may pursue one of several fields of specialization which include analytical, inorganic, organic, and physical chemistry, and biochemistry.

Admission to the Program

An applicant for admission to the graduate program in chemistry must have received a baccalaureate degree in chemistry or in a related discipline, including at least 36 quarter units of chemistry courses. An applicant lacking these qualifications may be admitted subject to a review of his academic background by the departmental graduate program committee. Admission to the program requires an undergraduate grade point average of 2.5 and an average of 3.0 in chemistry courses. A limited number of students not meeting these requirements may be admitted in conditional status if facilities permit. Such students must meet requirements stipulated in the statement of conditional admission within the time limit specified to remain in the university.

Each selected applicant with his advisory committee will design a program in his selected area of specialization based upon his interests, preparation, and performance on a departmental placement examination. The program will include required courses, selection of courses in an area of specialization, independent study, and a thesis. It will normally constitute

45 to 50 quarter units of credit.

In order to be advanced to candidacy for a Master of Science degree in Chemistry, the student must meet all of the general requirements specified in this catalog. He must also perform satisfactorily on departmental examinations, at entrance, on reexamination, or by completion of specified courses.

Requirements

1. The degree program must include a minimum of 45 quarter units, including no more than 9 acceptable units transferred from another graduate institution. No more than 21 units may be in approved 400-level courses.
2. The student must complete his program based upon the curriculum outlined below.
3. The student must demonstrate a reading knowledge of a modern foreign language or proficiency in a computer programming language acceptable to the Chemistry Department.
4. An acceptable thesis must be completed and the necessary copies submitted in accordance with university regulations.
5. A final comprehensive examination must be successfully completed.

Curriculum

Required Courses

		Units
CHM 550	Seminar in Chemistry (Not more than 3 units of seminar may be included in the 45-unit minimum.)	3
CHM 696	Research and Thesis	9
	Courses in an area of Specialization	8

Select 6 units in a 2-quarter sequence in an area of specialization, to be selected from CHM 521, 522 (theoretical); CHM 541, 542 (organic); CHM 553, 554 (physical); CHM 561, 562 (biochemistry); CHM 571, 572 (inorganic); or CHM 581, 582 (analytical). Each of these courses requires a concurrent enrollment in 1 unit of CHM 513, Independent Study.

Approved electives	**25**
Total minimum	**45**

Graduate Course Descriptions

CHM 513 Independent Study in Advanced Chemistry (1)

Reading and reports on papers in the literature, solving of assigned problems. Minimum of 60 hours total time. Concurrent: Any of CHM 521, 522, 541, 542, 553, 554, 561, 562, 571, 572, 581, 582. May be repeated for a maximum of 7 units.

CHM 521 Theoretical Chemistry (3)

Mathematical preliminaries; postulates of quantum chemistry; solutions of the Schrodinger equation for some simple chemical models; the hydrogen atom; angular momentum; the approximate methods: atoms of more than one electron. Lecture-discussion 3 hours. Concurrent: CHM 513. *Dr. Hsia.*

CHM 522 Applied Theoretical Chemistry (3)

Applications of quantum mechanics to problems of atomic and molecular srructure. Molecular orbital and valence bond theories; their applications and extensions. Electronic states and derived molecular parameters. Lecture-discussion, 3 hours. Prerequisite: CHM 521 or consent of instructor. Concurrent: CHM 513. *Dr. Haner.*

CHM 541, 542 Advances in Organic Chemistry (3) (3)

Modern synthetic organic chemistry with emphasis on reactions, reaction mechanisms, structure, structure determination, and sterochemistry of organic compounds. Selected topics from organic photochemical reactions and chemistry of organometallic, heterocyclic, organophosphorus, and organoboron compounds. Lecture-discussion, 3 hours. Concurrent: CHM 513. *Dr. Abernethy, Dr. Dev, Dr. Maya.*

CHM 543 Chemistry of Heterocyclic Compounds (3)

Chemistry of organic compounds, having three, four, five, and six membered cyclic structure and containing one or more than one hereroatom. Lecture-discussion, 3 hours. *Dr. Vollmar.*

CHM 544 Chemistry of Natural Products (3)

Isolation, structure elucidation and synthesis of naturally occurring compounds like alkaloids, carbohydrates, hormones, peptides, steroids, and terpenes. Lecture-discussion, 3 hours. *Dr. Simpson.*

CHM 545 Organic Photochemistry (3)

Light-induced chemical reactions of organic compounds. The mechanism of photochemical reactions and applications to synthesis problems encountered in organic chemistry. Lecture-discussion, 3 hours. *Dr. Dev.*

CHM 550 Seminar in Chemistry (1-3)

Special problems in selected areas of chemistry. Seminar, 1 to 3 hours.

CHM 553, 554 Advanced Physical Chemistry (3) (3)

Selected advanced topics in physical chemistry such as molecular spectra, optical activity, transport phenomena, dielectrics, elasticity and electrode processes. Lecture-discussion, 3 hours. Concurrent: CHM 513. *Dr. Hiemenz, Dr. Pye.*

CHM 555 Molecular Spectroscopy (3)

Theory and application of electrical magnetic transition moments, transition probability, symmetry consideration involving the correlation of IR, UV, Raman and spin resonance spectra for molecular structure elucidation. Lecture-discussion, 3 hours. *Dr. Haner.*

CHM 561, 562 Selected Topics in Biochemistry (3) (3)

Basic chemical principles as applied to topics of biochemical interest, for example, cellular energetics and kinetics, analysis of the structure and function of proteins and other supermolecules, feedback control of metabolism, biochemical behavior of organelles. Lecture-discussion, 3 hours. Each course may be repeated once for credit. Concurrent: CHM 513. *Dr. C. Bowen.*

CHM 563 Enzymology (3)

The nature of enzymes including enzyme kinetics, mechanisms of enzyme catalyzed reactions, enzyme inhibitors, classification of enzymes. Lecture-discussion, 3 hours. *Dr. Rice.*

CHM 564 Enzymology Laboratory (2)

Techniques for the isolation and characterization of enzymes from plant and animal sources. Kinetic studies, specificity, physical chemical properties. Laboratory, 6 hours. Concurrent: CHM 563. *Dr. Rice.*

CHM 565 Biochemical Mechanisms (3)

General mechanistic principles of organic and inorganic chemistry as they relate to biochemistry. Lecture-discussion, 3 hours. *Dr. C. Bowen.*

CHM 566 Biochemical Preparations (2)

Isolation of some eight different materials from plant and animal sources, such as a blood protein fraction, a plant nucleic acid, a plant terpene, a hormone preparation, a metabolic intermediate, and an urinary excretion product. Laboratory, 6 hours. *Dr. Abernethy.*

CHM 567 Advanced Clinical Chemistry (3)

Chemical basis of recent advances in analytical methods and techniques, basis of new instrumentation, treatment of data, interpretations of clinical analyses. Lecture-discussion, 3 hours. *Dr. Rice.*

CHM 571, 572 Advanced Inorganic Chemistry (3) (3)

Chemical applications of group theory; bonding theories and their applications to the properties of inorganic compounds; inorganic reaction mechanisms; physical methods in inorganic chemistry. Lecture-discussion, 3 hours. Concurrent: CHM 513. *Dr. R. Bowen.*

CHM 581, 582 Advances in Analytical Chemistry (3) (3)

Selected topics in modern analytical chemistry. Lecture-discussion, 3 hours. Concurrent: CHM 513. *Dr. Gutnikov.*

CHM 691 Directed Study (1-3)

Independent study in an area chosen by the student under the supervision and direction of a graduate faculty member.

CHM 696 Thesis (1-3)

Compilation, evaluation, interpretation, and report of research for thesis. Completion of approved, bound thesis.

CHM 699 Master's Degree Continuation (0)

Registration required in any quarter following final assignment of SP in continuing work in which student intends to use facilities of the university. Registration permitted instead of leave of absence when student plans to use university facilities. Prerequisite: Advancement to candidacy for master's degree or admission to a credential program.

Upper-division courses applicable to the master's degree will be found in the Department of Chemistry undergraduate section of the catalog. See p. 307.

Credential Programs

In the Teacher Preparation Center

Alvin H. Thompson, *Director*

California teaching and education specialist credentials are also certification objectives of university curricula. Post-baccalaureate students admitted to a program leading to university recommendation for a teaching credential are accorded classified status parallel to that of master's degree candidates.

The university is accredited by the State Commission for Teacher Preparation and Licensing to recommend qualified students for the Single Subject Teaching Credential, the Multiple Subjects Teaching Credential, and the Reading Specialist Credential. The university is developing a proposal to submit to the Commission for the Bilingual/Cross-cultural Specialist Credential. This program should be available at least partially by Fall, 1975. The Teacher Preparation Center also has developed a program of courses leading to the Early Childhood Education Specialist Credential and plans to apply to the Commission for approval in the future.

Information on admission and course requirements for these credentials is available from the Director of the Teacher Preparation Center and from the coordinators of the various credential programs.

Teacher Preparation Center

Teacher preparation is a university-wide function. The Teacher Preparation Center serves as the university-wide planning and coordinating office for all teaching credential programs. Faculty members from most schools have a role in meeting teacher preparation objectives. The members of the university-wide Teacher Education Advisory Committee represent the departments offering credential majors.

Credential Majors

The prospective Multiple Subjects (elementary) or Single Subject (secondary) teacher candidates must choose a major from the following:

Multiple Subjects Candidates:
Liberal Studies

Students with majors other than Liberal Studies must pass the National Teacher's Examination as a waiver to a Liberal Studies major.)

*Single Subject Candidates:
Agriculture, Art, Biological Sciences, Business, Chemistry, English, History, Home Economics, Mathematics, Music, Physical Education, Physics, Political Science, Social Science.

*Students with majors in Journalism, Speech, and Drama may be credentialed after completing specified requirements in the department of English and Modern Languages.

Admission to Candidacy

Admission to the university is not equivalent to being accepted into a teacher preparation program. A candidate for a teaching credential is selected through a three-step process involving university-wide teacher education committees which cooperate with the Teacher Preparation Center in reviewing the qualifications of the candidate and recommending regarding admission to the program. One may apply for the program after enrolling in TEP 391, Foundations of Teaching.

A candidate for a teaching credential must be granted approval by the appropriate teacher education committees to enter the teacher preparation program, to participate in student teaching, and to receive a recommendation for the credential. Detailed information is available at the Teacher Preparation Center.

Specialist credential candidates must enroll in TEP 599, Assessment of Competencies, as early as possible in their program. Information regarding the requirements for specialist credentials is available from the appropriate coordinator/adviser in the Teacher Preparation Center.

ECONOMICS

Master of Science in Economics

In the Department of Economics, School of Arts

Gertrude C. Boland, *Chairman*

The purposes of the program leading to a Master of Science degree in economics are (1) the preparation of economists qualified for immediate employment by business and government; (2) the preparation of economists for research positions in fields such as public administration, labor organization, finance, insurance and marketing; (3) the preparation of teachers of economics at the secondary school and community college level; (4) the enhancing of the competence of those students who wish to pursue advanced graduate work in economics. Graduate study specialization may be elected in any of the following areas: managerial economics and operations research; economic planning and development; quantitative economics; international economics; money and capital markets; industrial organization and public policy; urban and regional economics.

Admission to the Program

An applicant for admission to this program must hold a bachelor's degree from an accredited college or university and satisfy university and departmental requirements for admission to graduate study. An applicant who holds a bachelor's degree in a field other than economics or who does not meet admission criteria may apply for admission as a conditional graduate student. The conditions will be stated in writing at the time of admission and will specify the amount of time allowed to meet entrance conditions. In his undergraduate work, the applicant must have maintained a grade point average of 3.0 or better in economics courses and a grade point average of 2.7 overall. All applicants for admission to the program are required to take the Graduate Record Examination Aptitude Test and the Advanced Economics Test. Admission to the graduate program in economics requires that the applicant be accepted by the Department of Economics.

Requirements

A minimum of 45 quarter units is required for the Master of Science degree in economics. All students must take 16 units of required core courses and fulfill the terminal requirement of either a thesis, a project, or a com-

prehensive examination. Each student shall indicate in writing, prior to advancement to candidacy, his decision as to the manner of fulfilling the terminal requirement. Courses for the balance of the 45 quarter units are selected by the individual student in his area of interest or specialization with the advice and consent of his faculty adviser(s).

No more than 9 quarter units of acceptable credit may be transferred from another graduate institution. A maximum of 16 units may be taken in approved upper-division courses.

Curriculum

	Units
Required Courses	16
EC 550	
Microeconomic Analysis	(4)
EC 551	
Macroeconomic Analysis	(4)
EC 552, 553 Econometrics	(4, 4)
Field of Specialization -	8
Electives	12-21
Terminal Requirement	0-9
Thesis (9 maximum)	
Project (9 maximum)	
*Comprehensive examination	(0)
Total	**45**

*Students electing this option will include 9 additional units of electives in their programs.

Graduate Course Descriptions

EC 521 Business Economics (4)

The role of business firms in the resources allocation process. The behavior and decision-making process of firms in a variety of market structures. New approaches in the theory of the firm. Seminar, 4 hours. Prerequisites: Graduate standing and an elementary knowledge of economics.

EC 540 Seminar in Economics (1-3)

Special problems in selected areas of economics. Each seminar will be structured to meet the needs of individual students. Seminar, 1 to 3 hours.

EC 550 Microeconomic Analysis (4)

Analysis of the resources allocation systems and behavior of producing and consuming units. Lecture-discussion, 4 hours. Prerequisites: Some knowledge of elementary calculus and linear algebra; intermediate price theory (equivalent to EC 311); or consent of instructor.

EC 551 Macroeconomic Analysis (4)

Analysis of aggregate national economic activities. Lecture-discussion, 4 hours. Prerequisites: Some knowledge of elementary calculus and linear algebra; intermediate income theory (equivalent to EC 312); or consent of instructor.

EC 552, 553 Econometrics (4) (4)

Specification and statistical inference in econometric models; estimation, verification and prediction of economic variables; recent empirical studies, advanced topics in econometrics. Lecture-discussion, 4 hours. Prerequisites: Calculus and matrix algebra; intermediate price and income analysis; one year of statistics; or equivalent; or consent of instructor.

EC 560, 561 Managerial Economics and Operations Analysis (4) (4)

Advanced topics and new developments in managerial economics and operations research. Lecture-discussion, 4 hours. Prerequisites: Intermediate microeconomics, mathematical analysis (equivalent to MAT 108, 109, 204), and statistics (equivalent to EC 321, 322); or consent of instructor.

EC 654 Economics of International Finance (4)

Advanced topics in international liquidity and finance theory. Problems of international monetary system. Balance of payments theory and practices; theory of exchange rates and mechanism of international adjustment. Lecture-discussion, 4 hours. Prerequisites: Intermediate price and income theory; undergraduate money and banking; undergraduate international finance, or consent of instructor.

EC 655 Economics of International Trade (4)

Advanced topics in international trade. Theory of exchange; tariffs and other trade barriers. Problems of international competition and cooperation. Lecture-discussion, 4 hours. Prerequisites: Intermediate price and income theory; undergraduate international trade theory and policy, or consenf of instructor.

EC 656, 657 Money and Capital Markets (4) (4)

Topics in monetary and capital theory. Liquidity creation, financial intermediation and capital formation. Development of capital policy. Lecture-discussion, 4 hours. Prerequisites: Intermediate Price and Income Theory and undergraduate Money and Banking.

EC 658 Industrial Organization and Public Policy (4)

The organization and structure of the American enterprise economy with special reference to manufacturing and processing industries. Corporate behavior, price policy and workability of competition in industries. Public policy towards monopoly and competition. Lecture-discussion, 4 hours. Prerequisites: EC 311 and 312 or consent of instructor.

EC 659 Public Utilities and Transportation (4)

Economics of the public service corporation; economic problems of regulation; state and national problems arising from development of transportation and public utilities; pricing and resource allocation and policy problems. Prerequisites: EC 311, 312 or consent of instructor.

EC 660 Public Finance (4)

Government taxation and expenditure. The fiscal decision process and fiscal choice theory. Government budgeting and cost benefit analysis. Lecture-discussion, 4 hours. Prerequisites: Graduate standing and consent of instructor.

EC 665 Economic Development (4)

Advanced topics in economic development. Historical analysis of causes and consequences of economic development. Special attention to the problems of developing and underdeveloped nations. Lecture-discussion, 4 hours. Prerequisites: Undergraduate economic development or equivalent or consent of instructor.

EC 666 Economic Planning (4)

Critical review of goals, means, theories, and practices of economic planning. Central planning and decentralized planning. Conceptual and methodical differences in advanced economy and underdeveloped economy. Lecture-discussion, 4 hours. Prerequisites: Undergraduate economic development or equivalent or consent of instructor.

EC 667 Urban Economic Problems (4)

Economic analysis as applied to current and future urban problems and public policy. Demand and supply of urban public services. Problems of urban housing, transportation, and employment. Analysis of urban spatial distribution of economic activities. Lecture-discussion, 4 hours. Prerequisites: Undergraduate urban and regional economics or consent of instructor.

EC 668 Regional Economics (4)

Advanced theories and techniques of regional economic analysis. Distribution of resources among regions; regional competition and economic interdependence. Determinants of regional growth and policy options. Lecture-discussion, 4 hours. Prerequisites: Undergraduate regional economic analysis or equivalent or consent of instructor.

EC 691 Directed Study (1-2)

Independent study in an area chosen by the student under the supervision and direction of a graduate faculty member.

EC 695 Project (1-3)

Independent research resulting in a project. Reporting results in an approved form. Prerequisites: Advancement to candidacy for the master's degree and approval of graduate faculty adviser. Maximum credit, 9 units.

EC 696 Thesis (1-3)

Independent research and study under the supervision of the faculty. Reporting the research results in the approved form. Maximum credit, 9 units.

EC 699 Master's Degree Continuation (0)

Registration required in any quarter following final assignment of SP in continuing work in which student intends to use facilities of the university. Registration permitted instead of leave of absence when student plans to use university facilities. Prerequisite: Advancement to candidacy for master's degree or admission to a credential program.

Upper-division courses applicable to the master's degree will be found in the Department of Economics undergraduate section of the catalog. See p. 147.

EDUCATION

Master of Arts in Education

In the Teacher Preparation Center

Alvin H. Thompson, *Director*

Education Graduate Committee

George M. Platner, *Chairman*

The primary emphasis of the Master of Arts in Education is to develop superior teachers. Admission to the program is granted to qualified applicants who hold a California teaching credential or its equivalent, and to students who have been admitted to the university's credential program. Study for the Master of Arts is a continuation at a higher level of the university's undergraduate programs that lead to teaching credentials. Postbaccalaureate students who are working on credentials are encouraged to work concurrently on the master's degree.

Admission to the Program

An applicant for this program must have a valid teaching credential or have been admitted to a credential program at this university and hold a bachelor's degree from an accredited institution. Admission as a classified graduate student is awarded to an applicant with these qualifications who has an undergraduate grade-point average of 2.5 or better. Applicants who do not meet this minimum but who show compensating strengths may be admitted conditionally.

A conditionally classified student is provided with a written statement of entrance conditions including the time within which the conditions are to be met. If the conditions are not satisfied within the specified time, the student will be denied further enrollment in the program.

A student who holds a baccalaureate degree from this university and who plans to continue in graduate study will submit an application for change to graduate status to the Office of Admissions during the final quarter of the senior year.

Each student admitted in classified graduate status will complete a formal degree program in consultation with his adviser. It will be approved by the chairman of the Education Graduate Committee. The approved program constitutes the student's curriculum for the master's degree. No change will be made in the program without the mutual agreement of the student and his adviser.

Requirements

1. A minimum of 45 quarter units of acceptable graduate level work must be completed in the program; at least 24 quarter units must be at the 500 and 600 level (graduate). All 400-level courses accepted for master's degree credit will be specified by the Education Graduate Committee. Methods courses and student teaching shall not be applied to the master's degree.
2. At least 27 units of credit must be taken in the program after the student has been advanced to candidacy for the degree.
3. A grade-point average of 3.0 (B) or better must be maintained in all courses to satisfy the requirements for the Master of Arts in Education, as well as in all post-baccalaureate coursework attempted.
4. Completion of all requirements for a clear teaching credential is required prior to the granting of the degree of Master of Arts in Education.
5. A thesis or project must be satisfactorily completed and defended by the candidate.

Curriculum

The master's degree curriculum in education is a flexible one requiring a minimum of 45 units, organized as follows: 9 units in research courses, 24 units in education, and 12 units of electives. No more than 12 quarter units of extension and/or transfer credit will be accepted toward the degree.

The curriculum consists of three elements. The first element consists of 24 units of course work from the graduate offerings in education, selected by the student and his adviser to meet the student's academic needs, based upon his previous preparation and the requirements of his employment. Courses available for this purpose cover such areas as reading, early childhood education, instructional media, minority children, philosophy, and measurement. Additional areas are planned for the future.

The second part of the curriculum is made up of approved upper-division and graduate electives from offerings in education or in other appropriate disciplines to complement the rest of the student's curriculum and to round out his preparation for teaching. The culminating element is the presentation of a thesis or project, preceded by TEP 688, Critique of Research in Education.

Credential Programs

The university offers a number of programs leading to certification for elementary and secondary school teaching under the auspices of the Teacher Preparation Center. These are described in the catalog in the section which presents the programs of the center.

Graduate Course Descriptions

TEP 506 The Master Teacher (3)

Analysis and synthesis of the teacher education program, the student teacher, and student teaching. Intensified study of professional and personal competency development. Lecture-discussion, 3 hours. Prerequisite: Assignment as contract teacher and/or consent of graduate coordinator.

TEP 507 Comparative Education (3)

Public education in developed and developing nations; education as a strategic change force in selected nations. Comparative structures and goals of education in their social, political, economic, and cultural settings. International cooperation and multi-national education organizations. Research methodology in comparative education. Lecture-discussion, 3 hours.

TEP 508 Philosophy of Career Education (3)

Philosophy and organization of career education programs. Development of modern approaches to an integrated program based upon occupational opportunities and community needs. Developments in curriculum, occupational training, youth groups, summer programs, and distributive education. Lecture-discussion, 3 hours. Prerequisite: Consent of instructor.

TEP 509 Education of Contemporary Youth (3)

The dynamics of contemporary youth in the public secondary school. Values of youth, major problems, struggles, and conflicts as adolescents move toward maturity. Cultural and societal values which have an impact on youth; role of the teacher and school in helping young people achieve identity. Lecture-discussion, 3 hours. Prerequisite: TEP 393 or consent of instructor.

TEP 510 Interpersonal Relations in Teaching (3)

Examination of personality factors that are obstacles to effective teaching; emphasis upon developing open and authentic interpersonal relationships. Role-playing, demonstrations and other laboratory activities. Lecture-discussion, 2 hours, laboratory, 2 hours. Prerequisite: TEP 393 and consent of instructor.

TEP 511 Prescriptive Teaching and Behavioral Objectives (3)

Learner behaviors, reinforcers and elicitors; establishing learner entering behavior and performance requirements; writing precise educational objectives. Lecture-discussion, 3 hours. Prerequisites: TEP 393 or consent of instructor.

TEP 512 Measurement in Education (3)

Principles and practices in the construction of teacher-made tests and other forms of assessment devices. Basic concepts of validity, reliability, and standardization of educational-psychological tests. Standardized group tests currently used in schools with emphasis upon the uses and abuses of the testing process. Lecture-discussion, 3 hours. Prerequisite: Post-baccalaureate standing.

TEP 513 Psychological Issues in Education (3)

Psychological theories and research relevant to teaching and learning within the public-school classroom. Applications to school practice. Lecture-discussion, 3 hours. Prerequisite: TEP 393.

TEP 514 Philosophical Issues in Education (3)

Philosophical perspectives and methodology as tools for analyzing and evaluating educational goals and procedures. Historical perspective of Western and non-Western philosophies of education; alternative cultural philosophies of education in American society. Interdisciplinary teaching and curriculum development. Lecture-discussion, 3 hours. Prerequisite: TEP 392.

TEP 520 Diagnosis of Reading Difficulties (3)

Diagnosis and remediation of handicapped readers. Practice in diagnostic procedures, tests, and laboratory equipment. Use and interpretation of tests for the analysis of reading difficulties; methods of difficulty analysis, diagnostic test evaluation, assessment of psychological, emotional and physical factors. Lecture-discussion, 3 hours. Prerequisite: TEP 393 and 411.

TEP 521 Analysis of Corrective Reading Practices and Techniques (3)

Inhibiting factors associated with reading disabilities among school children; informal techniques of reading evaluation and corrective procedures in improvement of word recognition, vocabulary and comprehension skills; materials and organization of corrective programs. Group and individual techniques, case studies. Lecture-discussion, 3 hours. Prerequisite: TEP 520.

TEP 522 Laboratory of Clinical Practice: Treatment of Reading Disorders (3)

Observation and supervised experience in individual and group diagnostic therapeutic procedures. Supervised case study, diagnosis and remedial instruction in reading. Student will practice individual tutoring, group remedial activities, parent interviews, case study and clinic reports. Lecture-discussion, 2 hours, activity 2 hours. Prerequisite: TEP 521.

TEP 523 Development of Pre-reading Skills (3)

The young child's development in reading readiness. Clinical and laboratory experience in assessment of individual functioning in reading. Criteria for selection of curriculum materials and procedures in the development of pre-reading skills. Lecture-discussion, 3 hours. Prerequisites: TEP 393, 411, or consent of instructor.

TEP 524 Advanced Study of Reading Disability (3)

Classical and contemporary issues in reading disability. Emotional, neurophysiological, and cultural impediments to learning. Current approaches to diagnosis and treatment of severe cases of reading disability. Lecture-discussion, 3 hours. Prerequisite: TEP 522.

TEP 525 Psychology of Reading (3)

Historical development of selected theories and models of the reading process. Investigation and analysis of the interrelationships of the reading act: cognitive processes, languages, experience, and social-emotional factors. Lecture-discussion, 3 hours. Prerequisite: TEP 393, 411, or consent of instructor.

TEP 526 Strategies for Competency in Teaching Reading (3)

Basic reading skills; relevancy in the classroom teaching of reading; analysis of teacher effectiveness. Competency in testing and teaching for reading skills objectives. Lecture-discussion, 3 hours. Prerequisites: TEP 411 and 412 or 413.

TEP 527 Mediated Individualized Instruction (3)

Educational technology; analysis and implementation of selected technological hardware, teaching machines, and instructional systems as related to the development and management of reading instruction. Lecture-discussion, 2 hours, activity, 2 hours.

TEP 528 Linguistics, Phonics, and the Teaching of Reading (3)

Development of phonics and linguistics. Linguistically oriented reading and phonics programs. Applications of linguistics and phonic principles in the teaching of reading and the language arts. Lecture-discussion, 3 hours. Prerequisite: TEP 412 or 413.

TEP 529 Field Experiences in Reading (1-6)

Field experience for Reading Specialist Credential candidates to fulfill a competency criterion. May be repeated for credit. Prerequisite: Admission to the Reading Specialist Credential program and consent of adviser.

TEP 530 Education of the Slow Learner and the Retarded Child (3)

Etiology and origin of retardation. The training of the slow learner and the mentally retarded. Curriculum principles, methods, sources of materials with emphasis on reading. Lecture-discussion. 3 hours. Prerequisite: TEP 393 and consent of instructor.

TEP 531 Education of the Gifted Child (3)

Differential aptitudes and characteristics of gifted children; identification, acceleration, grouping and curriculum enrichment. Evaluation of programs, problems of underachievement, counseling, reading, development of talent. Lecture-discussion, 3 hours. Prerequisite: TEP 393.

TEP 540 Historical and Philosophical Bases in Early Childhood (3)

History of the major forces in the education of the young child. Analysis of philosophies and major trends in early childhood education. Lecture-discussion, 3 hours. Prerequisite: TEP 456 or teaching experience.

*TEP 541 Learning Patterns in Early Childhood (3)

Examination and evaluation of learning skills in early childhood education: socio-emotional, perceptual-motor, and cognitive. Programs which emphasize specific learning patterns. Approaches to the evaluation of learning patterns in early childhood. Lecture-disucssion, 3 hours. Prerequisite: TEP 540.

*TEP 542 Curriculum in Early Childhood Education (3)

Major curriculum models used in early childhood education. Examination of curricula emphasizing the needs of the child, the environment, and the teacher. Lecture-discussion, 3 hours. Prerequisite: TEP 540.

*TEP 543 Program Implementation in Early Childhood Education (3)

Implementation of early childhood education programs. Instructional strategies to achieve curriculum goals in language arts, science, motor activities, music, arts and crafts, blocks, and movement behavior. Lecture-discussion, 3 hours.

*TEP 544 Advanced Child Development and Education (3)

Experimental and theoretical literature in the development of the young child; implications for his continuing educational experiences. Lecture-discussion, 3 hours.

*TEP 545 Organization and Administration in Early Childhood Education (3)

Principles and practices of organization and administration in early childhood education. Organizational structure, budgeting, personnel policies and practices, records, statistics, reporting, relationship with community, relationship with regulatory agencies, relationships with parents. Lecture-discussion, 3 hours.

TEP 546 School, Community, Home Relations in Early Childhood Education (3)

Cooperative school, home, and community relations. Professional and community resources for family, health, welfare, and improving child development. Lecture-discussion 3 hours.

TEP 547 Participation and Practices in Early Childhood Education (3)

Developing, adapting, and evaluating curriculum materials and resources appropriate to various cultures and varying abilities of children, eight years and younger. Full classroom teaching assignment: student responsible for planning, evaluating learning activities, and developing effective child guidance techcniques. Lecture - discussion, 2 hours, activity, 2 hours.

TEP 550 Seminar in Educational Issues (2-3)

Intensive study of selected issues, problems, or areas in education, according to the interests of the students enrolled. Each seminar subtitled by its content. Seminar, 2-3 hours. May be repeated for a maximum of 6 units.

TEP 570 Utilization of Media in the Classroom (3)

Role of media in classroom learning. Systematic approach to instructional development of utilizing media. Skills in using equipment and materials. Lecture-discussion, 2 hours, activity, 2 hours. Prerequisite: Graduate standing.

TEP 571 Graphics for Classroom Instruction (3)

Planning, preparation, and utilization of graphic presentations in classroom learning. Charts, graphs, transparencies, mechanical lettering, mountings, and preserving techniques. Lecture-discussion, 2 hours, activity, 2 hours. Prerequisite: TEP 570.

**Note:* The credential in Early Childhood Education has not been approved for offering as of the date of this catalog.

TEP 572 Programmed Instruction for Classroom Use (3)

Application of current research and theory in the development of instructional programmed segments for classroom learning. Verbal programming and media-integrated programming. Lecture-discussion, 3 hours. Prerequisite: TEP 570.

TEP 574 Preparation of Audio Media (3)

Planning and preparation of scripts; production of recordings on cassette and reel-to-reel magnetic tape, video tape, and film. Principles of storing sound for retrieval. Lecture-discussion, 2 hours; activity, 2 hours. Prerequisite: TEP 571.

TEP 575 Preparation of Photographic Media (3)

Design and production of filmsstrips, slides, and prints for classroom utilization. Development of accompanying instructional guides. Lecture-discussion, 2 hours, activity, 2 hours. Prerequisite: TEP 573.

TEP 577 Instruction Film Production (3)

Perception and learning and their relation to program development; pre-production skills; production of instructional motion picture films. Lecture-discussion, 2 hours, activity, 2 hours. Prerequisite: TEP 574.

TEP 599 Assessment of Competencies (1-3)

Assessment of prospective specialist credential candidate's competencies. Must be taken during the first quarter of the student's enrollment in a specialist credential program. Seminar, 1 to 3 hours.

TEP 650 Seminar in Current Problems and Strategies in Education (2-3)

Critical treatment of new strategies, innovations, conditions, and the findings of research that currently affect or involve education. Choice of topics will be related to contemporary education problems. Seminar, 2-3 hours. May be repeated for a maximum of 6 units.

TEP 687 Reading Research Seminar (3)

Utilization of professional literature in reading. Library reference paper, field research, curriculum innovation projects, action research, field studies. Seminar, 3 hours. Prerequisite: Admission to the Reading Specialist Credential candidate program.

TEP 688 Critique of Research in Education (3)

Survey and critical analysis of selected educational research and other related literature in the major divisions of education. Emphasis on fundamentals of research design and interpretation of related statistics. Lecture-discussion, 3 hours. Prerequisite: Admission to master's degree study in education.

TEP 689 Methods and Techniques of Research (3)

Analysis of research methodology. Emphasis on educational research and efficient use of reference library facilities. Survey of the methods employed in educational research, common research errors, and problems of criteria. Lecture-discussion, 3 hours. Prerequisite: TEP 688.

TEP 691 Independent Study (1-3)

An intensive study of a particular problem in education under the direction of a member of the Teacher Education Advisory Committee. Maximum credit, 3 units. Prerequisite: Consent of an instructor to act as sponsor.

TEP 695 Project (1-6)

Independent research leading to successful completion of a project. Open to graduate students advanced to candidacy and with approval of adviser. Maximum credit, 9 units. Prerequisite or concurrent: TEP 688.

TEP 696 Thesis (1-6)

Independent research leading to successful completion of a thesis. Open to graduate students advanced to candidacy and with approval of adviser. Maximum credit, 9 units. Prerequisite or concurrent: TEP 688.

TEP 699 Master's Degree Continuation (0)

Registration required in any quarter following final assignment of SP in continuing work in which student intends to use facilities of the university. Registration permitted instead of leave of absence when student plans to use university facilities. Prerequisite: Advancement to candidacy for master's degree or admission to a credential program.

Upper-division courses applicable to the master's degree will be found in the Teacher Preparation Center undergraduate section of the catalog. See p. 335. See also upper-division and graduate courses in appropriate academic departments.

ENGINEERING

Master of Engineering

In the School of Engineering

Henry M. Clanton, *Graduate Studies Coordinator*

Engineering Graduate Studies Committee

Henry M. Clanton, *Chairman*

C. James Barr

John R. Biddle

Richard J. Hermsen

Joseph W. McKinley

R. Ramalingam

Robert R. Schneider

The School of Engineering offers an interdisciplinary graduate program leading to the Master of Engineering degree which, coupled with a bachelor's degree, will provide the student with a comprehensive preparation for entry into the engineering profession.

The program is designed to accept students with diverse undergraduate engineering backgrounds. A candidate for the Master of Engineering degree will have the opportunity to choose from technical courses in engineering disciplines supported by the School of Engineering. The School of Engineering offers undergraduate degree programs in the recognized disciplines of aerospace, chemical, civil, electrical and electronics, industrial, and mechanical engineering.

The student will complete a course of study tailored to his individual talents and professional goals. The course of study will feature breadth supplemental to his undergraduate education as well as courses designed to increase his general engineering competency and to emphasize the technical area of his choice.

Admission to the Program

An applicant for admission to this program must meet university criteria as specified in the Admission section of this catalog as well as the criteria outlined below. Applicants are advised that a reasonable proficiency in computer languages is necessary for successful completion of this program. If the student is deficient in this area, he will be expected to remove the deficiency early in his program.

UNCONDITIONAL ADMISSION

An applicant who meets the requirements of this section will be admitted to the university and to this program with classified standing. Such status will be granted upon recommendation of the engineering graduate studies coordinator and approval by the Dean of Engineering.

The applicant must hold a baccalaureate degree in engineering from an ECPD-approved curriculum. He must have attained a GPA of 2.5 in upper division courses of his undergraduate degree and 3.0 for courses completed with graduate standing.

CONDITIONAL ADMISSION

An applicant holding a baccalaureate degree not in engineering or a baccalaureate degree in engineering from a non ECPD-accredited curriculum may be admitted to the program with specified conditions upon recommendation by the graduate studies coordinator and approval of the Dean of Engineering. He will be expected to complete acceptable academic preparation as determined by the appropriate department.

When an applicant is admitted conditionally, the conditions are stated in the letter of admission. This statement will specify the conditions to be met and the time allowed for meeting them. If the conditions are satisfactorily met, the student will be accorded full classified standing. If the conditions are not met, the student will be disqualified from the program and not be permitted to reenroll.

Scholastic Requirements

GRADUATE COURSES TAKEN BY UNDERGRADUATES

A senior wishing to receive graduate credit for a course must petition through the graduate studies office, with the approval of his major department adviser. The petition will ordinarily be approved if the student is not on probation and the course is suitable for graduate credit. If approved, the credit will be recorded as graduate credit, not available for use in meeting baccalaureate degree requirements.

Approval of the petition does not constitute acceptance of the courses toward the master's degree unless and until a degree program including such courses has been approved by the engineering graduate studies committee.

ADVANCEMENT TO CANDIDACY

In order to be advanced to candidacy for a Master of Engineering degree, the student must meet the requirements of the university as specified in this catalog and apply through his graduate adviser. Approval will be granted by the Dean of Engineering upon the recommendation of the student's graduate adviser and the engineering graduate studies coordinator.

ADMISSION TO CLASSES

In some cases, class sizes are limited or multiple sections are not possible because of lack of faculty or facilities. If it is necessary to limit enrollment in graduate level courses in engineering (EGR 500 and 600 series), students will be admitted in the following priority order: (1) advanced to candidacy for the Master of Engineering degree; (2) fully classified; (3) conditionally classified; (4) post-baccalaureate without degree objective; (5) undergraduates. A student enrolled in a master's degree program other than engineering will be given appropriate priority by request through his adviser.

GENERAL REQUIREMENTS

General requirements for master's degrees are stated in the Graduate Scholastic Requirements section of the catalog.

After the student has been admitted to the program, a graduate adviser will be appointed. With the adviser's help, a degree program will be derived for the student and submitted for approval to the engineering graduate studies coordinator. The program will list all courses and requirements which the student must fulfill to earn the degree. Any deficiencies in fundamental subject areas will require prerequisite courses.

A minimum of 45 quarter units will be required, with a minimum of 24 quarter units of 500 or 600 level courses. Transfer credits not exceeding 9 quarter units completed in graduate standing at an accredited college or university may be accepted upon recommendation of the graduate adviser and approval of the engineering graduate studies coordinator.

Curriculum

1. A minimum of 16 quarter units will be selected to meet the breadth requirement. Of these, a minimum of 4 units will be in mathematics or engineering analysis (EGR 510, 511, 512, 513, 515, 563, and 540). The specific courses required of a student will be determined according to the nature of his undergraduate program of study. Breadth will be insured by a combination of broadly based courses, e.g., mathematics, science, and engineering courses not uniquely identified with a student's undergraduate engineering discipline.
2. A minimum of 12 quarter units will be selected to emphasize a technical area supported by the engineering disciplines of the School of Engineering. Normally, such courses will be 500 and 600 level, selected by the student with the approval of his adviser to provide a logical continuation of the design, synthesis, and systems effort of his undergraduate curriculum.
3. All candidates are required to take a comprehensive examination, prepare a thesis, or accomplish a project (see EGR 695 and 696). The candidate may be permitted to

waive this requirement based upon the justification contained in his petition.

4. The remainder of the courses in the student's program will be chosen to insure that it is consistent with his undergraduate preparation and his graduate goals, provides a sequential development of the design, synthesis, and systems approach of his undergraduate work, and constitutes an integrated educational experience.
5. The student should consult with his adviser and the professor in charge of each course to determine whether his previous coursework has provided the prerequisite information for that course.

UPPER-DIVISION COURSES

The following engineering courses are considered by the department concerned to be suitable for graduate credit. Credit toward the Master of Engineering degree will be given only upon approval of the student's program by the graduate studies committee. Graduate credit for an undergraduate student will be given only upon petition in advance. Other upper division engineering courses and upper division courses at the University may be granted graduate credit upon petition in advance.

ARO 404
ARO 406
ARO 407
ARO 408
ARO 409
ARO 410
ARO 418
ARO 426
ARO 427
ARO 431
ARO 435
ARO 444
ARO 445

CHE 401
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EEE 402
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Graduate Course Descriptions

EGR 510 Engineering Probability and Statistics (4)

Mean square estimation, introduction to stochastic processes, time averages and ergodicity, continuous testing and estimation, confidence intervals, significance, thermodynamics, machine design, systems analysis, and reliability. Lecture-discussion, 4 hours. Prerequisite: Undergraduate course in probability theory.

EGR 511 Numerical Solutions of Engineering Problems (4)

Approximating functions, difference methods, matrices, iterative methods. Approximation methods for ordinary and partial differential equations. Applications to electrical networks, transport phenomena, structural systems, dynamical systems, etc. Lecture-discussion, 4 hours. Prerequisite: Mathematics equivalent to ECPD-accredited curriculum or consent of instructor.

EGR 512 Vector Analysis and Complex Variables (4)

Vector and scalar fields. Gradient, divergence curl. Green and Stokes theorems. Complex functions and conformal mapping. Applications in electrodynamics, heat transfer, fluid dynamics and aerodynamics. Lecture-discussion, 4 hours. Prerequisite: Mathematics equivalent to ECPD-accredited curriculum or consent of instructor.

EGR 513 Applied Transform Methods in Engineering (4)

Laplace and Fourier transform methods. Integral equations. Applications to electrical networks, vibrations, heat conduction, hydrodynamics and elasticity. Lecture-discussion, 4 hours. Prerequisite: Mathematics equivalent to ECPD-accredited curriculum or consent of instructor.

EGR 515 Matrix Methods in Engineering (4)

Application of matrix methods in engineering analysis. Matrix algebra. Eigenvalues and eigenvectors. Energy techniques. Transformations. Applications in classical mechanics, analysis of structures, circuit analysis, vibrations, heat transfer and fluid dynamics. Lecture-discussion, 4 hours. Prerequisite: Mathematics equivalent to ECPD-accredited curriculum or consent of instructor..

EGR 516 Advanced Indeterminate Structures (4)

Analysis of multi-degree of freedom systems by slope deflection and superposition of distribution process. Elements of matrix application including flexibility and stiffness methods. Deflection of continuous trusses and frames. Stability analysis of beam-column utilizing classical strain energy theorems. Lecture-discussion, 4 hours. Prerequisite: upper-division course in structural analysis.

EGR 517 Advanced Steel Design (4)

Structural steel analysis and design including long span and tapered girders, orthotropic plates, space frames. Column stability and post buckling states, secondary stresses. Design of lateral force resistant building frames and composite steel-concrete systems. Plastic analysis and design of rigid frame structures. Lecture-discussion. 4 hours. Prerequisite: Upper-division course in structural steel analysis.

EGR 518 Stability of Structures (4)

Stability of beam columns; elastic and inelastic buckling of straight columns; torsional buckling of bars; lateral buckling of beams; local buckling of plate elements; stability to frames. Lecture-discussion, 4 hours. Prerequisite: EGR 511.

EGR 519 Advanced Indeterminate Structures (4)

Advanced finite element techniques, stiffness method, numerical techniques; stability and non-linear analysis; plate and shell elements. Lecture-discussion, 4 hours. Prerequisite: EGR 515, 516.

EGR 520 Elasticity (4)

Theory of stress and strain for continuous media. Stress-strain relations of elasticity. Plane stress and strain. Introduction to thermoelasticity. Lecture-disuussion, 4 hours. Prerequisite: Consent of instructor.

EGR 521 Structural Dynamics (4)

Concepts of the dynamics of elastic bodies. Longitudinal, transverse and torsional vibrations of structural elements. Vibrations of plates and shells. Approximate methods in dynamics of structures. Lecture-discussion, 4 hours. Prerequisite: Consent of instructor.

EGR 522 Advanced Reinforced Concrete Design (4)

Advanced design and analysis of continuous building frames to include floor systems, eccentrically loaded columns, folded plate and shell roof elements. Retaining structures, footings subject to overturning, composite deck sections. Lecture-discussion, 4 hours. Prerequisite: Upper-division course in design of reinforced structures.

EGR 523 Prestressed Concrete Design (4)

Design and analysis of prestressed concrete components including slabs, beams, and columns utilizing both elastic and ultimate strength design concepts; special problems involving composite design of structural systems. Lecture-discussion, 4 hours. Prerequisite: Upper division course in reinforced concrete design.

EGR 524 Mathematical Modeling in Transport Phenomena (4)

The application of mathematical analysis to the solution of transport phenomena problems. Topics include modeling and closed form solutions of ordinary and partial differential equations. Lecture-discussion, 4 hours. Prerequisite: Consent of instructor.

EGR 525 Foundation Engineering (4)

Advanced foundation engineering analysis and design. Comprehensive analysis and design of footings, mats, raft foundations, piles, caissons, and retaining structures. Survey of the analysis and design of cofferdams, abutments, tunnel shoring, and buried pipes. Lecture-discussion, 4 hours. Prerequisite: Consent of instructor.

EGR 526 Hydrodynamics (4)

Application of continuity, energy and momentum equations. Two- and three-dimensional potential flow; method of images. Conformal mapping; Schwarz-Christoffel transformation. Electroconductive analog. Navier-Stokes equations; some exact solutions. Boundary layer flows; pressure gradient. Laminar motion, transition and turbulent motion; cavitation. Introduction to unsteady flow. Introduction to non-Newtonian fluid mechanics. Lecture-discussion, 4 hours. Prerequisite: Consent of instructor.

EGR 527 Advanced Gas Dynamics (4)

Method of characteristics and applications; non-steady flows; the blunt body problem and curved shock waves; similarity rules; real gas results; Newtonian gas dynamics. Lecture-discussion, 4 hours. Prerequisite: Upper-division course in gas dynamics.

EGR 528 Hypersonic Aerodynamics (4)

Two- and three-dimensional flow fields. Hypersonic small disturbance and Newtonian impact theories and application. Boundary layer interaction with the inviscid flow field. Real gas phenomena. Blunt body and conical flow fields; minimum drag bodies; aerodynamic analysis of complete configurations. Lecture-discussion, 4 hours. Prerequisites: Upper-division course in supersonic aerodynamics, or consent of instructor.

EGR 529 Nuclear Engineering (3)

Diffusion and slowing down of neutrons; steady state reactor theory; critical size, homogeneous and heterogeneous reactor systems. Control of nuclear reactors, reactor kinetics, reactor system analysis, transient behavior. Reactor operation; startup, scram, and shutdown. Lecture-discussion, 3 hours. Prerequisite: undergraduate course in nuclear engineering.

EGR 530 Theory of Structural Plates and Shells (4)

Flexural theory of thin plates of various forms; stability of flat plates; small deflections of laterally loaded plates; effect of various edge restraints; optimum design of plate-type structures; general theory of thin shells involving stresses and deformation; stability analysis of thin shells; design of thin shell concrete roofs. Lecture-discussion, 4 hours. Prerequisite: EGR 511 and consent of instructor.

EGR 531 Atmospheric Pollution Dynamics (4)

Shifting equilibrium kinetics; rate constants, branching chain. Catalysis; rates, diffusion, mixing. Atmospheric environment; remote sensing, simulation, eddy diffusion. Coagulation of an aerosol. Atmospheric boundary layer; turbulence. Photochemical smog; chemical kinetics, modeling, simulation. Lecture-discussion, 4 hours. Prerequisites: Upper division course in atmospheric pollution, EGR 511, 535, or equivalents.

EGR 532 Conduction Heat Transfer (4)

Application of principles of heat transfer and thermodynamics in solution of steady-state, transient heat transfer problems. Classical heat conduction theory. Deriviation of Fourier field equation and integration of various single and multidimensional problems. Detailed discussion of thermal conductivity. Lecture-discussion, 4 hours. Prerequisite: Upper-division course in heat transfer.

EGR 533 Mechanical Metallurgy (4)

Study of the mechanical behavior of metals. Fundamental mechanisms controlling deformation phenomena, strain-hardening, creep, fatigue, and fracture. Strengthening mechanisms involving alloying and heat treatment. Lecture, 4 hours. Prerequisite: Undergraduate courses in strength of materials and materials science.

EGR 534 Fracture of Solids (4)

Engineering and microscopic approaches, fracture testing, nucleation and propagation of cleavage and shear cracks. Effect of notches, fracture of steels, creep and fatigue, stress corrosion cracking, and hydrogen embittlement. Lecture-discussion, 4 hours. Prerequisite: Consent of instructor.

EGR 535 Advanced Fluid Dynamics (4)

Fluid stress and rate of strain relationships. Momentum and energy similarity parameters. Fluid turbulence. Free turbulent flows. Hydraulic flows. Lecture-discussion, 4 hours. Prerequisite: Upper division course in fluid mechanics or consent of instructor.

EGR 536 Aerodynamics of Ground Transportation Systems (4)

Aerodynamics of high speed ground transportation vehicles; steady, unsteady flow. Analysis of vehicles in tubes; incompressible, compressible flow. Slender body aerodynamics: shielding effects, forces, moments. Ram wing: forces, moments, stability. Travel time reduction. Energy management. Drag: friction, interference. Lecture-discussion, 4 hours. Prerequisite: Upper division course in high speed surface transportation systems.

EGR 537 Boundary Layer Concepts (4)

Treatment of Newtonian and non-Newtonian fluids in the laminar and turbulent regimes. Positive and negative pressure gradients. Development of the thermal boundary layer. Some exact and inexact solutions. Wedge flow. Lecture-discussion, 4 hours. Prerequisite: EGR 535.

EGR 538 Advanced Engineering Economy (4)

Engineering economic decision criteria and models for evaluating capital investment proposals and engineering projects. Replacement studies, risk and uncertainty, tax effects, intangibles, probabilistic models, computer techniques. Lecture-discussion, 4 hours. Prerequisite: Three quarter units of undergraduate engineering economy.

EGR 539 Advanced Human Factors in Engineering Design (4)

Methods and research techniques in engineering design of optimum man-machine systems. Designing systems with the objective of developing optimum combinations of physical and human components. Effects of environment on human performance. Man-machine dynamics. Lecture-discussion, 4 hours. Prerequisite: Consent of instructor.

EGR 540 Systems Theory (4)

Application of matrix theory and linear vector spaces to the mathematical representation of systems. Analysis of the state equations for linear, time varying and invariant, continuous and discrete systems. Lecture-discussion, 4 hours. Prerequisite: Mathematics equivalent to ECPD-accredited curriculum or consent of instructor.

EGR 541 Advanced Networks Analysis (4)

General analysis procedures for linear networks. Properties and limitations of linear networks. Lecture-discussion, 4 hours. Prerequisite: Upper division course in networks analysis and EGR 540 or consent of instructor.

EGR 542 Sampled-Data Control Systems (4)

Basic theory of sampling and quantizing, state-space and Z-transform representation. Time response stability and design using both classical and modern techniques. Lecture-discussion, 4 hours. Prerequisites: Upper-division course in control systems and EGR 540 or consent of instructor.

EGR 543 Computer Architecture (4)

Digital computer organization and comparative architectural features; digital design languages as tools in establishing the engineering specifications leading to the systematic design of a digital logic system. Micro programming concepts and their influence on architecture and design. Lecture-discussion, 4 hours. Prerequisite: Upper division course in logic systems design or consent of instructor.

EGR 544 Communication Theory (4)

Information theory for continuous and discrete channels. Signal detection and recognition, coding for optimal communication nets. Lecture-discussion, 4 hours. Prerequisite: Upper-division course in communications systems.

EGR 545 Advanced Engineering Thermodynamics (4)

Development of concept of equilibrium. Reversible and irreversible principles of thermodynamics, second law consequences; estimation and correlation of thermodynamic properties. Physical basis of conservation equations. Statistical foundations. Lecture-discussion, 4 hours. Prerequsite: Upper division course in thermodynamics.

EGR 546 Heterogeneous Phase Equilibria (4)

Applied phase equilibria. A development of theoretical and empirical principles for understanding complex multiphase behavior in multicomponent chemical systems. Lecture-discussion, 4 hours. Prerequisite: Consent of instructor.

EGR 547 Separation Processes (4)

Design, cost and energy requirements for processes to remove pollutants from plant effluents. Topics include equilibrium processes, multistage processes, binary and multi-component systems. Lecture-discussion, 4 hours. Prerequisite: Consent of instructor.

EGR 548 Solid State Electronics (4)

Quantum theory and atomic structure. Classical and quantum statistics. Description of crystal structures. Lattic vibrations. Band theory of solids. Transport phenomena in semi-conductors and metals. Lecture-discussion, 4 hours. Prerequisite: Upper-division course in solid-state electronics.

EGR 549 Advanced Methods in Operations Research (4)

Methodology of operations research and algorithms for system and subsystem optimization; emphasis on methods yielding practical numerical procedures. Linear programming and extensions, dynamic and integer programming, queuing theory, network analysis, game theory and decision theory. Lecture-discussion, 4 hours. Prerequisite: Upper division course in operations research or consent of instructor.

EGR 550 Advanced Transport Phenomena (4)

Differential balances for momentum, heat, and mass transfer are derived. Convective energy, mass, and momentum transfer; internal and external flow, exact and approximate solutions. Application for space vehicle re-entry, binary and multicomponent systems, nuclear reactor cooling, mass transfer and heat exchanger analysis. Lecture-discussion, 4 hours. Prerequisite: EGR 537 or consent of instructor.

EGR 551 Logical Design of Finite State Machines (4)

Techniques of minimizing or decomposing combinational, sequential, and iterative circuits, finite state machine models, transition graphs, machine identification, decomposition, regular expressions, machine description, and lossless machines. Lecture-discussion, 4 hours. Prerequisite: Six quarter units of upper division logic systems design.

EGR 552 Nonlinear Control Systems (4)

Numerical approximation methods in the solution of non-linear systems. Phase-plane techniques including method of isoclines, delta, and analysis of singular points. Describing function techniques, perturbation reversion, variation of parameters and harmonic balance methods. Liapunov stability methods. Lecture-discussion, 4 hours. Prerequisites: Upper-division course in control systems and EGR 540 or consent of instructor.

EGR 553 Computer Simulation of Engineering Systems (4)

Systems theory as foundation for engineering analysis and synthesis of complex systems. Numerical methods and simulation models using digital computers. Optimization of engineering systems design and performance. Applications to engineering systems problems. Lecture-discussion, 4 hours. Prerequisite: Consent of instructor.

EGR 554 Modern Algebra for Digital Systems (4)

Algebraic systems of groups, rings and Boolean algebras. Application of digital computer systems and data communication. Lecture-discussion, 4 hours. Prerequisite: Three quarter units of upper division logic systems design.

EGR 555 Advanced Analytical Dynamics (3)

Lagrange's equations, Hamilton's principle, variational principles, equations of motion in Eulerian angle systems, characteristic equation of inertia matrix, cuspidal motion and notation. Lecture-discussion, 3 hours. Prerequisite: EGR 511.

EGR 556 Advanced Mechanics of Materials (4)

Theories of failure, dynamic loading, unsymmetrical bending, shear center, curved beams, thick-walled cylinders, inelastic action (limit design), residual stresses, energy methods, repeated loading (fatigue), stress concentration. Lecture-discussion, 4 hours. Prerequisite: Consent of instructor.

EGR 557 Analysis of Mechanical Designs (3)

Analysis of common machine elements. Relation to design decision making. Optimization, reliability, miniaturization, and statistical strength theory. Lecture-discussion, 3 hours. Prerequisite: Upper division course in stress analysis.

EGR 558 Solid State Electronics (4)

In-depth treatment of the physical principles and operational characteristics of advanced semiconductor devices; emphasis on current development and technology. Lecture-discussion, 4 hours. Prerequisite: EGR 548.

EGR 559 Applied Automata (4)

The study of information processing or pattern systems as applied to digital computing systems and data communication. Lecture-discussion 4 hours. Prerequisite: Upper-division course in probability theory.

EGR 560 Information Theory and Coding (4)

Channel models, coding theorems, coding systems, statistical properties of information sources. Lecture-discussion, 4 hours. Prerequisite: Upper-division course in probability theory.

EGR 561 Computer-Aided Circuit Design (4)

Device modeling, numerical techniques for solving network equations in the frequency and time domains, design techniques using adjoint circuits, recent network design and analysis programs. Lecture-discussion, 4 hours. Prerequisite: Consent of instructor.

EGR 562 Advanced Microwave Engineering (4)

Analysis of microwave components and networks, Green's functions; plane, cylindrical, and spherical wave functions; wave guides, cavities, scattering and defraction of waves, microwave networks and radiation. Lecture-discussion, 4 hours. Prerequisite: Undergraduate course in field theory or consent of instructor.

EGR 563 Systems Theory (4)

Nonlinear systems and perturbation theory; stability for linear and nonlinear systems using Liapunov methods; controllability and observability of linear systems. Lecture-discussion, 4 hours. Prerequisite: EGR 540.

EGR 564 Radiation Heat Transfer (4)

Radiation properties of surfaces; radiant interchange among surfaces separated by radiatively non-participating media including the interchange among black and gray surfaces; radiant energy transfer through absorbing, emitting, and scattering media. Lecture-discussion, 4 hours. Prerequisite: Upper division course in heat transfer.

EGR 565 Water Quality Analysis (4)

Application of chemical principles to analysis of natural water systems, water purification technology, and water pollution control. Physiology of organisms of importance in water supply and in waste-water treatment processes. Enzymatic reaction. Biochemical oxidation and fermentations. Ecology and eutrophication. Lecture-discussion, 3 hours, laboratory 3 hours. Prerequisite: Undergraduate lecture and laboratory course in sanitary engineering.

EGR 566 Fundamentals of Aseismic Design (4)

Characteristics of strong ground motion, causes, response spectra, earthquake response of single degree and multiple degree of freedom systems. Structural analysis based on revised Los Angeles City Code relative to earthquake-resistant design. Design of structures relative to earthquake resistance. Lecture-discussion, 4 hours. Prerequisite: Upper division course in structural analysis.

EGR 567 Unit Processes in Water and Wastewater Treatment (3)

The physical and chemical unit processes in water and waste treatment, relationship of design practice and theory, operational considerations, and the optimization of unit processes; aeration, sedimentation, flocculation, flotation, absorption, filtration, ion exchange, coagulation, corrosion control, and disinfection. Lecture-discussion, 3 hours. Prerequisite: Upper division course in sanitary engineering.

EGR 568 Biological Unit Processes in Waste Water Treatment (4)

Microbial reactions related to water and waste water treatment. Biological interactions in various unit processes related to design and operational considerations required for optimization; disinfection, activated sludge, trickling filters, and sludge digestion. Lecture-discussion, 4 hours. Prerequisite: Upper division course in sanitary engineering.

EGR 569 Groundwater Hydrology (4)

Properties of water-bearing materials, hydraulic conductivity, the equation of continuity, incompressible and irrotational flow, and basic differential-flow equations. Geohydrology and water level fluctuations in response to natural and artificial loads. Optimum design, groundwater modeling techniques, and ground-water basic management. Lecture-discussion, 4 hours. Prerequisite: Upper division course in hydrology.

EGR 570 Boiling Heat Transfer (4)

Examination and analysis of heat transfer characteristics and physical events associated with nucleate and film boiling, drop-wise and film-wise condensation, and two-phase flow. Lecture-discussion, 4 hours. Prerequisite: Upper division course in transport phemonema.

EGR 571 Cryogenic Engineering (4)

Design and analysis of engineering systems for gas liquification, separation of gas mixtures, and low-temperature refrigeration. Lecture-discussion, 4 hours. Prerequisite: Upper division course in engineering thermodynamics and transport phenomena.

EGR 572 Advanced Methods in Operations Research (4)

Mathematical models for optimizing systems and subsystems. Integer programming, nonlinear programming, and markov chains included. Lecture-discussion, 4 hours. Prerequisite: EGR 549 or consent of instructor.

EGR 573 Advanced Operations Planning and Control Systems (4)

Operations analysis of integrated production systems; mathematical and computer models for planning, scheduling, and control of production and service systems. Statistical techniques in forecasting; optimization of resources utilization. Lecture-discussion, 4 hours. Prerequisite: Upper-division course in operations research or consent of instructor.

EGR 574 Advanced Facilities Planning (4)

Planning, analyzing, justifying, controlling, and evaluating physical facilities. Long- and short-range facilities plans, decision criteria, authorization and control procedures, post completion audits. Resource allocation, optimization, simulation, and computer techniques. Technical, economic, ecological, safety, and intangible factors. Case studies. Lecture-dioscussion, 4 hours. Prerequisite: Undergradute course in engineering economy or consent of instructor.

EGR 575 Turbomachinery (4)

Application of energy, momentum, and continuity equations. General treatment of all forms of turbomachinery; energy transfer; dynamics and thermodynamics of compressible flow in passages and over blades of turbomachines. Applications to turbopumps, compressors, and turbines. Turbomachine design projects. Lecture-discussion , 4 hours. Prerequisite: Undergraduate course in compressible flow or consent of instructor.

EGR 576 Combustion Theory (4)

Molecular structure and statistical thermodynamics. Real gases. Transport phenomena. Chemical reactions in gases. Reactive gas dynamics. Combustion phenomena and diffusion flames. Premixed gas flames; flame propagation, cellular flames, quenching. Aerodynamics of flames; flame shape, turbulent flames. Detonation. Applications. Lecture-discussion, 4 hours. Prerequisites: Undergraduate courses in thermodynamics and heat transfer or consent of instructor.

EGR 577 Wing-Body Aerodynamics (4)

Three dimensional wings: steady, subsonic flow; supersonic flow. Lifting line theory: spanwise lift distribution, induced drag, twist, sweepback. Introduction to lifting surface theory: planar, nonplanar, interference. Transonic small-disturbance flow. Unsteady flow. Conical flows. Lecture-discussion, 4 hours. Prerequisite: Undergraduate course in aerodynamics.

EGR 578 Aircraft Stability and Control (4)

Static stability and control. Stick force to trim. Maneuverability. Influence of wing flaps. Influence of the propulsion system. Equations of unsteady motion. Stability derivatives: aerodynamics transfer functions, aeroelastic derivatives. Lecture-discussion, 4 hours. Prerequisite: Undergraduate course in aerodynamics or consent of instructor.

EGR 579 Vibration and Flutter (4)

Two- and three-dimensional flutter theory. Structural damping. Aerodynamics forces. Flutter stability. Non-linear characteristics. Aspect ratio and compressibility effects. Empennage vibration and flutter analysis. Wing torsional divergence, aileron reversal and effectiveness. Modeling concepts. Lecture-discussion, 4 hours. Prerequisites: Upper-division courses in aerodynamics, structures and dynamics and EGR 515, or consent of instructor.

EGR 599 Special Topics for Graduate Students (2-4)

Lecture-discussion of selected topics comprising new or experimental courses not otherwise offered. Each offering identified in the current schedule and on the student's transcript. Prerequisite: Consent of instructor.

EGR 690 Engineering Seminar (3)

Topics in advanced engineering chosen according to the interests and needs of the students enrolled. Each seminar subtitled to describe its content. Seminar, 3 hours. Prerequisite: Classified standing and professor's approval. May be repeated for a maximum of 6 units.

EGR 691 Directed Study (1-3)

Analytical or laboratory investigation, under direction of a graduate faculty member, of selected engineering problems with emphasis on individual initiative in gathering and organizing data and reporting results. May be repeated to a maximum of 3 units.

EGR 695 Master's Degree Project (2-4)

Independent research resulting in a project. Credit assigned upon successful completion of a project approved for the master's degree. Open to classified graduate students advanced to candidacy for the degree and with approval of the major professor. Maximum credit 9 units, minimum 4 units.

EGR 696 Master's Degree Thesis (2-4)

Independent research resulting in a thesis. Credit assigned upon successful completion of a thesis approved for the master's degree. Open to classified graduate students advanced to candidacy for the degree and with approval of the major professor. Maximum credit 6 units, minimum 4 units.

EGR 699 Master's Degree Continuation (0)

Registration required in any quarter following final assignment of SP in continuing work in which student intends to use facilities of the university. Registration permitted instead of leave of absence when student plans to use university facilities. Prerequisite: Advancement to candidacy for master's degree.

Upper-division courses applicable to the master's degree will be found in the section of the catalog describing undergraduate courses in the School of Engineering. See p. 239.

ENGLISH

Master of Arts in English

In the Department of English and Modern Languages, School of Arts

Robert E. Morsberger, *Chairman*

Graduate Committee

John F. Fulbeck, *Chairman*

Samuel I. Bellman

C. Edwin Harwood

Harold P. Levitt

Joseph H. Stodder

The primary objective of the Master of Arts program in English is to develop in the student a critical understanding of literature beyond the undergraduate level by cultivating in him an ability, through close reading of the literary text, to appreciate its form and explain the interrelationships of its part in the whole. Professionally, the program is designed to prepare competent English teachers for junior college and high school, and students who wish to proceed immediately to doctoral work.

Admission to the Program

For admission as a classified student in the Master of Arts program, the applicant should present a well-balanced undergraduate program—one that includes work in all the major periods, American literature, Shakespeare, Chaucer, literary criticism, and the English language. Deficiencies in any of these areas will be made up by course work; however, at the discretion of the chairman of the departmental graduate committee, a portion of such work may count toward the 45 units required for the degree. The student's grade point average in the upper division English courses of his undergraduate program must be at least 3.0. A student who does not meet these requirements may request special consideration for admission as a conditional student.

Admission to candidacy in the master's degree program in English will require the completion of at least fifteen quarter units of graduate work in English, in residence at this university, with an average grade of B; no grade below C will be accepted to meet this requirement.

Requirements and Curriculum

1. Course Work

The candidate will complete 45 units as follows:

Required Course

ENG 600 Techniques of Bibliography and Research 3

Alternate Requirements–18 units

In the following two-quarter sequences, the first quarter may be elected without the second. The student must show at least 3 units in each of Groups I, II, III and IV and elect two complete two-course sequences from different groups—I, II, III, IV or V. Complete two-course sequences in literature should be of different periods, one sequence in prose works and the other in poetry.

Group I 3-6
ENG 651, 652 Studies in English Literature
a. to 1500
b. 1500-1660
c. 1660-1800
d. 19th Century
e. 20th Century

Group II 3-6
ENG 661, 662 Studies in American Literature
a. to 1800
b. 19th Century
c. 20th Century

Group III 3-6
ENG 571, 572 Studies in Fiction
ENG 573, 574 Studies in Drama
ENG 575, 576 Studies in Poetry
ENG 577, 578 Studies in Non-Fictional Prose

Group IV 3-6
ENG 581, 582 Studies in the English Language

Group V
ENG 585 The New Rhetoric in Theory and Practice 3
ENG 586 Problems in High School Composition 3
ENG 588 Problems in College Freshman Composition 3

Elective Courses–24 units

These may include electives listed under Alternate Requirements above, and

ENG 550 English Seminar 1-3
ENG 570 Practical Criticism 3
ENG 580 Seminar in Creative Writing 1-4
ENG 587 The Teaching of Basic Language Skills 3
ENG 589 Developmental Reading in the Secondary School and Community College 3
ENG 691 Directed Study 1-3

A maximum of 8 units may be taken in fields related to English, chiefly philosophy, history, drama, communication arts, and the history of art.

2. Foreign Language

A candidate for the M.A. in English should be conversant in a foreign language. Normally, this means that level of achievement gained by two years of college study in the language. Variations of experience are such, however, that no single statement can be made. All candidates, therefore, are requested to consult with their advisers about the foreign language requirement.

3. Comprehensive Examination

Requirements for the degree include the successful completion of a final comprehensive examination.

Graduate Course Descriptions

ENG 550 English Seminar (1-3)

Topics in advanced areas of language or literature. Seminar, 1 to 3 hours. Prerequisite: Instructor's approval. May be repeated for a total of 9 units.

ENG 570 Practical Criticism (3)

Practice in applying to works of various genres such modes of criticism as the formal, the historical, and the psychological. Seminar, 3 hours.

ENG 571, 572 Studies in Fiction (3) (3)

Selected authors and topics. In the first quarter, extensive reading. In the second, explication, by students, of selected texts; long paper. First quarter or consent of instructor prerequisite to the second. Seminar, 3 hours.

ENG 573, 574 Studies in Drama (3) (3)

Selected authors and topics. In the first quarter, extensive reading. In the second, explication, by students, of selected texts; long paper. First quarter or consent of instructor prerequisite to the second. Seminar, 3 hours.

ENG 575, 576 Studies in Poetry (3) (3)

Selected authors and topics. In the first quarter, extensive reading. In the second, explication, by students, of selected texts; long paper. First quarter or consent of instructor prerequisite to the second. Seminar, 3 hours.

ENG 577, 578 Studies in Non-fictional Prose (3) (3)

Selected authors and topics. In the first quarter, extensive reading. In the second, explication, by students, of selected texts; long paper. First quarter or consent of instructor prerequisite to the second. Seminar, 3 hours.

ENG 580 Seminar in Creative Writing (1-4)

Two genres: fiction and non-fiction or poetry and drama. Seminar, 1 to 4 hours. Prerequisite: Approval of submitted manuscript or consent of instructor.

ENG 581, 582 Studies in English Language (3) (3)

Such topics as language as a cultural force, literary tradition approached linguistically, stylistics and poetics, dialects and their social context. Seminar, 3 hours.

ENG 583 The Contemporary American Novel (3)

Structure and theme in the American novel since 1945. Such writers as Bellow, Capote, Malamud, Roth, Styron, Updike. Lecture-discussion, 3 hours.

ENG 585 The New Rhetoric in Theory and Practice (3)

Readings in I. A. Richards, Kenneth Burke, Francis Christensen, and others. Application of rhetorical principles to problems in writing. Stylistic analyses of contemporary expository prose. Seminar, 3 hours.

ENG 586 Problems in High School Composition (3)

Practices in the teaching of composition in secondary schools. Readings, observations and sample teaching under supervision. Seminar, 2 hours, field work.

ENG 587 The Teaching of Basic Language Skills (3)

Approaches to the problems of high school and community college students with serious deficiencies in language skills. Lecture-discussion, 3 hours. Prerequisite: Consent of instructor.

ENG 588 Problems in College Freshman Composition (3)

The instruction of composition in the community college classroom. Readings, observations and sample teaching under supervision. Seminar, 2 hours, field work.

ENG 589 Developmental Reading in the Secondary School and Community College (3)

Theory and practice in the development of effective reading by students who have mastered basic reading skills and can be helped to enrich vocabulary, improve comprehension and increase speed. Lecture-discussion, 3 hours. Prerequisite: consent of instructor.

ENG 600 Techniques of Bibliography and Research (3)

Principles, techniques, and materials relevant to the solution of problems in scholarly and critical investigation. Bibliographical sources and methods. Should be taken in the first quarter of the student's degree program. Lecture-discussion, 3 hours.

ENG 651, 652 Studies in English Literature (3) (3)

Selected authors and topics: (A) to 1500, (B) 1500-1660, (C) 1660-1800, (D) 19th Century, (E) 20th Century. In the first quarter, extensive reading. In the second, explication of selected texts; long paper. First quarter or consent of instructor prerequisite to second. May be repeated with different content for additional credit. Seminar, 3 hours.

ENG 661, 662 Studies in American Literature (3) (3)

Selected authors and topics: (A) to 1800, (B) 19th Century, (C) 20th Century. In the first quarter, extensive reading. In the second, explication of selected texts; long paper. First quarter or consent of instructor prerequisite to second. May be repeated with different content for additional credit. Seminar, 3 hours.

ENG 691 Directed Study (1-3)

Independent reading in areas of student's interest. Preparation for comprehensive examination. May be repeated.

ENG 699 Master's Degree Continuation (0)

Registration required in any quarter following final assignment of SP in continuing work in which student intends to use facilities of the university. Registration permitted instead of leave of absence when student plans to use university facilities. Prerequisite: Advancement to candidacy for master's degree or admission to a credential program.

Upper-division courses applicable to the master's degree will be found in the Department of English and Modern Languages undergraduate section of the catalog. See p. 152.

LANDSCAPE ARCHITECTURE

Master of Landscape Architecture

In the Department of Landscape Architecture, School of Environmental Design

Cameron Man, *Chairman*

Landscape Architecture Graduate Studies Committee

John Lyle, *Chairman*
Chester A. Volski
D. Rodney Tapp
Mark J. von Wodtke

The Department of Landscape Architecture welcomes graduate students from a variety of academic disciplines who are concerned with the shaping of our physical environment. A graduate student in this program can learn the best and most advanced methods for establishing strong, clearly-defined, and mutually life-sustaining and enhancing relationships between man and the land. The curriculum emphasizes case study projects at scales varying from the garden to the region with frequent review, discussion, and seminar sessions.

Upon completion of the program, a student will have developed sufficient comprehension of landscape design, environmental planning, plant associations, and landscape technology to enable him to communicate effectively with experts in the key specialized areas of landscape architecture and related disciplines. He will also have acquired a professional level of skill in one or more of these areas for application in practice. To meet these objectives, the curriculum offers a balance of required and elective courses for a broad base and specialized concentration. The number of course options, combined with opportunities for individual directed effort, provides varied directions for professional development. In general the student is advised to follow a direction that that will effectively utilize his previous education.

Students with degrees in disciplines other than environmental design normally take a series of prerequisite courses before proceeding with regular graduate course work. These courses normally require three quarters of full time study. In most cases, they will fulfill the minor emphasis area requirement. Completion of the degree program, which usually takes six quarters in residence for the student with a bachelor's degree in environmental design, will generally take nine quarters, or three academic years, for the student from another discipline.

Admission to the Program

Admission to the Master of Landscape Architecture program as a classified graduate student requires an undergraduate grade point average of 3.0 or better. An applicant with an average between 2.5 and 3.0 will be considered for admission on a conditional basis if he can demonstrate compensating qualifications. In April the Graduate Studies Committee will select those candidates who will be admitted for the following summer or fall on the basis of their demonstrated ability.

Following admission, the student and his advisory committee will plan a program of study which lists all courses and other requirements which the student must fulfill for the degree. The curriculum specified in the program may be altered only by written petition, which shall be submitted in accordance with university regulations.

Requirements

1. A minimum of 72 quarter units of graduate work must be completed in the graduate degree program; of these, at least 50 units must be at the graduate level. Upper division courses in elective and minor emphasis areas must be approved by the student's adviser. A minimum grade point average of 3.0 must be maintained in all courses taken to satisfy degree requirements as well as in all graded course work attempted while in graduate standing at this university.
2. Students with undergraduate degrees in landscape architecture will take a minimum of 12 units in a minor emphasis area. This area should be related to the student's professional direction and must be approved by the graduate adviser.
3. Courses required for all graduate students in landscape architecture are LA 512, LA 601 and either LA 695 or 696. At least six units are required from each of the following groups of courses: LA 551, 692; LA 604, 632, 642; LA 691, 692. Eighteen units are required from the following group of courses (including those repeated for credit): LA 602, 603, 605, 606. In addition, students with degrees in disciplines other than environmental design must take the following prerequisite courses: ENV 510, LA 511, 531, 541, and six units of environmental history.
4. Within four quarters after beginning the program, each student, in consultation with his adviser, will develop a program listing all courses that he must take for the degree. The number required by this program will, in most cases, exceed the minimum 72.

Curriculum

In consultation with his adviser, and in accordance with the above requirements, the student will select courses from the following list and approved electives to complete the 72-unit requirement for the Master of Landscape Architecture degree.

		Units
LA 511	Landscape and Human Habitat	6
LA 512	Methods and Applications for Landscape Architecture	12
LA 531	Landscape Construction and Design	6
LA 541	Landscape Planting	6
LA 551	Seminar on the Profession	2
LA 601	Theory and Literature of Landscape Architecture	6
LA 602	Landscape Design and Natural Processes	6
LA 603	Landscape Design and Human Behavior	6
LA 604	Environmental Analysis	6
LA 605	Design of the Humanized Landscape	6
LA 606	Ecosystematic Landscape Design	6
LA 632	Landscape Technology	6
LA 642	Plant Ecology and Design	6
LA 652	Graduate Seminar	2
LA 691	Special Project	1
LA 692	Directed Research	1-6
LA 695	Project	2
LA 696	Thesis	4

Graduate Course Descriptions

LA 511 Landscape and Human Habitat (6)

Application of the design process to the shaping of the landscape for human purposes; exercises involving analysis and synthesis in the use of plant materials, land form, and structures at various scales and levels of complexity. Lecture-discussion, 3 hours, laboratory, 9 hours. Prerequisite: ENV 510 or degree in a design discipline.

LA 512 Methods and Applications for Landscape Architecture (12)

Exploration of concerns underlying landscape design; processes for dealing with them in area of ecosystems; methods for relating these concerns to planning and design; emphasis on applied ecology, systems analysis techniques, computer applications, and environmental policy and management. Lecture-discussion, 6 hours, laboratory, 18 hours. Prerequisite: ENV 510 or degree in a design discipline.

LA 531 Landscape Construction and Design (6)

Basic methods of landscape alteration, augmentation, and control including grading, drainage, roads and trails, utilities, and small structures; the uses, limitations, and effects of such alterations. Lecture-discussion, 3 hours, laboratory, 9 hours. Prerequisite: AE 131.

LA 541 Landscape Planting (6)

Selection of plant associations for the developed landscape on the basis of culture, utility and visual character, and ecological relationships; identification, classification, and use of common basic plants. Lecture-discussion, 3 hours, laboratory, 9 hours. Prerequisite: ENV 510 or degree in a design discipline or permission of instructor.

LA 551 Seminar on the Profession (2)

Analysis and discussion of the structure and organization of the profession of landscape architecture; its history and future. Case studies of profesional firms and organizations in the Los Angeles region. Seminar, 2 hours. Prerequisite: LA 601 or permission of instructor.

LA 601 Theory and Literature of Landscape Architecture (6)

Review and analysis of the existing body of literature concerning relationships between man and his natural environment, with particular concentration on ecosystems and human needs according to the preference of the individual student. Lecture-discussion, 3 hours, laboratory, 9 hours. Prerequisite: LA 512 or permission of instructor.

LA 602 Landscape Design and Natural Processes (6)

Applications of ecosystematic principles and methods explored in the first two quarters to physical problems of landscape design, encompassing a broad and complex range of human and natural considerations. Lecture-discussion, 3 hours, laboratory, 9 hours. Prerequisite: LA 512.

LA 603 Landscape Design and Human Behavior (6)

Application of approaches to the determination, satisfaction and expression of human needs in the shaping of space for human use and habitation. Lecture-discussion, 3 hours, laboratory, 9 hours. Prerequisite: LA 512.

LA 604 Environmental Analysis (6)

Techniques for prediction of alterations in social and natural processes brought about by human use of the land and the application of such assessments to environmental management. Lecture-discussion, 3 hours, laboratory, 9 hours. Prerequisite: LA 512 or permission of the instructor.

LA 605 Design of the Humanized Landscape (6)

Definition and solution of problems in the shaping of space involving human needs both individual and social, as a primary determinant of form. Emphasis on site planning and the urban context. Lecture-discussion, 3 hours, laboratory, 9 hours. Prerequisite: LA 603 or permission of instructor. May be repeated for credit.

LA 606 Ecosystematic Landscape Design (6)

Applications of the ecosystematic approach to complex large scale problems of landscape design and natural resource planning. Lecture-discussion, 3 hours, laboratory, 9 hours. Prerequisite: LA 602 or permission of instructor. May be repeated for credit.

LA 632 Landscape Technology (6)

Application of modern technology to landscape construction involving adaptation of the landscape for human purposes. Lecture-discussion, 3 hours, laboratory, 9 hours. Prerequisite: LA 531 or degree in landscape architecture.

LA 642 Plant Ecology and Design (6)

Determination and establishment of appropriate communities of plants for landscapes of varied degrees of development on the basis of ecological factors; advanced methods of plant selection and combination with emphasis on native plants and communities. Lecture-discussion, 3 hours, laboratory, 9 hours. Prerequisite: LA 541 or degree in landscape architecture.

LA 652 Graduate Seminar (2)

Seminar presentations and discussion of work in progress by all gradute students. Seminar, 2 hours. Prerequisite: LA 551.

LA 691 Special Project (1)

Individual exploration of particular area of concern. Required each quarter of classified students.

LA 692 Directed Research (1-6)

Independent study and research on a subject chosen by the student with the consultation, approval and direction of his adviser.

LA 695 Project (2)

Development of a terminal creative project designed to demonstrate skills and knowledge achieved in the graduate program. The subject will be selected by the student in consultation with his adviser. Prerequisite: LA 605 or 606.

LA 696 Thesis (4)

Development of a terminal creative research report, selected by the student and approved by the graduate studies committee, on a problem in the field of landscape architecture. Prerequisite: LA 605 or 606.

LA 699 Master's Degree Continuation (0)

Registration required in any quarter following final assignment of SP in continuing work in which student intends to use facilities of the university. Registration permitted instead of leave of absence when student plans to use university facilities. Prerequisite: Advancement to candidacy for master's degree.

Upper-division courses applicable to the master's degree will be found in the Department of Landscape Architecture undergraduate section of the catalog. See p. 304.

MATHEMATICS

Master of Science in Mathematics

In the Department of Mathematics, School of Science

Emil R. Herzog, *Chairman*

The university offers the degree of Master of Science in Mathematics to provide opportunities for advanced study to students whose background and interests focus on mathematical studies. Completion of this program will develop the student's knowledge and competence in mathematics and develop his ability to pursue advanced self-directed study in this field. A central curriculum, required of all candidates, provides a foundation for the study of recent developments in mathematics. Each student's degree program beyond the requirements will be planned to further his plans to pursue a career in applied fields of mathematics, in teaching, or in more advanced study leading to the doctorate.

Admission to the Program

An applicant for admission to this program should have completed a baccalaureate degree program in mathematics comparable to that offered at this university or a baccalaureate degree in a related field with at least 16 quarter units of upper division courses including MAT 314 and MAT 417 or their equivalent. Students whose undergraduate degree is in a field other than mathematics will generally find it necessary to follow a program of additional preparation before undertaking graduate work in mathematics. An upper division grade-point average in mathematics of at least 3.0 is required for admission as a classified graduate student in mathematics. Each applicant will be considered by the departmental graduate committee and recommended for admission on the basis of all evidence applicable to his admission. An applicant not meeting the minimum standards of the department may be admitted as a conditional student if space is available. He must comply with the conditions under which he is admitted within the time stipulated.

Student Program

The student's study list will be based upon his undergraduate preparation, his current interests in mathematics, and his occupational and professional goals. During the first quarter of residence, each classified graduate stu-

dent will prepare a study list in consultation with his major professor. This will define all courses and other requirements which the student must fulfill to earn the degree. Once approved by the School of Science and verified by the Graduate Division, the study list may be amended only by petition, as outlined in the appropriate sections of the catalog.

Requirements

1. At least 45 units of acceptable graduate work must be completed in the master's degree program. At least 25 units of this credit shall be in courses at the graduate level.
2. No more than 9 units of graduate credit earned at other accredited institutions or in extension may be applied to degree requirements.
3. At least 27 units of credit toward the degree shall be completed after the student has been approved for advancement to candidacy.
4. A grade-point average of B(3.0) or better shall be maintained in all course work taken to satisfy the degree requirements.

Curriculum

REQUIRED COURSES

	Units
MAT 511 Real Analysis	4
MAT 517 Abstract Algebra	4
*MAT 413 Advanced Calculus	4
*MAT 419 Abstract Linear Algebra	4
*MAT 428 or 528 Complex Analysis	4

A project or comprehensive examination is required of all candidates.

ELECTIVES

Graduate mathematics, including completion of two graduate sequences	17
Additional electives from	8

1. Graduate courses in mathematics
2. Senior level courses in mathematics other than MAT 417.
3. Up to two courses from approved graduate offerings of other departments

Total	45

*If a comparable course has been completed previously, a 4-unit elective may be substituted.

Graduate Course Descriptions

MAT 501 Metric Mathematics (3)

Teaching mathematics to elementary students; techniques for meaningful presentation of content as well as material for practice. Metric system of weights and measures; definitions, applications, interrelationships of metric units, relationship to English units; methods for teaching the system. Lecture-discussion, 4 hours. Prerequisite: MAT 207 or consent of instructor. Not acceptable as credit towards a master's degree.

MAT 511, 512 Real Analysis (4) (4)

Properties of Lebesgue measure and integration, Borel Sets, monotone functions and functions of bounded variation, classical Banach spaces, metric spaces, measure spaces and measurable functions, the Radon-Nikodym theorem, the Fubini theorems, Daniel integrals. Lecture-discussion, 4 hours. Prerequisite: MAT 315.

MAT 517, 518 Abstract Algebra (4) (4)

Groups, Sylow theorems, rings and modules, chain conditions, morphism theorems, principal ideal domains, field extensions and finite fields, Galois theory. Lecture-discussion, 4 hours. Prerequisite: MAT 417.

MAT 521, 522 Topology (4) (4)

Topological spaces, connectedness, compactness, continuity, separation and countability axioms, metric spaces, product spaces, function spaces and quotient spaces, uniform spaces, paracompactness. Lecture-discussion, 4 hours. Prerequisite: consent of instructor.

MAT 528, 529 Complex Analysis (4) (4)

General form of Cauchy's theorem, conformal mappings, normal families. Riemann mapping theorem n, theorems of Mittag-Leffler and Weierstrass, analytic continuation. Picard's theorem. Selected topics such as Dirichlet's problem, generalization of Picard's theorem, gamma and zeta functions. Lecture-discussion, 4 hours. Prerequisite: MAT 314 or 428.

MAT 535 History of Mathematics (4)

Historical development of selected mathematical topics drawn generally from the body of 18th Century and later mathematics. Topics to be covered announced by the professor prior to registration. Lecture-discussion, 4 hours. Prerequisite: Consent of instructor.

MAT 544, 545 Topics in Applied Mathematics (4) (4)

Topics from applied mathematics with emphasis on modern mathematical techniques as well as their related abstract concepts; linear operators, integral transforms, partial differential equations, the eigenvalue problem, integral equations, calculus of variations, tensor analysis, group representations. Lecture-discussion, 4 hours. Prerequisite: consent of instructor.

MAT 550 Seminar in Mathematics (1-4)

Topics in advanced mathematics chosen according to the interests and needs of the students enrolled. Each seminar will have a subtitle according to the nature of the content. Seminar, 1 to 3 hours. Prerequisite: Instructor's approval. May be repeated for a maximum of 8 units.

MAT 599 Special Topics for Graduate Students (3-4)

Topics to be announced in advance. Lecture-discussion, 3 to 4 hours.

MAT 691 Directed Readings (1-2)

Individual reading program in an area chosen by the student under the direction and supervision of the faculty. Maximum of 4 units credit.

MAT 695 Project (1-3)

Independent research and study under supervision of the faculty. Reporting of research results in an acceptable form. Maximum of 3 units credit.

MAT 699 Master's Degree Continuation (0)

Registration required in any quarter following final assignment of SP in continuing work in which student intends to use facilities of the university. Registration permitted instead of leave of absence when student plans to use university facilities. Prerequisite: Advancement to candidacy for master's degree or admission to a credential program.

Upper-division courses applicable to the master's degree will be found in the Department of Mathematics undergraduate section of the catalog. See p. 318.

PHYSICAL EDUCATION

Master of Science in Physical Education

In the Department of Physical Education, School of Arts

Leo H. Teghtmeyer, *Chairman*

Physical Education Graduate Committee

Lynne Emery, *Chairman*
V. B. Anooshian
Stanley Bassin
Otto F. W. Gasser
Jessie I. Klinger
Frank D. Lansford
Mary Jo Oliver
Arthur Ridgway
Magnus Syverson
Leo H. Teghtmeyer

The Master of Science in Physical Education curriculum is planned to provide the student with an opportunity to improve his professional competencies within his chosen area of specialization. Experiences will be provided to enhance the analytical and critical tools for research and decision making. Historical and philosophical study will provide the student with a frame of reference that will aid in understanding today's problems in the profession.

A candidate for the master's degree in physical education will be required to choose among three areas of specialization: behavioral science of human performance, the scientific bases of physical education, or the organization and administration of physical education. The behavioral sciences specialization is directed to the needs of the teacher in a school situation. It is descriptive in nature and emphasizes causes of and methods for coping with today's problems. The scientific bases specialization provides an experimental approach to problems in physical education. Objectives of the program include the preparation of students for research and advanced graduate programs. The specialization in organization and administration of physical education is planned to prepare students for positions as athletic directors, department heads, or supervisors of health and physical education programs. Opportunity is provided for selection of elective courses within the department as well as from other graduate programs.

Admission to the Program

An applicant for admission to this program must have received a baccalaureate degree in physical education or a related discipline from an

accredited institution. A candidate with a baccalaureate degree in a major other than physical education may be admitted subject to review of his academic background and performance by the departmental graduate studies committee.

An undergraduate grade point average of 3.0 or better, or an undergraduate grade point average of 2.5 or better with a 3.0 grade point average in all upper division work, is required for admission. An applicant not meeting these admission criteria will be reviewed by the Physical Education Graduate Committee. If the committee accepts the applicant, he will be admitted conditionally.

The conditions, including the time allowed for meeting them, will be stated in writing at the time the applicant is admitted to the university. One condition will be completion of PE 590, Research Methods, with a grade of A or B. All applicants must have approval of the departmental graduate studies committee.

Each selected applicant will be assigned a Physical Education Department adviser. This assignment will be based upon the student's area of specialization and his thesis topic so that the adviser's expertise will coincide with the student's academic emphasis. The student, with his adviser, will develop a program based on his interests and preparation. This program will include required core courses, area of specialization courses and appropriate elective courses. All programs will be reviewed and approved by the departmental graduate studies committee.

A student may petition for advancement to candidacy when he has completed three graduate courses in the Department of Physical Education.

Requirements

1. The degree program must include a minimum of 45 quarter units, including no more than 9 acceptable units transferred from another graduate institution. No more than 18 units may be in approved upper-division courses. An overall 3.0 grade point average in all graduate work attempted is required.
2. In addition to completing 9 units of required core courses and 9 units in an area of specialization, the candidate must fulfill the terminal requirement of either a thesis or a comprehensive examination. He shall indicate at the time of filing his program his decision as to the manner of fulfilling the terminal requirement.
3. A student will enroll for 9 units of thesis credit. The candidate who chooses to write a thesis must present an oral defense upon completion. The student adopting the option of a comprehensive examination will be tested on material from the core and specialization area, and may elect either an oral or a written examination.

Curriculum

REQUIRED COURSES

		Units
PE 510	Philosophical Bases of Physical Education	3
PE 590	Research Methods	3

PE 650	Problems in Physical Education	3
		9

SPECIALIZATION COURSES

Behavioral Science of Human Performance

PE 540	Cultural Patterns and Physical Education	3
PE 640	Socio-Cultural Aspects of Sport	3
PE 643	World History of Physical Education	3
		9

Scientific Bases of Physical Education

PE 580	Advanced Motor Learning and Human Performance	3
	or	
PE 583	Advanced Motor Development	3
PE 680	Advanced Kinesiological Analysis	3
PE 683	Advanced Physiology of Exercise	3
		9

Organization and Administration of Physical Education

PE 550	Problems in Administration in Physical Education	3
PE 553	Curriculum Development in Physical Education	3
PE 653	Supervision of Physical Education	3
		9

ELECTIVES

Elective courses to complete the required minimum of 45 units must be selected. Electives must have approval of the student's adviser.

A list of electives, which includes upper division and graduate courses in related disciplines, is available in the adviser's office.

Graduate Course Descriptions

PE 510 Philosophical Bases of Physical Education (3)

The development of the philosophies of physical education and the assumptions upon which current professional philosophies rest. Lecture-discussion, 3 hours. *Dr. Bassin.*

PE 540 Cultural Patterns and Physical Education (3)

Preparation and presentation of critical reviews of literature in sociology of sport. The topics to be considered are: the impact of sport on industry, economics, and the institutions of politics and education; sport as it affects man's sociocultural development and his value system. Lecture-discussion, 3 hours. *Dr. Oliver.*

PE 550 Problems in Administration of Physical Education (3)

Study and critical analysis of theories and philosophies relating to administrative situations. Effective evaluation with reference to interrelated conditions, decision-making, and developing an integrated way of behaving while implementing decisions. Lecture-discussion, 3 hours. Prerequisite: PE 420. *Dr. Lansford.*

PE 553 Curriculum Development in Physical Education (3)

Basic considerations and problems of physical education curricula in secondary schools. Lecture-discussion, 3 hours. *Dr. Syverson.*

PE 560 Advanced Theory of Modern Dance (3)

The kinesiological basis of ballet and modern dance technique. The development of sensory, motor, and spatial awareness as an outgrowth of technical developments. Examination of selected movement forms and application to modern dance technique. Lecture-discussion, 3 hours. Prerequisite: PE 348.

PE 565 Analysis of Ethnic Dance (3)

Ethnic dance from Africa, Europe, or the Middle or Far East. Dance forms of the area, cultural aspects, and techniques of choreography for performance. Lecture-discussion, 2 hours, activity, 2 hours. Prerequisite: permission of instructor. May be repeated for credit.

PE 570 Advanced Adaptive Physical Education (3)

Specific activity programs for various types of handicapping conditions. Program development, organization, and administration; evaluation of adaptive physical education in a school setting. Lecture-discussion, 3 hours. Prerequisite: PE 406, graduate standing.

PE 580 Advanced Motor Learning and Human Performance (3)

Preparation and presentation of critical reviews of literature in motor learning. Topics are: kinesthesis, reaction time, strength in neuromotor coordination, motor learning, and transfer factors affecting motor performance. Lecture-discussion, 3 hours. *Dr. Bassin.*

PE 583 Advanced Motor Development (3)

Analysis of physical growth and motor development from infancy to adulthood. Changes in anthropometric measurements, rates of growth of various body tissues, organs, and segments, and ossification of the skeleton during childhood and adolescence. Aspects of motor development at various ages. Lecture-discussion, 3 hours. Prerequisite: PE 312 or 430. *Dr. Bassin.*

PE 585 Scientific Bases of Physical Education (3)

The scientific foundations for physical education and athletic programs; application of principles from exercise physiology, kinesiology, and motor leacning. For students with minimal scientific background. Lecture-discussion, 3 hours. Prerequisite: permission of instructor. *Dr. Teghtmeyer.*

PE 590 Research Methods and Design (3)

Advanced evaluation of experimental design, instrumentation procedures and analysis of factors relating to human performance. Lecture-discussion, 3 hours. Prerequisite: PE 425 and a course in basic statistics, or the equivalent. *Dr. Ridgway.*

PE 640 Socio-cultural Aspects of Sport (3)

Discussion and analysis of interrelationships between sport and society. Consideration of sport as a subsystem of more inclusive social systems. Development of sociological, anthropological, and cultural implications and patterns. Lecture-discussion, 3 hours. *Dr. Ridgway.*

PE 643 World History of Physical Education (3)

The development of physical education from ancient times to the present in both Eastern and Western cultures. Emphasis on the growth and development of physical education in Greece and Rome. Lecture-discussion, 3 hours. *Dr. Emery.*

PE 645 The Behavioral Sciences of Human Movement (3)

Preparation and presentation of critical reviews of current research literature in behavioral science of physical education leading to an understanding of the research process and applying techniques to the solution of specific problems. Seminar, 3 hours. *Dr. Emery.*

PE 650 Problems in Physical Education (3)

Recent developments in physical education; relations with other social and educational agencies, curriculum changes, professional organization, individual and group problem solving. Seminar, 3 hours. *Dr. Syverson.*

PE 653 Supervision of Physical Education (3)

Emerging concepts and principles of physical education supervision; application to situations in which administrators, supervisors, coordinators and teachers are working. Lecture-discussion, 3 hours. Prerequisite: PE 420. *Dr. Lansford.*

PE 655 Legal Aspects of Health, Physical Education, Recreation, and Athletics (3)

Legal theory relating to health, physical education, recreation, and athletics; legislation, court decisions, and legal procedures affecting these fields. Lecture-discussion, 3 hours. Prerequisite: permission of instructor.

PE 670 Problems in Programs for the Atypical (3)

Problems in developing programs for the atypical performer. Recent literature, research, and experimentation with programs for the atypical performer. Seminar, 3 hours. Prerequisite: PE 570 or permission of instructor.

PE 680 Advanced Kinesiological Analysis (3)

Advanced kinesiological analysis utilizing knowledge of muscle groups and principles of movement and human performance to develop a logical and cohesive understanding of human movement. Lecture-discussion, 3 hours. Prerequisite: PE 302. *Dr. Gasser.*

PE 683 Advanced Physiology of Exercise (3)

The physiological adjustments made by the body during exercise and changes which result from prolonged periods of intensive physical training. Critical analysis of training programs. Lecture-discussion, 3 hours. Prerequisite: PE 303. *Dr. Teghtmeyer.*

PE 691 Independent Study (1-2)

Independent study in an area chosen by the student under the direction and supervision of faculty.

PE 696 Thesis (1-3)

Development of a terminal creative research report on a topic selected by the student, approved by the department graduate studies committee and submitted to the faculty as evidence of his mastery of the principles of the profession. May be scheduled for a maximum of 9 units.

PE 699 Master's Degree Continuation (0)

Registration required in any quarter following final assignment of SP in continuing work in which student intends to use facilities of the university. Registration permitted instead of leave of absence when student plans to use university facilities. Prerequisite: Advancement to candidacy for master's degree or admission to a credential program.

Upper-division courses applicable to the master's degree will be found in the Department of Physical Education and Recreation Administration undergraduate sections of this catalog. See pp. 181 and 194.

URBAN PLANNING

Master of Urban Planning

In the Department of Urban Planning, School of Environmental Design

Harry A. Anthony, *Chairman*

Urban Planning Graduate Studies Committee

Harry A. Anthony, *Chairman*

David E. Bess
William R. Dale
John M. Ducey
Sherman W. Griselle
Stephen A. Kaufman
Charles R. Stapleton
Harvey Steinberg
William C. Warner

Graduate study in the Department of Urban Planning leads to the degree Master of Urban Planning. The two-year curriculum is designed to provide instruction combined with supporting studies, seminars, and studio projects integrated with "real world" field work. Both the theoretical and the applied aspects of urban planning are pursued. The work is directed toward competent professional development and prepares the student to meet present and probable future needs of the planning profession. Holders of the Master of Urban Planning degree will be qualified for employment in city, county, regional, and state planning departments; national planning, housing, and urban development agencies; other public organizations, foundations, industries, and private architectural, engineering, and planning consulting firms. They will also be able to work as urban planning consultants in the public and the private sector following prerequisite work experience; teach urban planning at junior college, college, and agency levels (inservice training programs) following some additional preparation and practical experience; and undertake further post-graduate study leading to a doctoral degree.

The Master of Urban Planning degree program has received recognition by the American Institute of Planners.

Admission to the Program

An undergraduate grade point average of 3.0 or better, or an undergraduate grade point average of 2.5 or better with satisfactory performance on the aptitude test of the Graduate Record Examination is required for

admission to the degree program. The departmental graduate studies committee may approve admission on a conditional basis for applicants not meeting these qualifications but exhibiting promise of successfully engaging in graduate work.

A bachelor's degree in urban planning (or city and regional planning) is the best preparation for this program of graduate studies. However, an applicant with a bachelor's degree in architecture, landscape architecture, civil engineering, or another discipline relevant to urban planning, such as economics, sociology, political science or public administration, is also welcome.

Following his admission, the student and his graduate adviser prepare a program which specifies all courses and other requirements which the student must fulfill to earn the master's degree. Each student's detailed program is composed to fit his particular needs and professional goals. Selection of all elective courses must be approved by the student's adviser.

Requirements

1. Seventy-two quarter units of graduate work must normally be completed in the graduate degree program. While the length of the program is two years, exceptionally well qualified students, such as those with prior graduate education and/or significant professional experience, those coming from five-year undergraduate professional programs, and students with a Bachelor of Science degree in Urban Planning from this university, may complete the program with fewer units in less time. Certain courses may be waived by the chairman of the department or the departmental graduate studies commiteee based either on a special examination or on an evaluation of the student's prior education and/or professional experience.
2. No more than nine quarter units of graduate credit, graded "B" or better, earned at another accredited institution may be transferred toward second year requirements for the degree. No course below the 400 level will be accepted for graduate credit. A grade point average of "B" or better must be maintained in all graded course work attempted on graduate standing at this university and in all courses used to satisfy degree requirements. A grade of "B" or better must be earned in all Urban Planning courses taken at this university. No grade below "C" will be accepted for credit in any course applied to the master's degree.
3. Satisfactory completion (over a two- or three-consecutive-quarter period) and defense of a thesis or a terminal project are required of all students prior to the awarding of the degree. The examination is conducted by the departmental graduate studies committee. Other faculty members and planning professionals, are, on occasion, invited to participate.

Curriculum

REQUIRED COURSES

		Units
*UP 431	General Plan Survey	4
*UP 432	General Plan Development	4
*UP 465	Urban Planning Implementation	4
*UP 511, 512	Urban Planning Theory & Practice	8
UP 534	Urban Housing and Community Development	4
UP 535	Urban Data and Stimulation Programs	4
UP 536	Urban Transportation & Circulation Systems	4
UP 537	Regional, State, and National Planning	4
UP 621	Design of Urban Projects & Spaces	4
UP 622	Design of the Residential Environment	4
	or	
UP 623	Design of the Metropolis	4
UP 651	Planning in Contemporary Society	3
UP 652	Planning Administration & Professional Practice.	3
UP 689	Urban Research Methods & Techniques	3
UP 691	Directed Study	1
UP 695	Project	
	or	
UP 696	Thesis	6
		60
Approved Electives		12
		72

*Students with a bachelor's degree in Urban Planning(or city and/or regional planning) are not required to take these courses.

ELECTIVES

Elective courses to complete the required minimum of 72 units may be selected from any 400-, 500-, or 600-level course at this university with the approval of the student's adviser. The student should select a group of electives that will help him either to specialize in one area (e.g., urban design, social planning, housing and community development, urban economics, planning administration) or to broaden his background and acquire a wider area of competence.

Students with undergraduate degrees in fields other than urban planning, architecture, or landscape architecture, are required to include ENV 510, Environmental Design and Graphics, as an elective course, preferably during the first quarter of graduate study at this university.

Graduate Course Descriptions

UP 621 Design of Urban Projects and Spaces (4)

Design assignments in the city, such as open spaces, large scale public works projects. Commercial, industrial, and institutional land use, preparation and presentation of workable design solutions considering all aspects of the problems. Lecture-discussion, 1 hour, studio, 9 hours.

UP 622 Design of the Residential Environment (4)

Creation of new housing policies and programs; design involving a variety of types of living areas; redesign of in-city neighborhoods. Lecture-discussion, 1 hour, studio, 9 hours.

UP 623 Design of the Metropolis (4)

Design experience in large-scale metropolitan planning; development of functional relationships between systems and sub-areas of the metropolis; new towns; the application of functional, economic, and aesthetic principles to the planning and design of metropolitan areas. Lecture-discussion, 1 hour, studio, 9 hours.

UP 651 Planning in Contemporary Society (3)

Contemporary urban social trends and projected conditions as they affect urban planning and its future; emerging relationships of planning to political, social, and economic institutions; advocacy planning and the role of citizen groups; the planner's role in contemporary urban society. Seminar, 3 hours.

UP 652 Planning Administration and Professional Practice (3)

Administration of planning agencies; development and administration of planning and community development programs; the place of planning in local government organization and structure; function of the professional planner in public and private practice; professional ethics and responsibilities. Seminar, 3 hours.

UP 689 Urban Research Methods and Techniques (3)

Methodology and techniques of research in urban planning. Lectures and class discussions; directed individual student research on a subject or subjects of importance in urban planning. Student must demonstrate competence in the methodology and the techniques of urban planning research. Lecture-discussion, 3 hours.

UP 691 Directed Study (1-2)

Individual reading program in an area chosen by the student or study of an urban planning problem selected by the student and investigated under the direction of a graduate faculty member. May be repeated to a maximum of 4 units of credit.

UP 695 Project (1-3)

Development of a terminal research and/or design project on a topic selected by the student, approved by the graduate studies committee, and submitted to the faculty in acceptable form. Maximum credit, 9 units.

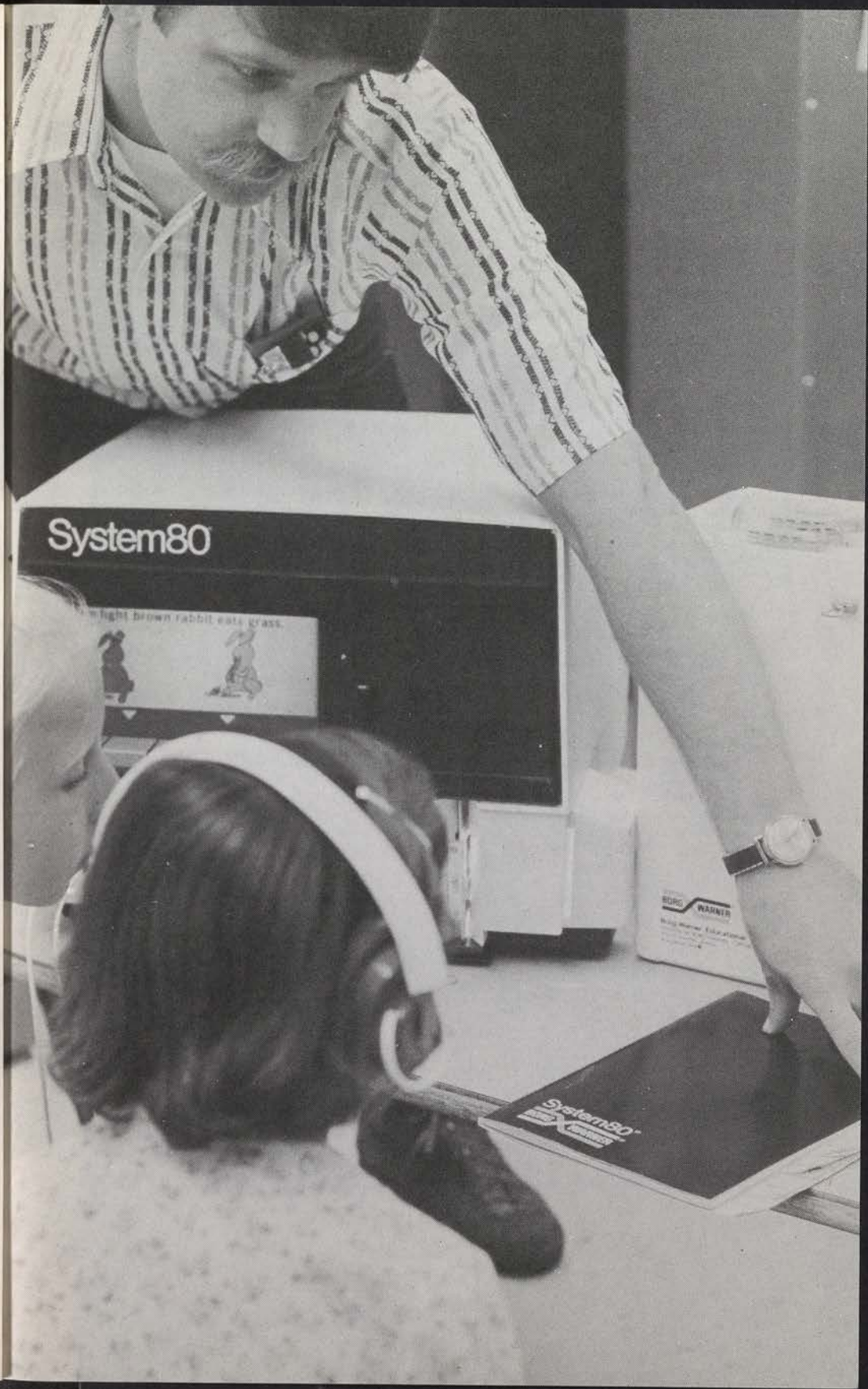
UP 696 Thesis (3)

Development of a terminal research report on a topic selected by the student, approved by the graduate studies committee and submitted to the faculty as evidence of his mastery of the principles of his profession. Maximum credit, 9 units.

UP 699 Master's Degree Continuation (0)

Registration required in any quarter following final assignment of SP in continuing work in which student intends to use facilities of the university. Registration permitted instead of leave of absence when student plans to use university facilities. Prerequisite: Advancement to candidacy for master's degree.

Upper-division courses applicable to the master's degree will be found in the Department of Urban planning undergraduate section of the catalog. See p. 327.


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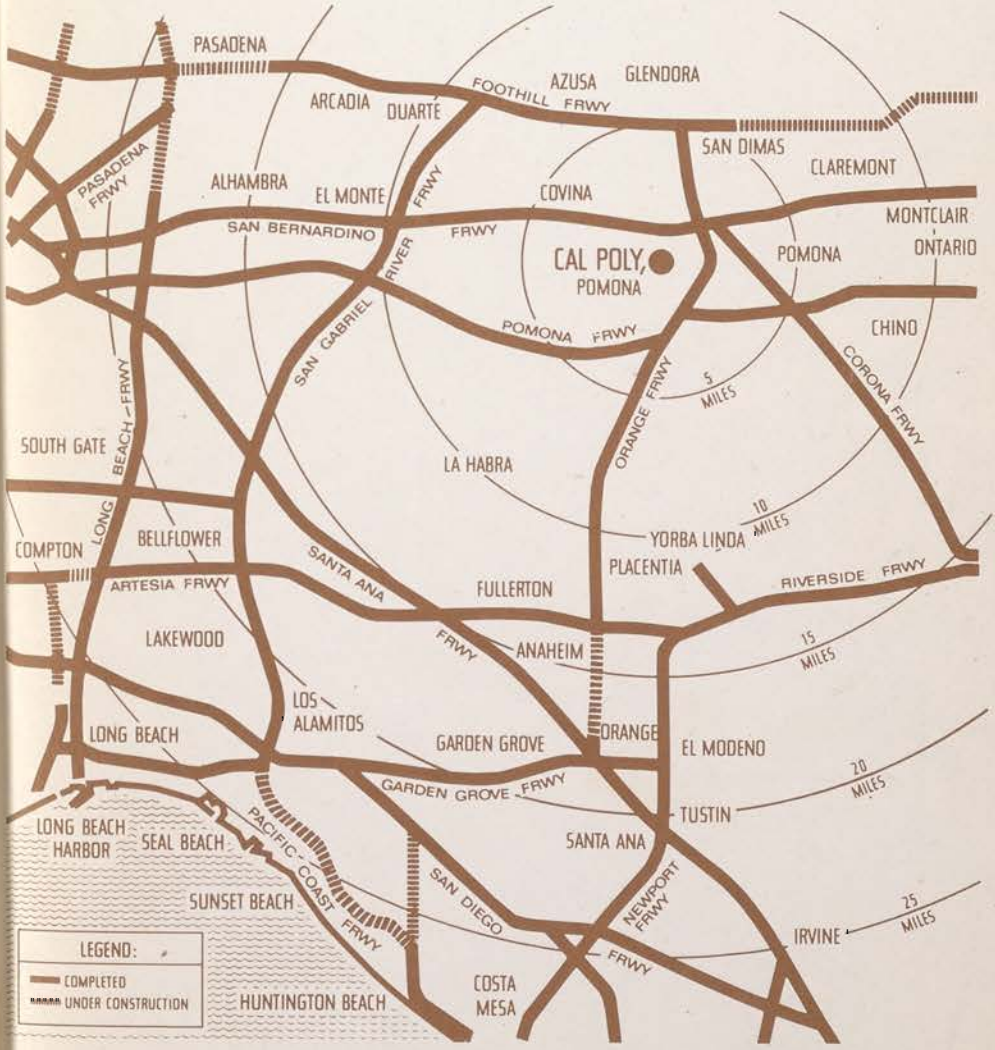
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