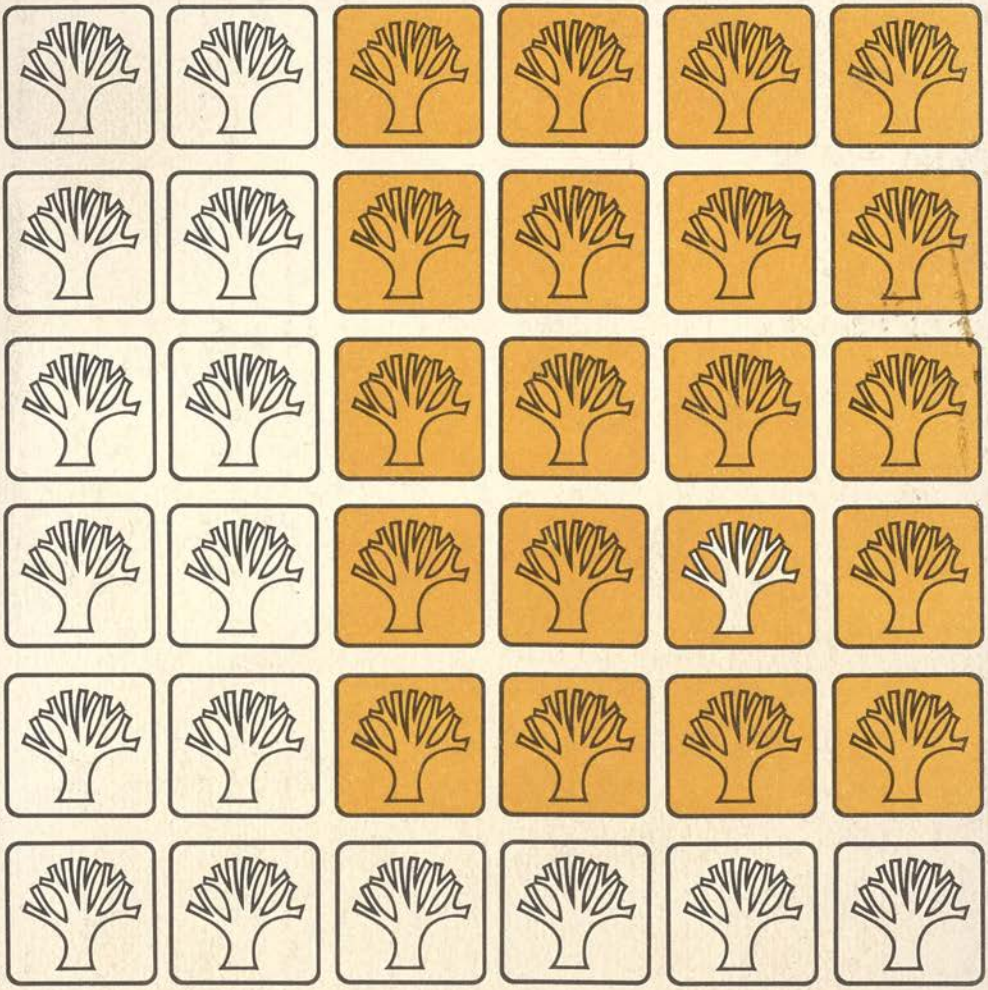
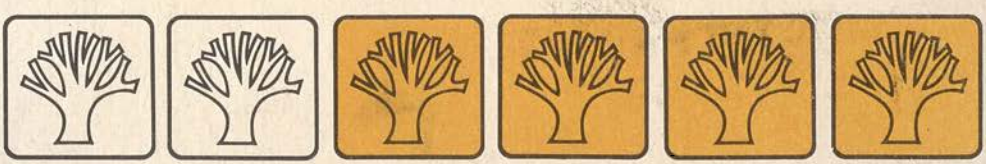


CALIFORNIA STATE POLYTECHNIC COLLEGE

Kellogg-Voorhis · Pomona

1969-70 CATALOG



CALIFORNIA STATE POLYTECHNIC COLLEGE
Kellogg-Voorhis · Pomona

1969-70 CATALOG

CONTENTS

GENERAL INFORMATION, 9

The California State Colleges, 11. California State Polytechnic College, Kellogg-Voorhis, 15.

ADMISSIONS AND REGISTRATION, 31

Admission to the College, 33. Registration Procedures, 41. Changes in Curriculum, 43. Course Numbering System, 44.

DEGREE AND SCHOLASTIC REQUIREMENTS, 47

Degrees and Credentials Offered, 49. Undergraduate Studies Program, 51. Graduate Studies Program, 61. Special Programs, 74. Teacher Preparation Center, 76.

STUDENT SERVICES AND ACTIVITIES, 83

Student Activities and Athletics, 85. Services, 88. Student Residence Halls, 96. Fees and Expenses, 97. Student Conduct, 99.

SCHOOL OF AGRICULTURE, 103

Agricultural Business Management, 106. Agricultural Engineering, 112. Animal Science, 114. Environmental Design, 121. Foods and Nutrition, 127. International Agriculture, 131. Ornamental Horticulture, 134. Plant and Soil Science, 140. Related Agriculture, 153.

SCHOOL OF ARTS, 157

Communication Arts, 160. Economics, 164. History, 169. Language Arts, 174. Music and Art, 186. Physical Education, 191. Political Science, 199. Social Science, 203.

SCHOOL OF BUSINESS ADMINISTRATION, 215

Accounting, 218. Business Management, 222. Marketing, 231.

SCHOOL OF ENGINEERING, 237

Aerospace Engineering, 241. Chemical Engineering, 247. Civil Engineering, 252. Electrical and Electronics, 259. Industrial Engineering, 266. Mechanical Engineering, 272.

SCHOOL OF SCIENCE, 281

Biological Sciences, 285. Mathematics, 299. Physical Sciences, 304.

DIRECTORIES, 319

Faculty, 321. Faculty Overseas Assignments, 363. Index, 365.

ACADEMIC CALENDAR—1969–70

Summer Quarter, 1969

June 12—Orientation of new students

June 16—Beginning of the college year
Classes begin for all students

June 20—Last day to add classes

June 30—Last day to withdraw from classes without penalty

July 4—Independence Day — Academic Holiday

July 10—Summer student deadline for fall quarter scheduling

July 11—Last day to apply for summer quarter graduation

August 15—Deadline to apply for admission to fall quarter

August 26–29—Final examinations

August 29—End of summer quarter

Fall Quarter, 1969

September 15—Beginning of quarter for faculty

September 16–19—Orientation of new students

September 22—Classes begin for all students

September 26—Last day to add classes

October 6—Last day to withdraw from classes without penalty

October 17—Last day to apply for fall quarter graduation

1969

JUNE

S	M	T	W	T	F	S
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JULY

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AUGUST

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SEPTEMBER

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OCTOBER

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Classes

Examinations

November 6—Current student deadline for winter quarter scheduling
November 11—Veteran's Day—Academic Holiday
November 21—Deadline to apply for admission to winter quarter
November 27–28—Thanksgiving — Academic Holiday

December 8–12—Final examinations
December 12—End of fall quarter
December 15–January 2—Christmas— Academic Holiday

Winter Quarter, 1970

January 2—Orientation of new students
January 5—Classes begin for all students
January 9—Last day to add classes
January 19—Last day to withdraw from classes without penalty
January 23—Last day to apply for winter quarter graduation

February 20—Deadline to apply for admission to spring quarter
February 26—Current student deadline for spring quarter scheduling

March 16–20—Final examinations
March 20—End of winter quarter

Spring Quarter, 1970

March 26—Orientation of new students
March 30—Classes begin for all students

NOVEMBER

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1970

JANUARY

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April 3 ..... Last day to add classes

April 13 ..... Last day to withdraw from classes without penalty

April 17 ..... Last day to apply for June commencement

April 30 ..... Current student deadline for summer quarter scheduling

May 15 ..... Deadline to apply for admission to summer quarter

May 21 ..... Current student deadline for fall quarter scheduling

May 30 ..... Memorial Day—Academic Holiday

June 8-12 ..... Final examinations

June 13 ..... Commencement — End of college year

Tentative Summer Quarter 1970

June 18 ..... Orientation of new students

June 22 ..... Beginning of the college year
Classes begin for all students

June 26 ..... Last day to add classes

July 4 ..... Independence Day — Academic Holiday

July 6 ..... Last day to withdraw from classes without penalty

July 10 ..... Last day to apply for summer quarter graduation

July 16 ..... Summer student deadline for fall quarter scheduling

August 14 ..... Deadline to apply for admission to fall quarter

August 31–
September 3 ..... Final examinations

September 3 ..... End of summer quarter

APRIL

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JUNE

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JULY

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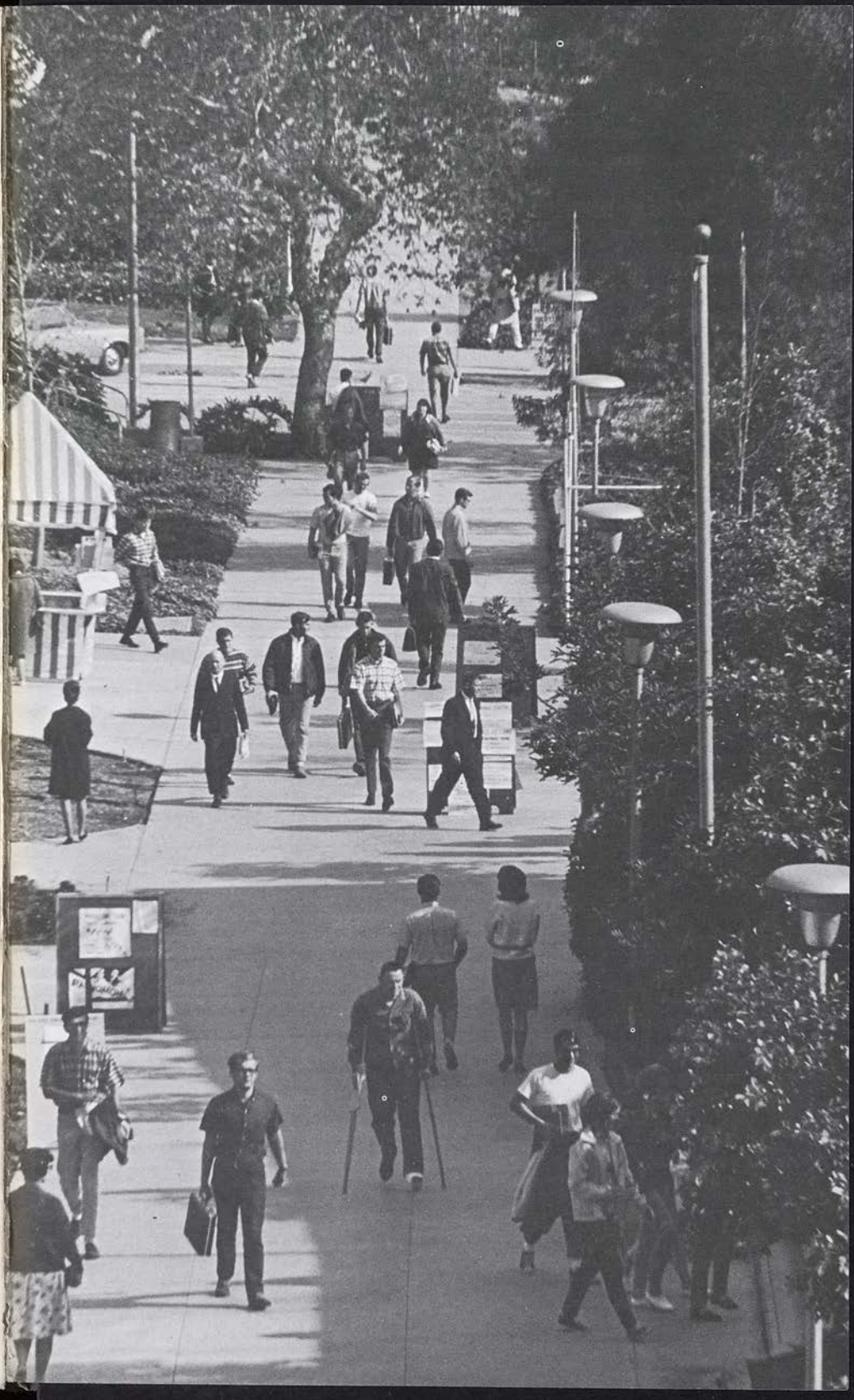

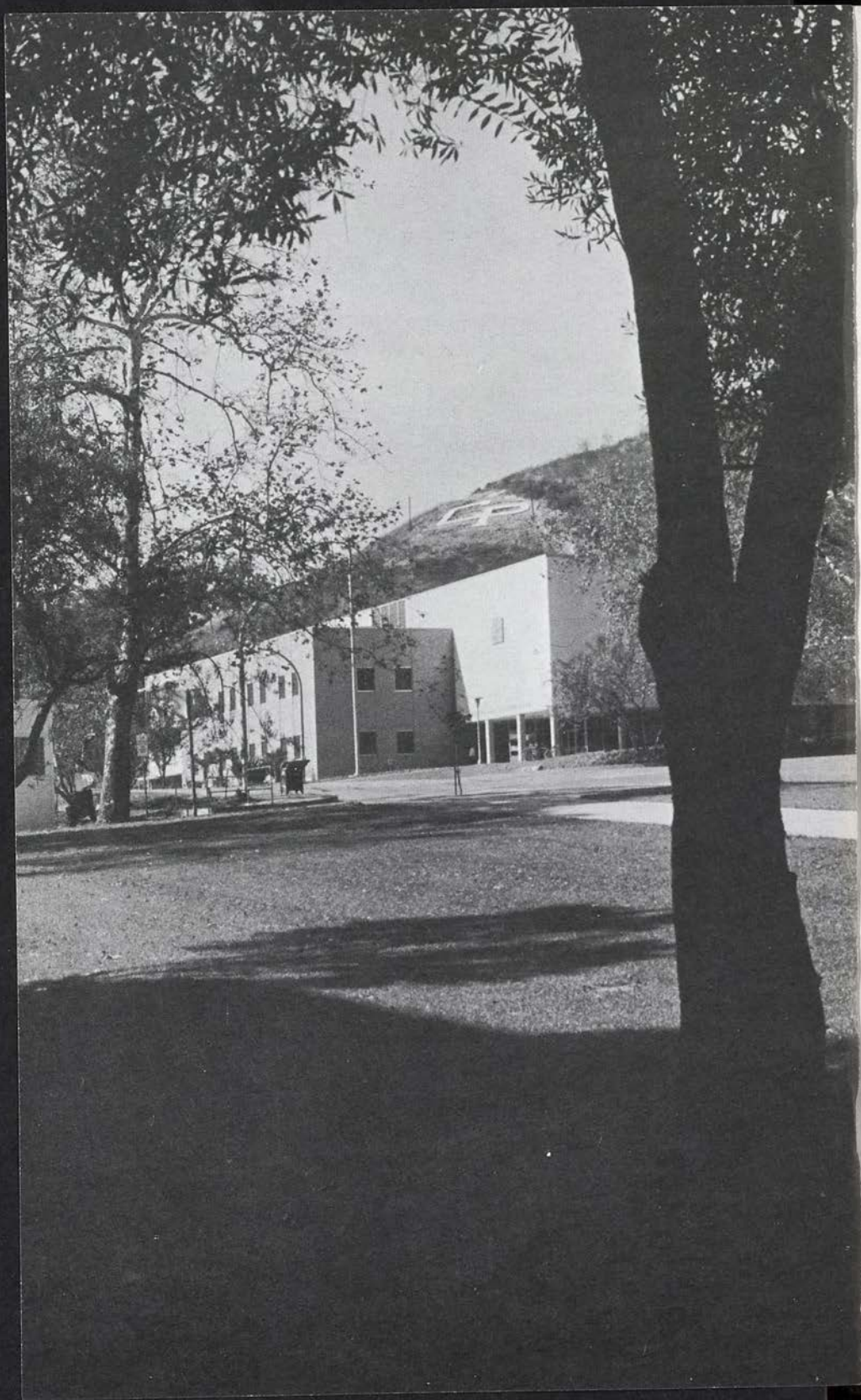

GENERAL INFORMATION

THE CALIFORNIA STATE COLLEGES . . . 11
Board of Trustees . . . 12
Office of the Chancellor . . . 13
List of the California State Colleges . . . 14

CALIFORNIA STATE POLYTECHNIC COLLEGE
KELLOGG-VOORHIS, POMONA . . . 15
Administration . . . 17
The Campus . . . 20
Continuing Education . . . 25
Kellogg Unit Foundation . . . 26
Development Program . . . 27
Alumni Association . . . 27
Arabian Horse Program . . . 27

The California State Colleges

Glenn S. Dumke, *Chancellor*

The 19 campuses of the California State Colleges, spanning the state from Humboldt County in the north to San Diego in the south, represent the largest system of public higher education in the Western Hemisphere and one of the largest in the world. Current enrollment exceeds 212,000 full-time and part-time students. The faculty and administrative staff number approximately 10,000.

Each college in this system, with a geographic and curricular character of its own, offers a basic program in the liberal arts. Course offerings leading to the bachelor's and master's degree and a limited number of joint doctoral degrees are designed to satisfy existing student interests while serving the educational and professional requirements of the state.

The California State Colleges are dedicated to rigorous academic standards. The primary faculty responsibility is the instructional process, with recognition of the necessary role of research in institutions of higher education.

Responsibility for the California State Colleges is vested in the Board of Trustees, appointed by the Governor, and its administrative officer, the Chancellor. The Trustees and the Chancellor set broad policy for the colleges while delegating responsibility for implementation to the colleges. A statewide Academic Senate, made up of representatives elected by the faculty at each college, recommends academic policy to the Board of Trustees through the Chancellor.

While the oldest of the colleges, San Jose State College, was founded over a century ago, the California State Colleges system under an independent Board of Trustees was created by the Donahoe Act of 1960.

The California State Colleges are now in a dynamic period of development. Prior to World War II there were seven State Colleges with a peak total enrollment of 13,000. Since 1947, twelve new colleges have been established and sites have been selected for new campuses in Ventura, San Mateo and Contra Costa counties. Enrollment in the system is expected to reach 300,000 by 1980.

Board of Trustees

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Governor of California
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State Capitol, Sacramento, 95814

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State Capitol, Sacramento, 95814

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State Capitol, Sacramento, 95814

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Superintendent of Public Instruction
721 Capitol Mall, Sacramento, 95814

GLENN S. DUMKE, *A.B., M.A., Ph.D., LL.D., L.H.D.*
Chancellor, California State Colleges
5670 Wilshire Boulevard, Los Angeles, California, 90036

APPOINTED TRUSTEES

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

LOUIS H. HEILBRON, *A.B., LL.B. LL.D.*
Term expires in 1969
44 Montgomery Street
San Francisco, 94104

CHARLES LUCKMAN, *LL.D., A.F.D.*
Term expires in 1974
9220 Sunset Boulevard
Los Angeles, 90069

PAUL SPENCER, *B.A.*
Term expires in 1969
1323 La Terracita Drive
San Dimas, 91773

THEODORE MERIAM, *A.B.*
Term expires in 1971
P.O. Box 370
Chico, 95927

ALBERT J. RUFFO, *LL.B., B.S. in E.E.*
Term expires in 1971
675 North First Street, Suite 1200
San Jose, 95112

MRS. PHILIP CONLEY, *B.A.*
Term expires in 1972
3729 Huntington Boulevard
Fresno, 93702

E. GUY WARREN, *B.A.*
Term expires in 1973
P.O. Box 59
Hayward, 94541

DANIEL H. RIDDER, *B.A.*
Term expires in 1975
604 Pine Street
Long Beach, 90801

GEORGE D. HART, *A.B.*
Term expires in 1975
111 Sutter Street
San Francisco, 94104

JAMES F. THACHER, *A.B., LL.B.*
Term expires in 1970
310 Sansome Street
San Francisco, 94104

ALEC L. CORY, *B.A., LL.B.*
Term expires in 1973
1900 First National Bank Bldg.
San Diego, 92101

WILLIAM A. NORRIS, *A.B., LL.B.*
Term expires in 1972
609 South Grand
Los Angeles, 90017

EDWARD O. LEE, *B.A.*
Term expires in 1974
595 16th Street
Oakland, 94612

EARLE M. JORGENSEN
Term expires in 1970
10650 South Alameda
Los Angeles, 90054

DUDLEY SWIM, *A.B., M.A.*
Term expires in 1976
P.O. Box 1590
Monterey, 93940

KARL L. WENTE, *M.S.*
Term expires in 1976
5565 Testa Road
Livermore, 94550

OFFICERS OF THE TRUSTEES

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Theodore Meriam

Vice-Chairman
Daniel H. Ridder

Secretary-Treasurer
Chancellor Glenn S. Dumke

Office of the Chancellor

5670 Wilshire Boulevard
Los Angeles, California 90036
213 938-2981

Chancellor
Glenn S. Dumke

Executive Vice Chancellor
Raymond A. Rydell

Vice Chancellor, Academic Affairs
Russell G. Whitesel

Vice Chancellor, Business Affairs
Harry E. Brakebill

Assistant Chancellor, Faculty and Staff Affairs
C. Mansel Keene

List of the California State Colleges

California State College,
Dominguez Hills
809 East Victoria Street
Dominguez Hills, California 90247
Leo F. Cain, President
213 532-4300

California State College at Fullerton
800 North State College Boulevard
Fullerton, California 92631
William B. Langsdorf, President
714 870-2011

California State College at Hayward
25800 Hillary Street
Hayward, California 94542
Ellis E. McCune, Interim President
415 538-8000

California State College
in Kern County
615 California Avenue
Bakersfield, California 93304
Paul F. Romberg, President
805 327-9101

California State College at Long Beach
6101 East Seventh Street
Long Beach, California 90804
Carl W. McIntosh, President
213 433-0951

California State College at
Los Angeles
5151 State College Drive
Los Angeles, California 90032
John A. Greenlee, President
213 224-2011

California State College at
San Bernardino
5500 State College Parkway
San Bernardino, California 92407
John M. Pfau, President
714 887-6311

California State Polytechnic College,
Kellogg-Voorhis
3801 West Temple Avenue
Pomona, California 91766
Robert C. Kramer, President
213 964-6424

California State Polytechnic College,
San Luis Obispo
San Luis Obispo, California 93401
Robert E. Kennedy, President
805 546-0111

Chico State College
1st and Normal Streets
Chico, California 95926
Robert E. Hill, President
916 343-4411

Fresno State College
Shaw and Cedar Avenues
Fresno, California 93726
Frederic W. Ness, President
209 487-9011

Humboldt State College
Arcata, California 95521
Cornelius H. Siemens, President
707 822-1771

Sacramento State College
6000 Jay Street
Sacramento, California 95819
Robert Johns, President
916 454-6011

San Diego State College
5402 College Avenue
San Diego, California 92115
Malcolm A. Love, President
714 286-5000

San Fernando Valley State College
18111 Nordhoff Street
Northridge, California 91324
Paul Blomgren, Acting President
213 349-1200

San Francisco State College
1600 Holloway Avenue
San Francisco, California 94132
S. I. Hayakawa, Acting President
415 469-9123

San Jose State College
125 South Seventh Street
San Jose, California 95114
Robert D. Clark, President
408 294-6414

Sonoma State College
1801 East Cotati Avenue, Rohnert
Park (Cotati), California 94928
Ambrose R. Nichols, President
707 795-2011

Stanislaus State College
800 Monte Vista Avenue
Turlock, California 95380
Alexander Capurso, President
209 634-9101

CALIFORNIA STATE POLYTECHNIC COLLEGE, KELLOGG-VOORHIS, POMONA

Robert C. Kramer, *President*

In historical development, methods of education, and dedication to professional and occupationally-centered curricula the California State Polytechnic College, Kellogg-Voorhis, has a distinctive identity among colleges in California.

As one of the 19 colleges in the state college system, it offers educational programs in agriculture, arts, business, engineering, science and the preparation of elementary and secondary teachers.

Cal Poly's programs stress instruction which is specific and practical. Faculty members are selected on the basis of academic qualifications, professional experience, and teaching ability. Students are encouraged to obtain actual experience through the use of individual and group projects, work-study programs, and internships. In laboratories, classrooms, and field study there is a constant interplay between general principles and practical applications.

This concept of the application of knowledge has established wide acceptance of Cal Poly graduates among employers. In each program in the college the student begins work in his major field during his freshman year, continuing studies in his specialization throughout his college career. Through a parallel arrangement of general education and elective courses, the student is able to relate other fields of knowledge to his chosen area of endeavor. The programs offered to the student provide the graduate opportunities to qualify for a position in his first significant employment or for further study in his specialization, and also prepare him for citizenship, leadership, and constructive living in a democratic society.

HISTORICAL DEVELOPMENT

The college has its antecedents in the establishment in 1901 of a vocational high school at San Luis Obispo, which began offering junior college courses in 1927 and became a two and three-year technical institution in 1933. In 1936 a degree transfer program was added, and in 1940 the first bachelor of science degrees were authorized.

The Cal Poly program was extended to Southern California in 1938, when the 157-acre Voorhis School for Boys near San Dimas

was deeded to the state by Charles B. Voorhis of Pasadena, and his son, former Congressman Jerry Voorhis.

The Kellogg campus, originally founded by W. K. Kellogg as an Arabian Horse Ranch in 1925, was given to the State of California in 1949 for use by California State Polytechnic College. Academic instruction began on the 813-acre campus in 1956. The Voorhis campus now serves as a continuing educational center.

Since 1956 the educational program at the Kellogg campus has grown from six academic majors offered to an enrollment of 550 men, to 36 academic programs and an enrollment of over 6,000 men and women. The number of degrees granted increased from 54 in June, 1957, to over 1,000 in June, 1968.

From his appointment as president of California State Polytechnic School in 1933 until his retirement in 1966, the late Dr. Julian A. McPhee was chief administrator of the San Luis Obispo and Kellogg-Voorhis campuses of California State Polytechnic College. In October, 1966, the Trustees of the California State Colleges formally established the Kellogg-Voorhis campus as a separate state college. They named Dr. Robert C. Kramer as president of the college.

Future development of curricula and facilities as provided by the Legislature and the Trustees of the California State Colleges will insure the continuation of a valuable and distinctive polytechnic education for California's citizens.

ACCREDITATION

The college 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 Teacher Credentials, both elementary and secondary specializations, in a number of subject areas. In addition, the college holds associate membership in the Northwest Association of Secondary and Higher Schools.

Administration

President
Robert C. Kramer

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

Administrative Vice President
Richard M. Swenson

Director of Business Affairs
Cecil W. Jones

Foundation Manager
John W. Francis

Educational Center Director
Kenneth H. Kitch

College Librarian
Harold F. Wells

Dean of Students
Henry House

Director of Graduate Studies
Robert L. Maurer

Director of Information Services

Director of Undergraduate Studies
Kenneth H. Anderson

Executive Dean, Planning
Robert G. Bonde

SCHOOL OF AGRICULTURE

Dean, Carl R. Englund *(on leave until September, 1969)*
Acting Dean, Ramiro C. Dutra

Department Chairmen

Agricultural Business Management
William P. Rowley

Agricultural Engineering
Haven Q. Conard

Animal Science
Harry B. McLachlin

Environmental Design
Jere S. French, Acting

Foods and Nutrition
Ramiro C. Dutra

International Agriculture
Milton M. Snodgrass

Ornamental Horticulture
Oliver A. Batcheller

Plant and Soil Science
Robert L. Procsal

SCHOOL OF ARTS

Dean, Albert J. Aschenbrenner
Associate Dean, Floyd H. Ross
Associate Dean, James E. Sutton

Department Chairmen

Communication Arts
Ben F. Thompson, Acting

Economics
Franklin Y. H. Ho

History
Werner H. Marti

Language Arts
C. Edwin Harwood

Music and Art
Philip R. Browne

Physical Education
Donald E. Warhurst, Acting

Political Science
Gerald Rigby

Social Sciences
Donald H. Pflueger

SCHOOL OF BUSINESS ADMINISTRATION

Dean, Louis Kaufman

Department Chairmen

Accounting
Martin K. Barrett

Business Management and Marketing
Richard H. Schoning

SCHOOL OF ENGINEERING

Dean, Harold P. Skamser
Associate Dean, Douglas C. Dowell

Department Chairmen

Aerospace
Rodney D. Sutherland

Chemical
Max Epps

Civil
John W. Comer

Electrical and Electronics
Richard T. Black

Industrial
Joseph P. Wymer

Mechanical
Kenneth J. Schneider

SCHOOL OF SCIENCE

Dean, Vincent E. Parker

Department Chairmen

Biological Sciences
Jerome E. Dimitman

Mathematics
Harold F. Simmons

Physical Sciences
Earl L. Pye

The Campus

LOCATION

Located south of the San Bernardino Freeway on the eastern slope of Kellogg Hill, the Cal Poly campus is one of the largest educational facilities in the state college system. It represents a careful blending of the tile-roofed Spanish ranch buildings 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 and engineering facilities and a modern theater demonstrates the full range of the Cal Poly program.

Freeway construction is placing Cal Poly at the hub of an important transportation network. Adjacent to the San Bernardino Freeway, the campus is 40 minutes from downtown Los Angeles, and will be convenient for travelers on the Pomona, Foothill, Corona, and Orange freeways.

Note: Numbers in parentheses indicate building locations on map on page 24.

ADMINISTRATION BUILDING

A large three-story structure facing the central Mall, the Administration building (1) houses the college executive and business offices, various support services, and instructional units. The latter include a computer center, equipped with an IBM 1130 digital computer and data processing equipment; faculty offices for Language Arts, Social Sciences, and Art; the Teacher Preparation Center; journalism and student publications laboratories; art instruction studios; and classrooms and conference rooms.

LIBRARY

A new, 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. The building is constructed to allow the addition of two more floors to serve a growing student body and faculty.

AGRICULTURAL FACILITIES

The chief agricultural facility is the Agriculture building (2) which contains laboratories, classrooms, faculty offices, and the office of the Dean of the School of Agriculture.

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 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 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 are located in the Library (15).

Next year, much of the instruction and the school offices will be located in the Classroom building (5). This structure, one of the early academic buildings constructed and formerly the library, is being remodeled this year.

Now in this building is the Audio-Visual Center, a college-wide operation providing instructional aids for the entire faculty.

Journalism laboratories, student publications offices, art studios, and related faculty offices are located on the third floor of the Administration building (1).

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 area (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 office of the school dean. 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 the office of the Dean of the School of Engineering, classrooms, electronics laboratories, faculty offices, and a snack bar. Other structures contain equipment and facilities for instruction in Aerospace, Civil, Chemical, Electrical, Electronics, Industrial, and Mechanical Engineering (10–13).

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 and Physical 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.

STUDENT CENTER

The main building in the two-building Student Center is the 800-seat Dining Hall (97), which also includes a snack bar, outside patio, and dining rooms for faculty and staff, residence students, and special groups. The lower level provides a recreation room and storage and display areas for the college store, El Patio. Located nearby is one of the original ranch buildings, called the Duplex

(95); it houses the offices of the Associated Students, Inc. and the activities offices of the Student Personnel Division.

STUDENT RESIDENCE COMPLEX

Six residence halls (20, 21, 22, 23, 57, 58) accommodating 1220 students line the Kellogg Road main entrance to the campus. Also located in this area is a 600-seat Residence Student dining hall (98) and overlooking the pond, a 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, physiotherapy, laboratory tests, and emergency care and treatment, as well as doctors' offices and examination rooms. Although there are no infirmary rooms, day-rest facilities are available.

OFFICIAL RESIDENCES

The atmosphere of the college is enhanced through use of original Kellogg Ranch buildings and landscaping. The Manor House (111) is the official residence of the college 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 a natural setting for the campus.

TO POMONA
FREEWAY
TO LOS ANGELES
SAN BERNARDINO
SAN JOSE ROAD
KELLOGG DRIVE
ARGUELLO
SPAORA RD.
WALNUT AVENUE
RUSSELL ROAD
COLLINS STREET
TO WALNUT
N
P

Continuing Education

VOORHIS EDUCATIONAL CENTER

The college's Voorhis Educational Center on the Voorhis Campus located near San Dimas is one of the most unusual conference centers in the nation. Although located within the Los Angeles metropolitan complex, the center maintains a campus tranquility valuable to conference groups from business, industry, education, government, and community. The center has living and dining facilities which make possible programs ranging from one to several days.

Continuing education conferences are local to international in scope, with more than half serving business and industrial needs. Past programs range from a computer school for area junior college science instructors and a series of man-and-wife cultural retreats for corporation executives to a two-week workshop of 85 computer engineers from 12 nations meeting to develop a new microlanguage for computer programming.

Two special objectives of the center are to bring to the West outstanding continuing-education programs held previously in other sections of the country, and to give assistance to organizations or firms developing their first in-residence conference program. More than 50 organizations have been counseled and assisted in presenting their first in-residence conference. These conferences, which can accommodate 127 in-residence participants, average four days each, and constitute the majority of the center's programs.

The center staff is available to assist in program planning or professional evaluations, in securing effective resource and teaching personnel, and in serving as an experienced and knowledgeable host. Priority is given to programs which involve the college faculty as teachers and which are particularly valuable to the faculty and staff in keeping current a teaching knowledge of one or more occupational fields.

Information about the center is available from college faculty members or from the Director of the Educational Center, Voorhis Campus, California State Polytechnic College, San Dimas, California 91773. Representatives of prospective planning groups are invited to visit the center for staff-conducted tours.

KELLOGG WEST

A new continuing education center, Kellogg West, is scheduled for construction on the hill west of the Performing Arts Center and just off the Central Mall. Included in the center will be an auditorium, meeting rooms, exhibit areas, and residence and dining facilities for 200 people.

Every facet of the Southland community will find in the center a modern facility for training and updating personnel to maintain competence and understanding of the changing world and society. Because of its location and integration into the college operation, programs at the center will be able to make use of the varied facilities of the entire campus.

The center has been made possible by a $3 million grant from the Kellogg Foundation, Battle Creek, Michigan, and contributions from numerous members of the business and industrial community. Kellogg West is the tenth continuing education facility funded by the Kellogg Foundation. It is the first center established within a statewide system of public higher education, — the 19 California State Colleges. The Kellogg contribution is the largest single grant received by a college in the California State College system.

Kellogg Unit Foundation

The Cal Poly Kellogg Unit Foundation was organized and is operated to provide essential services and facilities which are an integral part of the educational program of the college.

Activities in which it is involved include research projects, workshops, institutes, conferences, gifts, loan funds, supplementary health services, overseas programs, student instructional projects, Arabian horse shows, food services, and bookstores.

The Foundation was created on February 28, 1966 as a nonprofit educational organization within the scope of the provisions of the *California Revenue and Taxation Code*, Section 23701 (d) and the *United States Internal Revenue Code*, Section 501 (c) (3), and operates in conformity with regulations established by the Trustees of the California State 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 College administrative organization as required by Title 5, *California Administrative Code*, Section 42601 (c).

Development Program

An Office of Development, under the direction of the Administrative Vice President, conducts a continuing program of solicitation of support from the public, private foundations, governmental agencies, alumni and friends of the college, and coordinates receipts of, and requests for, gifts, grants, equipment and services on behalf of the college programs.

The Director of Development is available for counsel or discussion of proposals with any person or group considering the establishment of trusts and memorials, or the presentation of gifts or grants to the college.

Alumni Association

The Cal Poly Kellogg-Voorhis Alumni Association is an association of graduates and former students. The operations of the organization are carried out by a Board of Directors consisting of a president; five vice presidents, representing the instructional areas of the college program; secretary; treasurer; executive secretary and 10 directors.

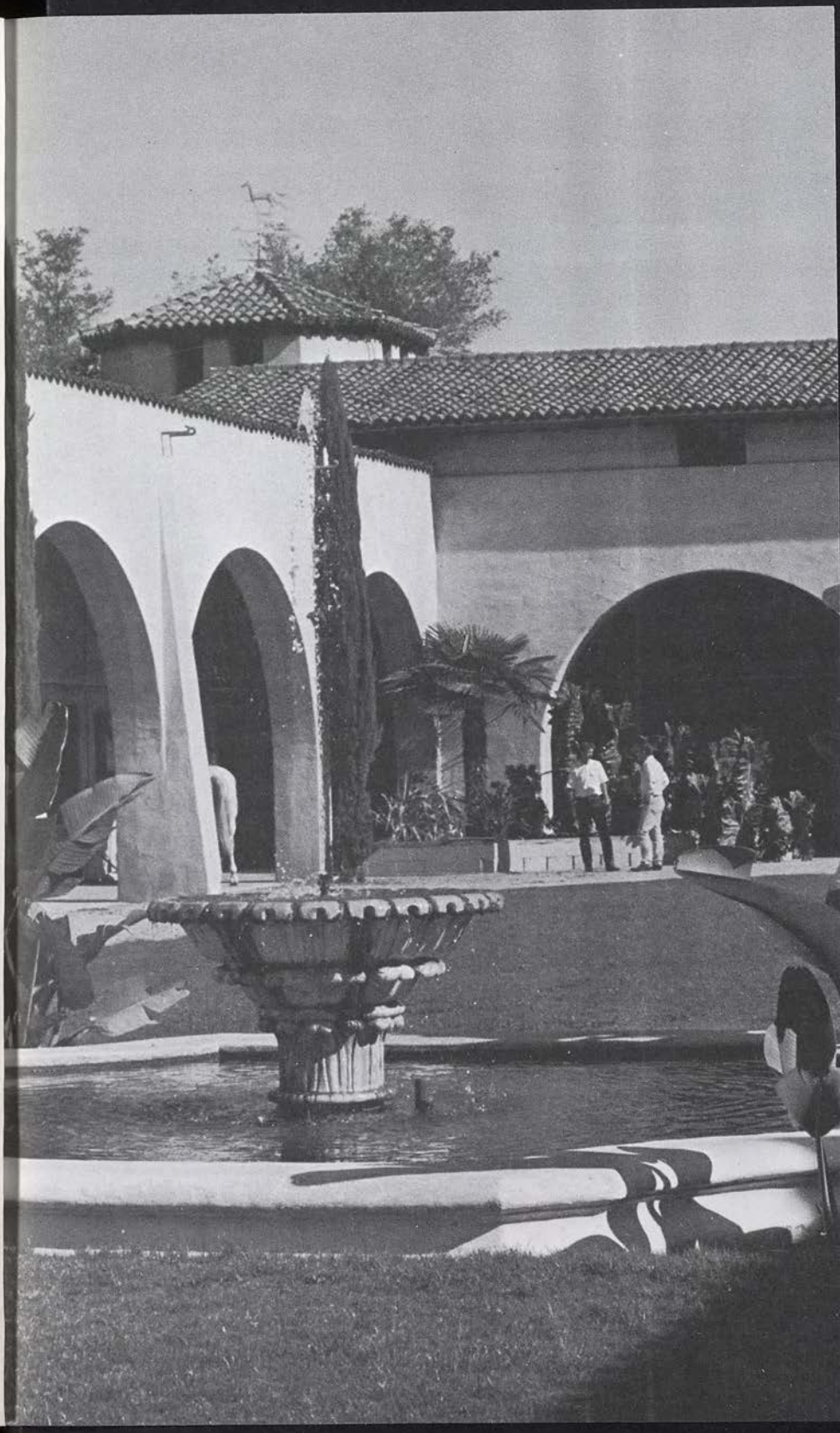
In addition to regional and local meetings of alumni, the association welcomes members to receptions during Poly Vue, maintains an alumni directory and publications, and annually honors an Alumnus of the Year.

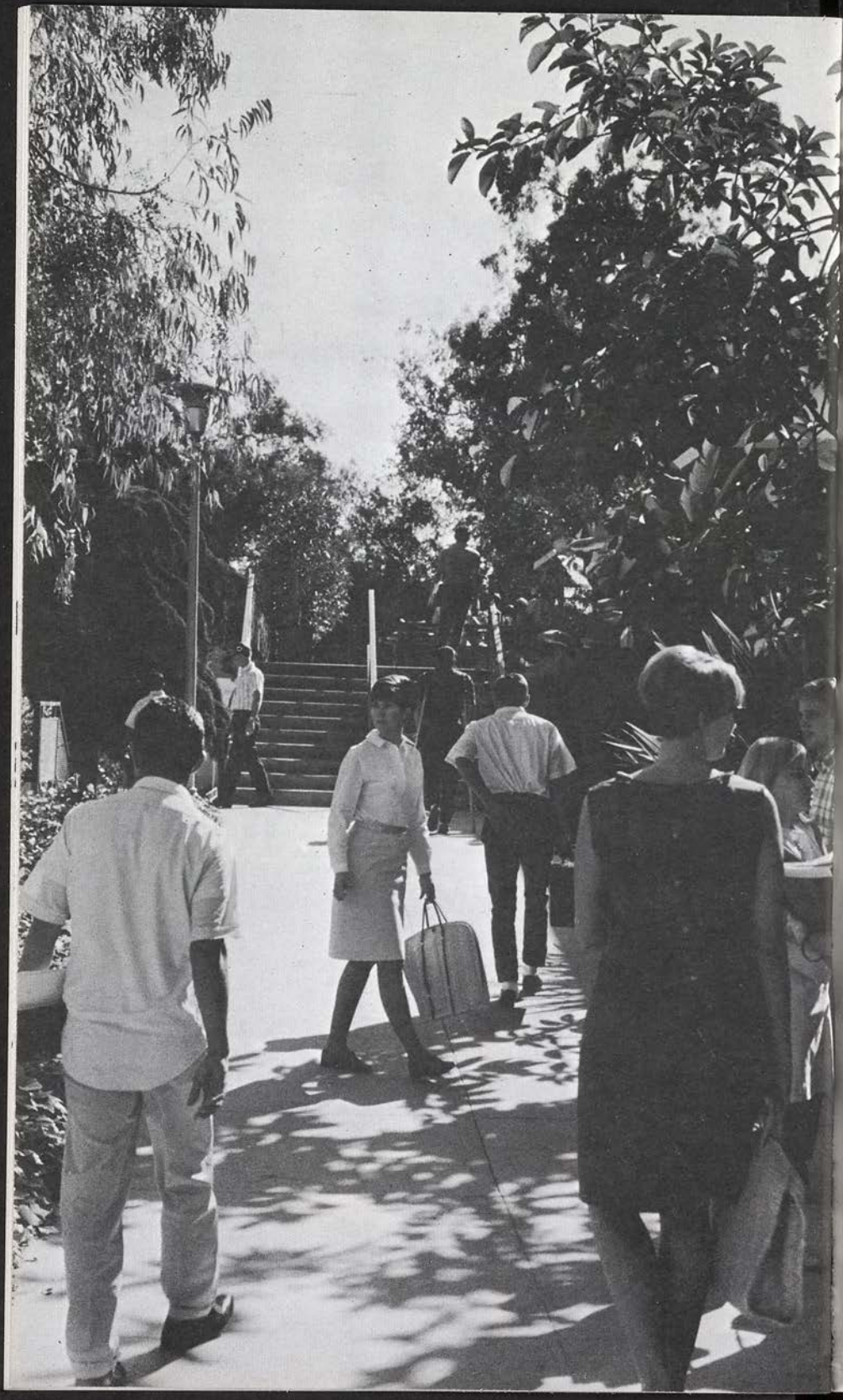
Information about the association may be obtained from the alumni adviser on the campus.

Arabian Horse Program

The oldest campus tradition is the Sunday afternoon Arabian horse show, first started by W. K. Kellogg 43 years ago, and continued after his ranch became a college campus. Public performances are given every Sunday afternoon, October, November, and January through May at 2 and 3:30 p.m. The program, featuring the Arabian horse under both English tack and western stock saddle, is planned, trained, and handled by the college's students and staff.

The shows are designed to promote interest in the Arabian breed and point up the horse's versatility, beauty, and intelligence. The Kellogg ranch has been one of the world's outstanding Arabian horse breeding farms, and the college continues the program today, perpetuating the Arabian and making valuable blood lines available to the public. The sixty to seventy Kellogg Arabians are a noted attraction for thousands of Southern Californians and tourists who view the show each year.





ADMISSIONS AND REGISTRATION

ADMISSION TO THE COLLEGE . . . 33

As a Freshman . . . 33

As an Undergraduate Transfer . . . 35

From a Foreign Country . . . 36

As a Graduate Student . . . 37

REGISTRATION PROCEDURES . . . 41

General Procedures . . . 41

Maximum Unit Program . . . 42

Change in Program . . . 42

Auditing Courses . . . 43

Transfer to Other Colleges . . . 43

CHANGES IN CURRICULUM . . . 43

Change of Curriculum . . . 43

Curriculum Deviation . . . 44

Revision of Curricular Requirements . . . 44

COURSE NUMBERING SYSTEM . . . 44

ADMISSION TO THE COLLEGE

Requirements for admission to California State Polytechnic College, Kellogg-Voorhis are in accordance with Title 5, *California Administrative Code*, Chapter 5, Subchapter 2 as amended by the Board of Trustees of the California State Colleges on January 21, 1965. A prospective applicant who is unsure of his status under these requirements is encouraged to consult with his high school or college counselor or to contact the Admissions office at this college.

All prospective students must submit an application for admission, transcripts of previous high school and college training, including available test data, and a "Statement of Residence" (Form SC-50). The application for admission includes an indication of the curriculum to be studied, since at the time of admission all students are accepted into a specific degree and major program. Regardless of the number of units to be taken, all prospective students are subject to the admission procedure and requirements.

A non-refundable application fee of $10.00 is payable at the time of application. Deadlines to apply for admission in a particular quarter are listed in the academic calendar. Application forms and information may be secured by writing to or visiting the Admissions office on the first floor of the Administration building. Transcripts and records presented for admission or evaluation are retained as a part of the student's permanent college record.

Admission as a Freshman

An applicant who has had no college work will be considered for admission under one of the following provisions. Except as noted, submission of the results of the American College Test (ACT) is required.

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 a grade point average and composite score on the ACT * which provides an eligibility index placing him among the upper one-third of California high school graduates. The grade point average is based upon all

* For this year the ACT minimum eligibility index is 741. It is computed by multiplying grade point average by 200 and adding it to 10 times the composite ACT score.

high school work taken excluding work completed in the freshman year as well as any courses in physical education or military science. The table below does not cover every case, but gives several examples of the test score needed to be eligible for admission with a given grade point average.

Grade Point Average	Minimum ACT Score
3.21 and above	Eligible with any score
2.80	19
2.40	27
2.00	35
1.99 and below	Not eligible

NON-RESIDENTS GRADUATING FROM HIGH SCHOOLS IN OTHER STATES OR POSSESSIONS

An applicant who is a non-resident for tuition purposes and who is a graduate of a high school in another state or a U.S. possession must have an eligibility index which would place him among the upper one-sixth of California high school graduates. The minimum required eligibility index for non-residents is ACT-826 and is calculated as in the previous section.

NON-HIGH SCHOOL GRADUATES

An applicant who is over 21 years of age, but who has not graduated from high school, will be considered for admission only when his preparation in all other ways is such that the college believes his promise of academic success is equivalent to that of eligible California high school graduates.

OTHER APPLICANTS

An applicant 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 college. Permission is granted only by special college action.

RECOMMENDED 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 60 OR MORE SEMESTER UNITS (90 QUARTER UNITS)

An applicant who has completed 60 or more semester units or the equivalent at an accredited college or university will be admitted 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.

APPLICANTS WITH FEWER THAN 60 SEMESTER UNITS (90 QUARTER UNITS)

An applicant who has completed fewer than 60 semester 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.

APPLICANTS WITH PARTICULAR MAJORS

An applicant who does not meet either of the above provisions may be admitted to the college if his desired major is such that

60 semester units of work appropriate to that major are not offered by the institution from which he seeks to transfer, and if he meets all of the following:

1. He has completed all appropriate course work offered at the college from which he will transfer.
2. He has attained a grade point average of 2.0 (C) in all college work attempted.
3. He was in good standing at the last college attended.
4. He can, in the judgment of the college, succeed in his degree objective.

OTHER APPLICANTS

Only under the most unusual circumstances will applicants not meeting either of the above provisions be considered for admission. Permission is granted by special college 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 official transcript of record and other credentials of an applicant for admission from a foreign country should be submitted in official English language translation. They will be evaluated under the general regulations governing 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 whose education has not been conducted in the English language may be admitted only after demonstrating that his command of the language will permit him to profit from instruction in this college. An applicant will be asked

to take an English language test in his own country or one administered by the college.

An applicant who is a graduate of a foreign high school must have preparation equivalent to that required of eligible California high school graduates. The college will carefully review the previous record of all such applicants, and will admit only those with promise of academic success equivalent to that of eligible California high school graduates. Such applicants are not required to take the ACT, except when specifically requested to do so.

Admission as a Graduate Student

In order to register for graduate study at the college, an applicant must file complete application forms and be accepted by the Office of Admissions and Records as a student. The application must be filed no later than the deadlines listed in the college calendar (pages 4-6). In addition, two sets of official transcripts must be *received* by the college no later than four weeks preceding the first day of scheduled classes in the quarter for which admission is sought.

Applicants must request the registrars of all colleges or universities attended to forward official transcripts to the Office of Admissions and Records. Transcripts will not be accepted from the applicant; however, the student should have his own copy of his transcript to show to the department faculty when requesting advice concerning either an advanced degree or a credential.

Admission to the college with graduate standing does not constitute admission to a graduate degree program.

A student may be admitted either as a classified or unclassified graduate student. To become a candidate for a master's degree or a college recommended teaching credential, however, a student must achieve classified status.

Objective is the particular graduate program the student wishes to enter and within that program the particular concentration or emphasis, if any, he wishes to pursue. An applicant should declare his *objective* by filling in the appropriate space on the application form when applying for admission to the college. Graduate objectives include the following: (a) master's degree (by major); (b) credential only; (c) master's degree and credential; (d) neither degree nor credential.

ADMISSION TO GRADUATE STANDING: UNCLASSIFIED

For admission as an unclassified graduate student, an applicant shall have completed a four-year college course and hold an acceptable baccalaureate degree from an accredited institution or shall have completed equivalent academic preparation as determined by appropriate college authorities.

Graduate students admitted to the college who are not presently qualified for or do not wish to pursue programs leading to master's degrees or credentials to be awarded through this institution will be placed in unclassified status. While in this status, they may be restricted from enrolling in certain courses for which attainment of classified status is a prerequisite.

ADMISSION TO GRADUATE STANDING: CLASSIFIED

Students whose objective is the earning of a master's degree or a credential may gain classified status as follows:

1. In accordance with college and departmental policies, and in consultation with representatives of those departments, classified status may be granted immediately upon admission to students whose records indicate satisfactory initial promise of successfully completing the program involved.
2. Students whose previous records show certain deficiencies but who have been admitted to the college and placed in unclassified status may later petition through their departments for classified status when such deficiencies have been removed and when their records show sufficient promise of success in the degree program involved.
3. Graduate students who seek a school service credential will also achieve classified status for those objectives through a similar process carried on by the Teacher Education Selection Committees. Details of admission and candidacy requirements for these credentials are outlined in the section dealing with credentials. Further information may also be obtained from the Credentials Secretary at the Teacher Preparation Center.

ADMISSION OF CONTINUING BACCALAUREATE STUDENTS

A student who holds a baccalaureate degree from this college and plans to continue as a graduate student need not apply for admission to the college. Completion of an Application for Change to Graduate Status at the Office of Admissions and Records is required.

A continuing student who fails to carry out this procedure will be continued on the rolls as an undergraduate student and he may thus hamper his progress in a graduate program.

The necessary transcripts will generally be on file at the college, but it is the student's responsibility to be sure he has met requirements for admission to graduate standing. Other procedures such as application for classified standing are the responsibility of the student.

ADMISSION OF FORMER STUDENTS

A student previously enrolled in the college, planning to return after an absence of more than one quarter, must file a new Application for Admission. If the absence was for one year or less, and if the student did not attend another institution during that time, no application fee will be charged.

If the absence was only for one quarter and if the student did not attend another institution during that quarter, admission to graduate status may be accomplished by completing the Application for Change to Graduate Status.

ADMISSION FROM NONACCREDITED SCHOOLS

A student who is a graduate of a nonaccredited school must apply for admission as an undergraduate to complete requirements for a bachelor's degree from this institution. However, once admitted, a student in this category who gives evidence of unusual promise and superior background may petition the department concerned for reclassification as an unclassified graduate student, and if the petition is granted, he may then proceed in the graduate program.

ADMISSION OF FOREIGN STUDENTS

A student from a foreign country should contact the Office of Graduate Studies to determine the special college regulations which apply for admission to graduate status.

WAIVER OF PREREQUISITES FOR EXCEPTIONAL STUDENTS

Prospective students of unusual promise, possessing a baccalaureate degree, but who have not met the normal master's degree undergraduate prerequisites in the designated major, may, under careful review and procedures, be admitted to master's degree programs, providing they demonstrate this unusual promise by substantial evidence that they are superior in background to those who

normally qualify. For information concerning the circumstances under which a waiver may be granted, consult the Graduate Office or the appropriate department.

GRADUATE TEST REQUIREMENTS

New graduate students enrolling at this college who matriculate with a degree or credential objective are required during or before the first term of residence to take the Aptitude Test of the Graduate Record Examination. Some departments of the college also require of master's degree applicants the Advanced Test of the Graduate Record Examination in their subject matter areas. Other departments additionally require a locally developed qualification examination in their subject matter areas.

Foreign students take English proficiency examinations in addition to the Aptitude Test of the Graduate Record Examination. Information concerning the Test of English as a Foreign Language may be obtained from the Office of the Foreign Student Adviser. No foreign students are excused from departmental requirements for Advanced Tests or other qualifying examinations.

REGISTRATION PROCEDURES

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.

Instruction 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 college and successfully completes the course. An individual is not properly registered unless his completed registration forms listing the program approved by his adviser are on file in the Registrar's office. A student may not be admitted to a course unless he is properly registered in the college.

Late registration may be permitted after classes begin upon payment of a $5.00 late fee, until the date noted in the academic calendar.

DUAL REGISTRATION

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

HOLDING OF RECORDS

Student records may be placed on a *hold* status because of financial or other obligations to the college. 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*.

HONORABLE DISMISSAL

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

Maximum Unit Program

The maximum number of units a student may take in any one quarter is 19, including audited courses and approved concurrent work at other colleges. Exceptions may be made upon the advance approval by the Dean of the School in which the student is registered of a "Petition to Carry an Excess Load." Maximum program limits will be waived only upon presentation of evidence of the student's ability to successfully complete such a group of courses.

The maximum for graduate students is 16 quarter units.

Change in Program

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 fifth day of classes. Courses may be dropped without penalty (no grade assigned) through the 14th calendar day following the day on which classes begin. After this date and through the seventh week of classes, a student withdrawing from a course in which he is enrolled is assigned a grade based on his work in the course to the date of withdrawal. For course withdrawals during this period the instructor will assign a grade of W (withdraw) if the student is passing the course at the time, or a grade of F (failure) if he is failing.

A student who withdraws from courses after the end of the seventh week of instruction will receive an administrative F, whether he is passing or failing, unless he obtains approval of a petition claiming a college-recognized emergency. When a student withdraws from college, grades are assigned to all courses according to the preceding regulations.

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. The deadline to change from audit to credit is the same as for adding a course, and the deadline to change from credit to audit is the same as for dropping a course.

In classes where enrollment must be limited, priority is given to students enrolling for credit.

The materials and services 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 Colleges

A student who plans to transfer from this college 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 Curriculum

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 curriculum. 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 college 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 Curricular 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 the time of his graduation. Substitutions for discontinued courses not taken by the student may be authorized or required by the student's major department.

COURSE NUMBERING SYSTEM

Courses are grouped into number series indicating the college level at which they are normally taught.

1–9 Courses carrying no credit toward degree requirements.

100–299 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, but bearing no graduate degree credit.

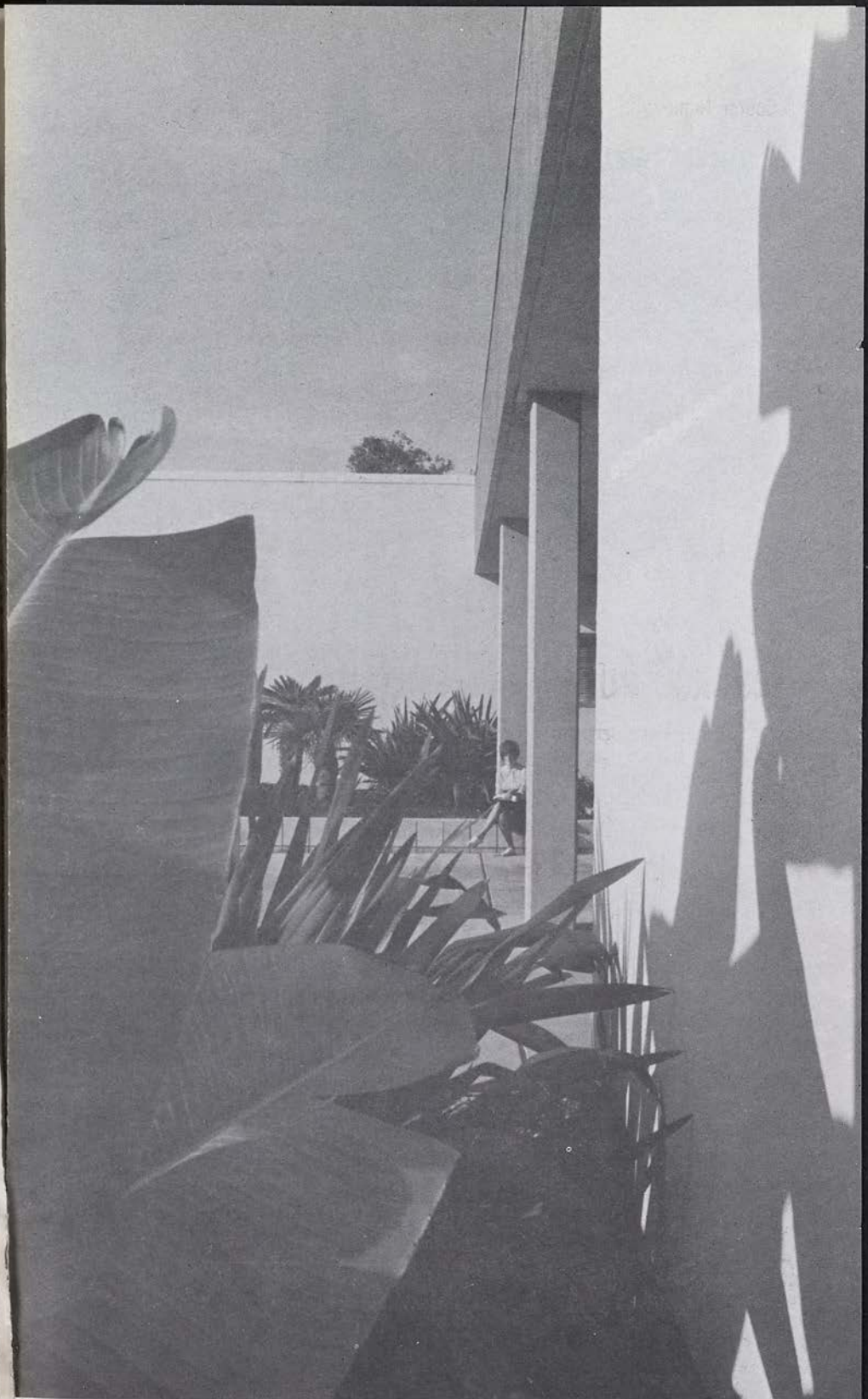
400–499 Courses for advanced undergraduates and graduate students.

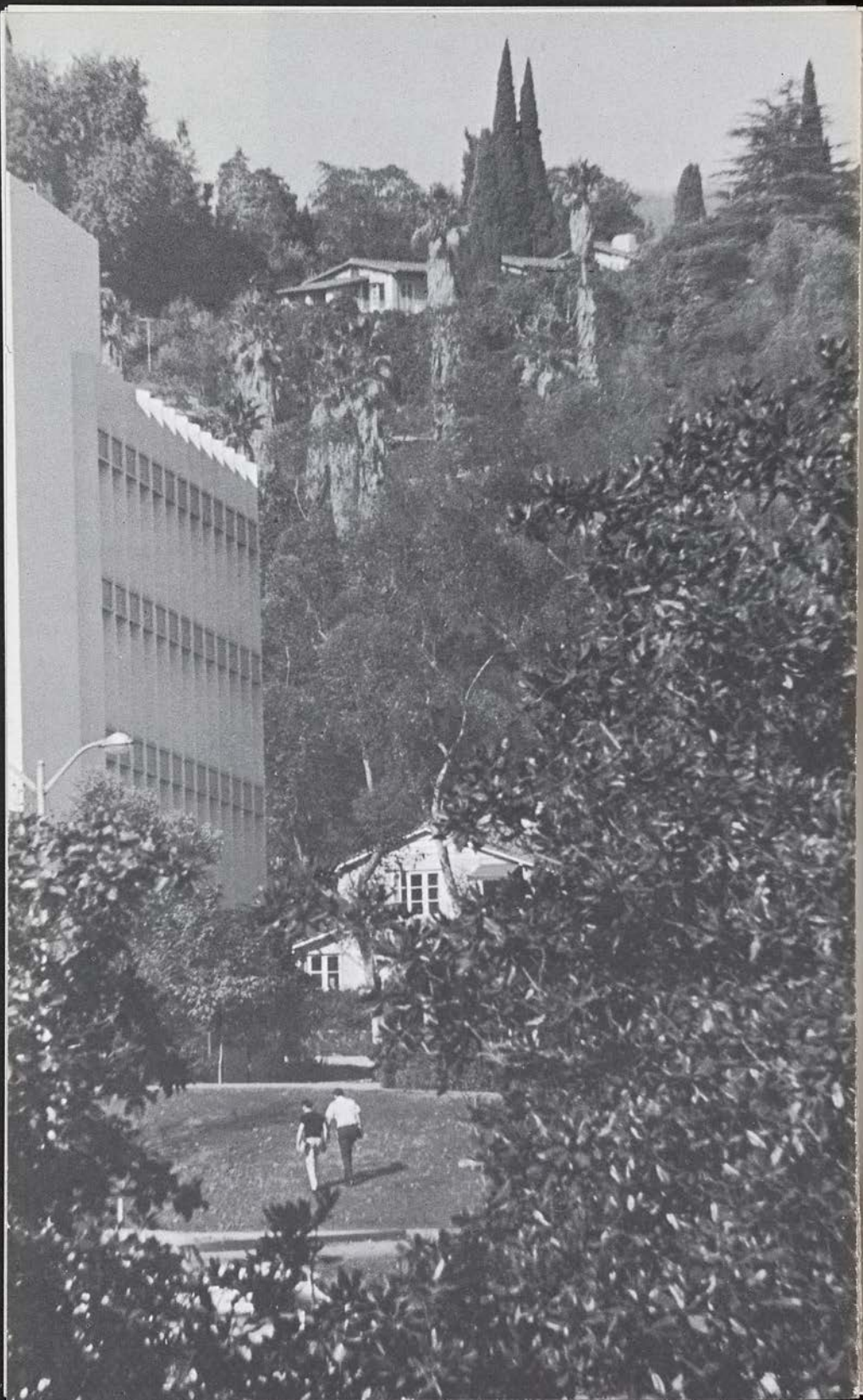
500–599 Courses open only to graduate students or undergraduate students with graduate standing.

600–699 Courses open only to graduate students.

900–999 Courses designed to provide professional upgrading for personnel in the field, carrying no degree credit.

Courses numbered 300–499 may be used for post-graduate credential credit.





DEGREE AND SCHOLASTIC REQUIREMENTS

DEGREES AND CREDENTIALS OFFERED . . . 49

UNDERGRADUATE STUDIES PROGRAM . . . 51

General Requirements for the Bachelor's Degree . . . 51

General Education Requirements . . . 51

Transfer Credit . . . 53

Double Majors . . . 54

Academic Policies . . . 54

Advanced Placement and Special Credit . . . 58

GRADUATE STUDIES PROGRAM . . . 61

Standards of Graduate Study . . . 61

Requirements for the Master's Degree . . . 62

Advancement to Candidacy for the Degree . . . 65

Academic Policies . . . 67

General Information . . . 70

SPECIAL PROGRAMS . . . 74

Early Admission . . . 74

Reserve Officer Training . . . 74

International Study . . . 74

TEACHER PREPARATION CENTER . . . 76

Credential Majors and Minors Offered . . . 77

Courses Required for Credential Programs . . . 77

Admission to Candidacy for a Teaching Credential . . . 78

Courses in Teacher Preparation . . . 80

DEGREES AND CREDENTIALS OFFERED

The college offers curricula leading to the degrees of Bachelor of Arts, Bachelor of Science, and Master of Science. In addition, programs are offered leading to teaching credentials authorizing service in California public schools. Degrees, majors *, and teaching credential programs * offered by the college are:

BACHELOR OF ARTS with majors in:

English	(175)	Political Science	(199)
History	(169)		

BACHELOR OF SCIENCE with majors in:

Biology	(287)	Microbiology	(289)
Botany	(288)	Physical Education	(191)
Chemistry	(305)	Physical Sciences	(306)
Communication Arts	(160)	Physics	(307)
Economics	(165)	Social Sciences	(204)
Language Arts	(176)	Social Services	(205)
Mathematics	(299)	Zoology	(290)

BACHELOR OF SCIENCE IN AGRICULTURE with majors in:

Agricultural Biology	(141)	Foods and Nutrition	(127)
Agricultural Business Management	(107)	Fruit Industries	(144)
Agronomy	(142)	Ornamental Horticulture	(134)
Animal Science	(114)	Park Administration	(136)
		Soil Science	(145)

BACHELOR OF SCIENCE IN BUSINESS ADMINISTRATION with majors in:

Accounting	(218)	Finance, Insurance, and Real Estate	(225)
Business Management	(223)	Marketing	(231)
Data Processing	(224)		

* Numbers in parentheses indicate the page on which requirements are listed.

BACHELOR OF SCIENCE IN ENGINEERING with majors in:

Aerospace Engineering (242)
Chemical Engineering (248)
Civil Engineering (252)
Electrical and Electronics Engineering (260)
Industrial Engineering (266)
Mechanical Engineering (272)

BACHELOR OF SCIENCE IN ENVIRONMENTAL DESIGN with majors in:

Landscape Architecture (123)
Urban Planning (123)

BACHELOR OF SCIENCE IN INTERNATIONAL AGRICULTURE with a major in:

Latin American Agriculture (132)

MASTER OF SCIENCE in:

Biological Sciences (286)

TEACHING CREDENTIAL PROGRAMS

Standard Teaching Credential—Elementary Specialization (77)
Standard Teaching Credential—Secondary Specialization (77)

* Numbers in parentheses indicate the page on which requirements are listed.

UNDERGRADUATE STUDIES PROGRAM

General Requirements for the Bachelor's Degree

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; completed for Bachelor of Science degrees (except in Engineering) a minimum of 198 quarter units; completed for the Bachelor of Science in Engineering degree a minimum of 210 quarter units.

7) 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 college 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 college offers a variety of courses in general education.

† Curriculum requirements including major, general education, and supporting courses are listed under the department offering the 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 college.

The pattern of courses included in the program is designed primarily to insure that:

a. The student develop the ability to express himself effectively in both written and oral communication;
b. He understands nature and is able to relate himself to his biological and physical environment;
c. He is acquainted with man's cultural heritage and has developed the capacity to appreciate the creativity of others and to be creative himself;
d. He understands the economic, technological and social problems of contemporary society and appreciates the responsibilities and procedures of modern citizenship;
e. He has a basic understanding of the requirements of good health and is able to maintain his own physical well-being;
f. 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 College, Kellogg-Voorhis, a student must complete a minimum of 60 quarter units of general education. No more than six units in the major academic discipline of the student may be counted toward meeting general education requirements.

The courses listed below include all courses which may fulfill the college's general education requirements. Each curricula requires specific courses to be taken in fulfilling general education requirements. These courses are listed under the department offering the degree program.

If the student takes only the minimum number of units in each of the areas, six additional units of general education are required. These units may be taken from any of the following courses, but the total units taken in any one area to meet general education requirements may not exceed the maximum indicated.

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

NATURAL SCIENCES—(minimum 15 units—maximum 24 units)

Every student must complete at least one science course which includes a laboratory activity.

A minimum of 3 units (but not more than 21 units) taken from the following life science courses:

BIO 110, 115, 145, 213, 228, 229, 303; BOT 124, 125; ZOO 134, 135, 234, 235

A minimum of 3 units (but not more than 21 units) taken from the following physical sciences:

PSC 101, 215, 221, 222, 321; PHY 102, 121, 122, 123, 131, 132, 133, 204, 212; CHM 103, 104, 105, 111, 112, 113, 141, 142, 151, 152, 153, 201, 211, 251

SOCIAL SCIENCES—(minimum 15 units—maximum 24 units)

9 units of American Civilization, AMC 301, 302, 303

A minimum of 6 units (but not more than 15 units) taken from the following courses:

EC 201, 202, 203, 213; HST 101, 102, 103, 201, 202, 342; GEO 101, 312; ANT 201, 202; SOC 201, 202, 206; PLS 221, 222, 223; PSY 202, 203, 205; COM 413

HUMANITIES—(minimum 9 units—maximum 24 units)

A minimum of 9 units (but not more than 24 units) taken from the following courses:

ENG 110, 111, 112, 113, 201, 202, 203, 206, 306, 308, 403, 406; PHL 201, 202, 204, 211, 212, 213, 304; TA 203, 411, 412; ART 110, 212, 213, 312; MU 100, 204, 310

BASIC SUBJECTS—(minimum 12 units—maximum 24 units)

6 units of Freshman Composition, ENG 104, 105

A minimum of 6 units (but not more than 18 units) taken from the following courses:

ENG 106, 216, 218, 219; SP 200, 203, 300; FR 101, 102, 103, 201, 202, 203; SPN 101, 102, 103, 201, 202, 203; GER 101, 102, 103; MAT 101, 102, 104, 105, 107, 108, 109, 114, 115, 116, 117, 123, 140, 141, 142, 204

ADDITIONAL COURSES — (minimum 3 units—maximum 10 units)

3 units of Physical Education, PE 141

Not more than 7 units (no minimum number of units required) taken from the following courses:

PE 107, 141; FN 235; AG 311; AS 111; AGR 111; BUS 102, 301; EGR 201; SS 221, 231

Transfer Credit

A student who has attended accredited two-year or four-year colleges will be given full credit for college level courses success-

fully 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 18 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 curricula 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 college. 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 college, he must secure the approval of his adviser prior to taking courses at another institution for credit toward major requirements at this college. See also Dual Registration page 41.

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.

A student who desires to submit only one senior project for the two majors must file a petition for special consideration prior to the date of commencing the senior project.

Academic Policies

Each student is expected to meet the academic standards required by the state, the college and by his instructors. He is expected to attend classes regularly; absences are regarded as serious offenses.

An excused absence can be allowed only by the instructor in charge of the class upon consideration of the reasons for the

absence presented by the student. An excused absence merely gives the individual who missed the class an opportunity to make up the work and in no way excuses him from the work required.

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 college determines otherwise.

MINIMUM SCHOLARSHIP REQUIREMENTS

Uniform minimum standards for academic probation or disqualification are in effect at all California State 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 college. 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 college level work attempted and for all such work attempted at this college.
3. A student on probation *may* be disqualified from the college when his cumulative grade point average for all college level work attempted or for all such work attempted at this college 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. a freshman or sophomore (less than 90 quarter units of college work completed) is 22½ or more grade points below a 2.0 (C average).
   b. a junior (90 to 134 quarter units of college work completed) is 13½ or more grade points below a 2.0 (C average).
   c. a senior (135 or more quarter units of college 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 make 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 college 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.

GRADING SYSTEM

The following grading system is in effect:

A—Superior
B—Above average
C—Average
D—Below average
E—Incomplete
F—Fail
P—Pass
W—Withdrew passing
X—No Pass
AU—Audit (no credit)

Grade points are assigned for each grade as follows:

A—4 points
B—3 points
C—2 points
D—1 point
E—0 point
F—0 point
P—0 point
X—0 point

Passing grades are A, B, C, D, or P.

INCOMPLETE GRADES

When a student has been doing satisfactory work in a course, but for reasons judged appropriate by the instructor has been permitted additional time to complete requirements, the instructor will submit an Incomplete grade and the symbol E will be entered on the student's permanent record. The grade Incomplete will be issued only if the student is doing satisfactory C grade work; otherwise, the grade of D or F will be issued.

Grade E may be given to a student if he is passing in classwork, but does not take the final examination, or if he is passing in classwork completed and passes the final examination, but has not completed some assigned work.

In order to receive a final grade in the course, the student must complete the remaining requirements in the manner and by a date acceptable to the instructor, but in no case later than the close of the next regular quarter or, at the option of the instructor, the next time the course is offered. An Incomplete grade may not be changed except by special authorization of the instructor on a Change of Grade form.

Students may not remove an Incomplete 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 E grade.

An Incomplete appearing on either the student's permanent college record or transcripts from other institutions will not be considered in determining units attempted and thus will not affect any grade point average.

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.

REPETITION OF COURSES

A student may repeat a course in which he has received a grade lower than C, but each time the course is taken the student will be charged with units attempted and will receive the grade points earned. Unit credit is given only *once* for a repeated course and is recorded the first time the course is passed.

Except where noted in the specific course description, a student may not take again (except as an auditor) or receive credit by examination for any course in which he has received a grade of C or higher.

Grades may be picked up at the Records office or will be mailed if the student makes arrangements with the Records office.

PASS-NO PASS COURSES

To encourage students to explore interests in fields not directly related to their majors, the Pass-No Pass grading system has been adopted for courses outside the major. To receive a grade of Pass for such a course, the student must earn a grade of C or better. A grade of D or below would be officially recorded as No Pass. Neither of these grades affects the student's grade point average, nor does the student receive unit credit for a course taken on this basis. To qualify to take courses on this basis, a student must have earned at least 45 units of credit with a 2.5 minimum grade point average. The conditions listed for auditing a course prevail for Pass-No Pass courses. Interested students should obtain an application to take a course on a Pass-No Pass basis from the Records Office and have it signed by the adviser and the instructor of the course.

GRADUATE COURSES TAKEN BY UNDERGRADUATES

Seniors who are within 12 quarter units of qualifying for graduation with baccalaureate degrees may petition through their major departments to use as many as nine quarter units of their senior-year load as graduate credit, provided the following conditions are met:

1. The student has completed his graduation check;
2. The adviser endorses the request;
3. The student agrees to enroll for no more than the maximum load of 16 units for the quarter in which this work is taken;
4. Neither the courses involved nor the credit for them is needed to complete requirements for the baccalaureate degree.

If approved, these credits will apply to graduate objectives, as appropriate, and will be recorded on the students' permanent records as graduate credit.

Advanced Placement and Special Credit

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 examinations 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 college credit at the time of admission. A maximum of 30 units, with no more than 10 units in any one field, is allowed for advanced placement. The use of such credits to satisfy college 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 college.

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 graduation 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. Recommendations of the American Council on Education are followed in determining military credit.

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 "Dean's 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 Honors 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 college of 12 or more units during each of the fall, winter, and spring quarters.

A candidate for a bachelor's degree is eligible for "Graduation with Honors" if at the end of the quarter preceding commencement he has earned a 3.1 or better cumulative grade point average, including all college-level work attempted at this college and accepted from other institutions.

GRADUATE STUDIES PROGRAM

During the 1969–70 academic year, the college offers its first graduate curriculum which will lead to the degree, Master of Science in Biological Sciences. Master's degrees in other areas are under consideration. They will be announced as they are approved and descriptions of them will appear in future issues of this catalog.

A detailed description of the requirements for the Master of Science in Biological Sciences as well as descriptions of graduate course offerings in the Biological Sciences will be found in the departmental section of the catalog. In addition, other departments of the college offer courses at the graduate level for credential candidates and for other graduate students. Descriptions of such courses will be found in the appropriate departmental listings.

Standards of Graduate Study

Graduate study deals with more complex ideas and demands more sophisticated techniques, searching analysis, creative thinking, and more time than undergraduate study. The research required is extensive in both primary and secondary sources and a high quality of writing is expected.

Graduate study is designed to develop independence and originality in the quest for knowledge and truth. Each candidate for a master's degree is required to demonstrate mastery in his chosen field of study through independent research culminating in an acceptable thesis or project and through successfully passing a final examination.

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 com-

mittee concerned and approved by the Director of Graduate Studies. 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 more specific in his suggestions, but the adviser can make no formal decisions on the basis of hand-carried transcripts.

The Director of Graduate Studies maintains in his office a file of records on each graduate student and is available to assist graduate students with information or counsel.

Requirements for the Master's Degree

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 College, Kellogg-Voorhis, in the discipline in which he intends to do his advanced work, or he must be prepared to undertake additional work to make up any deficiency.

A student seeking a master's degree at this college will present an acceptable thesis or project which will consist of the presentation of an appropriate topic or the production of a design or other project related to the student's primary emphasis in graduate study.

At the time the student applies for classified standing he will consult with his graduate committee regarding a topic, approval of which will involve a committee of the departmental faculty and a representative of the Graduate Office. Before the student is certified for the master's degree, he will be required to present an oral defense of his thesis or project in addition to meeting all other requirements prescribed in his approved program.

Not more than nine units of credit toward degree requirements may be met by the thesis or project research programs. The thesis or project report will be bound according to college requirements and the original copy deposited in the college library.

GENERAL REQUIREMENTS

The requirements for graduation depend upon the master's program undertaken and upon the major field. The following requirements apply to all master's degrees offered by the college:

1. The program for the master's degree must consist of not less than 45 units in courses numbered 400 and above with a minimum of 24 units of 500 and 600 level courses completed at the college consistent with departmental requirements. Work unacceptable for graduate credit in the school where it was taken is not acceptable for graduate credit at this college. Not more than 18 units of work taken in unclassified status may be applied toward the student's approved program.
2. At least 36 units in 400, 500, and 600 series offerings must be completed in residence at this college.
3. A candidate for the master's degree must earn a 3.0 (B) average in all graduate work taken at this college. (No course with a grade lower than "C" may apply toward the fulfillment of degree requirements.)
4. A 3.0 (B) average must be maintained in the major.
5. A thesis or project must be successfully completed and defended in an examination.
6. A favorable vote of the 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 Registrar's 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.

SPECIFIC DEGREE REQUIREMENTS

Specific degree requirements and graduate course offerings currently available are outlined in sections of this catalog dealing with programs offered through the respective schools of the college. Each student seeking a graduate degree will be held responsible for meeting specific requirements applicable to the program of his choice and to fulfilling general master's degree requirements.

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 classification 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.

THESIS OR PROJECT

A student may register for course 692 or 696 (thesis or project) only after he has been advanced to candidacy for the master's degree or unless there is no reasonable doubt that the department or school will recommend advancement to candidacy in the quarter in which enrollment takes place. Before registration, the student must have conferred with his thesis adviser and the departmental graduate coordinator and have an officially appointed thesis or project committee and a tentative subject. Each student registering for thesis or project is required to register each succeeding regular quarter for a minimum of one unit until the work is complete; any candidate failing to do so will be considered as having dropped out of the degree program. When a student has failed to register in the approved manner after commencing a thesis or project, his readmission to the program will require departmental recommendation and approval of the Director of Graduate Studies.

A thesis or project in the official master's degree program will carry not less than three nor more than nine units depending upon departmental policy. Only after the thesis or project has been completed, after the faculty committee has signed the approval page, and after there has been library clearance, will the credit for course 692 or 696 be recorded on the official transcript. Deadline dates for submission of the thesis to the library can be found in the academic calendar.

The student must prepare three copies of the thesis. The original and first copy are for deposit in the library, while the third is for the department. Further information is contained in the Thesis Instruction Manual available at the Graduate office.

FOREIGN LANGUAGE

A reading knowledge of a foreign language may be required in some areas. A student should consult his adviser or the section of this catalog in which requirements for his area of concentration are given.

SEVEN-YEAR TIME LIMIT

The graduate degree program of not less than 45 units must be completed within seven years from the time the first course which applies to the degree requirements is started. This seven-year time limit, at the option of the college, may be extended for students who pass a comprehensive examination in the entire subject field.

LEAVE OF ABSENCE

A student may petition the Graduate office for a leave of absence, and if the leave is approved, he may upon his return continue under the catalog requirements that applied to his enrollment prior to the absence. Except in the case of required military service, a leave of absence may be granted for a maximum of one year. Illness and compulsory military service are the only routinely approved reasons for leave of absence. Even though granted a leave of absence, a student must file an application for admission to the college in order to be readmitted when his leave terminates.

Advancement to Candidacy for the Master's Degree

A student who has received classified standing in a master's degree curriculum in order to progress toward the degree, must next be advanced to candidacy. Requesting advancement to candidacy for the master's degree is the responsibility of the student. The following qualifications and procedures are necessary:

1. Scholarship. At the time the student applies for advancement to candidacy for the master's degree, his grade-point average for all courses taken subsequent to receipt of his bachelor's degree must be at least 3.0 (B). In addition, his grade-point average for all courses taken at this college subsequent to receipt of his bachelor's degree must be at least 3.0 (B). Courses numbered 399 and lower, and courses completed more than seven years previous to application, will not be included when computing this average. A student is not normally advanced to candidacy until he has completed at least 15 units of work which are acceptable to the school and department in which the advanced degree is sought. Students with exceptional undergraduate records (which must include an upper-division grade-point average of at least 3.0) may apply for advancement to candidacy before completing 15 units of graduate work.

2. The student should initiate an Application for Advancement to Candidacy. Forms are available in the Graduate office.
3. Upon receiving the completed request for advancement to candidacy, the Graduate office will send to the student's adviser an official Master's Degree Program form. The student and his adviser will complete the form, listing all courses and other requirements which the student must fulfill to receive the degree. The proposed program must meet the following specifications:
   a. At least 45 quarter units of graduate work must be included in the graduate degree program. Of these, at least 24 units must be courses numbered 510–699.
   b. 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. In developing programs, advisers will seek to plan a meaningful pattern of courses focused upon the objectives of the major and the student rather than a scattering of irrelevant courses in a number of different fields. 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 units in his approved master's degree program. Advisers will permit the use of already completed courses in master's programs only if they satisfy the overall pattern requirements of the master's curriculum involved.
   c. No more than 18 quarter units of graduate work taken prior to the candidate's advancement to candidacy may be applied to the degree requirements. If more than 18 units have been completed, the most recent units will be applied.
   d. No more than nine quarter units of graduate credit earned at other accredited institutions and accepted by the college Admissions office as graduate credit may be used. Directed teaching and methods course credits may not be used in master's degree programs. Credits earned through extension in other institutions may not be used in master's degree programs.
   e. No more than nine quarter units of credit for thesis or project or related research courses may be included.
4. The Master's Degree Program must be approved by the candidate's departmental graduate committee and by the college Graduate Council. The student will be notified, by letter, of

the actions of these committees. If the program is approved, it becomes an official agreement between the institution and the candidate.

CONTINUOUS REGISTRATION

All students who have been advanced to candidacy for the master's degree are required to register for credit each quarter, exclusive of summer quarter, following such advancement until all requirements for the degree are satisfactorily accomplished. This requirement may be met either by registering for course work or by registering for one or more units of credit for Thesis or Project or Individual Master's Study. However, once a candidate enrolls for Thesis or Project or Individual Master's Study, he is required to continue to so register each regular quarter until all degree requirements are satisfactorily completed. Failure upon the part of the candidate to comply with this requirement shall constitute presumptive evidence that the student has withdrawn from the graduate degree program. Exceptions to this rule are made for candidates who have been granted a formal leave of absence by the Director of Graduate Studies, with the approval of the adviser and the chairman of the department in the field in which the candidate seeks the degree.

OFFICIAL CHANGES IN MASTER'S DEGREE PROGRAMS

To make official changes (course substitutions) in approved master's degree programs, the candidate secures a copy of the Request for Course Substitutions from the Graduate Studies office. He enters the numbers and titles of courses to be added and those to be dropped and states his reasons. He processes the form through his departmental master's degree adviser. Courses which have been completed may not be dropped from approved programs.

Academic Policies

SCHOLARSHIP REQUIREMENTS FOR GRADUATE STUDENTS

All Graduate Students. All graduate students—classified or unclassified—will be disqualified from the college if their postgraduate grade-point average on work completed at this college: (a) falls below 2.0 prior to completion of 12 quarter units, or (b) falls below 2.7 after completion of 12 or more quarter units.

Classified Graduate Students. All classified graduate students, after first completing a minimum of 12 quarter units in postgraduate status, must subsequently maintain a 3.0 grade-point average in all work at this college. If, later, the student's grade-point average on this work falls below 3.0, he will be placed in unclassified graduate status.

Graduate Students Who Have Been Advanced to Candidacy for the Master's Degree. Such students must earn a "B" (3.0) average in all courses in their approved master's degree program.

FAILURE TO ACHIEVE A 3.0 GRADE-POINT AVERAGE ON COMPLETED PROGRAM

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 510-699 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, 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 college.

REPETITION OF COURSES

A student who has received a grade of "D" or "F" in a graduate course (or an undergraduate course included in the degree program) may repeat the course and receive the grade assigned by the instructor under whom the course is repeated. The extra units so earned may not be counted toward the degree, but such units will be counted in the total units attempted for computation of the student's overall grade-point average.

MAXIMUM UNIT LOAD

The maximum load for graduate students working toward a master's degree is 16 units per quarter. Students who are employed full time should not exceed eight units per quarter. No exception is made to the maximum load for graduate students. Graduate students holding assistantships will have reduced academic loads based upon the amount of time required by their duties.

CONCURRENT ENROLLMENT

A graduate student enrolled at the college may enroll concurrently for additional courses at another institution only with advance written approval from the student's academic adviser and the Graduate office. Permission will not be granted when the study load in the proposed combined program exceeds the 16 quarter units authorized at this college.

TRANSFER AND OTHER CREDIT

If accepted by the faculty of the discipline involved, a maximum of nine units of graduate credit from another accredited institution may be applied toward the master's degree.

Extension or correspondence courses may not be used to satisfy degree requirements. Extension course work may be used to satisfy prerequisites when such work is acceptable to the department or school offering the master's degree. No waiver of course requirements or credit by examination may be used to satisfy master's degree requirements.

LIMITATION ON PRECLASSIFICATION COURSEWORK

No more than 18 units of postgraduate work taken prior to classified status may be applied to a student's master's degree program. Students who receive postgraduate credit for courses taken during their final quarter as a senior shall include them in this limitation.

Courses taken in unclassified graduate standing will be accepted in fulfillment of later degree requirements only if the department and graduate adviser accept them on an advanced program. Such work taken during unclassified standing must average "B" or better with no grades below "C" if the student wishes consideration for admission to candidacy for an advanced degree.

ENROLLMENT OF A DISQUALIFIED GRADUATE STUDENT 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 Director of Graduate Studies and must be reported to the Graduate Council. The student will receive a new classification date effective at the time that the Director of Graduate Studies approves his enrollment in the new program.

SECOND MASTER'S DEGREE

Students may obtain a second master's degree, but courses taken to meet the requirements for one degree will not be applicable to the second degree.

INTERNATIONAL STUDY

The college participates in the California State Colleges' program of study abroad (see description under International Study). Under this program, some courses taken at designated foreign universities, when arranged in advance through the appropriate department, may be applied toward the requirements of a degree awarded by this college. It is important that plans be completed several months in advance of starting such a program. For details, consult the international study adviser.

General Information

CHANGES IN GRADUATE OBJECTIVES

Official changes in graduate objectives are to be initiated in the Graduate Studies office. A change of objective may be one or more of the following: (a) changing from one major field to another for the master's degree program; (b) adding a credential objective to an existing master's degree objective; (c) adding a master's degree objective to a credential objective; or (d) changing from graduate unclassified objective to some stated objective as listed in this catalog.

The evaluation of credits transferred to the college is based in part upon the objective indicated on the application for admission, thus, a change in objective may affect the acceptance 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 Petition to Change Objective in the Graduate office, (2) obtain the signatures of the faculty adviser, the graduate coordinator, and/or the chairman of the department or dean of the school in which he plans to register, and (3) submit a new graduate program following the accepted procedures for initiating work in the new discipline.

A student who discontinues working for a masters' degree in one department to undertake master's work in another department must replace the first master's program, if he has one, by one in the new major. Up to 18 quarter units of degree credit may be transferred from the original program, but the transfer of credits must be approved by the new department.

FINANCIAL ASSISTANCE

Various forms of financial assistance are available to qualified students. The college Placement office maintains an employment bureau to assist students in obtaining part-time employment while attending college.

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, students should consult the heads of the departments in which they are interested.

Graduate Assistantships. There are a limited number of appointments as graduate assistants available to outstanding graduate students who are working on graduate 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 or the Graduate Studies office.

Student Assistants. Most departments throughout the college employ graduate and undergraduate students to assist instructors with various instructional activities. Rates of pay, on an hourly basis, vary according to the types of work performed. Graduate students wishing to be considered for such work should apply directly to the heads of the departments in which they are interested.

Nonresident Tuition Fee Waiver. To be granted a waiver of the nonresident fee, the nonresident student must make formal application to the Director of Graduate Studies at the time of enrollment at the college. Waivers are based on both scholarship and financial need. Application forms are available in the Graduate Office. Only

graduate students who are candidates for advanced degrees are eligible for consideration, and any student accepting such a waiver is legally obligated to complete a minimum of ten units of acceptable work in 400 or above series courses each quarter for which he receives a waiver.

California school district employees who are not yet legal residents of California may be exempted from the nonresident 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 under the 1961 law.

Children or spouses of California State College academic or administrative employees are also eligible to apply for exemption from the nonresident fee.

COURSE NUMBERING FOR GRADUATE COURSES

Graduate-level courses are numbered 500 through 699. These courses are open only to graduate students. Seniors who petition for graduate standing when within 12 units of reaching the bachelor's degree may take 500–599 courses. Otherwise, undergraduate students may not enroll in graduate courses.

Graduate course numbers have significance as follows:

500–509 Professional education courses; degree credit only by petition.

510–699 Graduate degree credit courses.

600–699 Open only to holders of baccalaureate degrees registered as classified graduate students.

692–699 Project or thesis, open only to graduate students advanced to candidacy for a degree.

GRADUATE COURSE ENROLLMENT PRIORITIES

Departments with high graduate enrollments may assign priorities to students wishing to enroll in graduate-level courses. Applicants for master's degrees who have been admitted to candidacy have first priority; classified graduate students, degree or credential, who have not yet been admitted to candidacy have second priority; and unclassified graduate students have third priority.

LIBRARY FACILITIES FOR GRADUATE STUDY

The college library is organized on the disciplinary plan, with separate reading rooms for Humanities, Science and Technology, and Social Science, as well as general reference and bibliography

rooms. The library contains a well-rounded book collection, including many bound periodicals; pamphlets, courses of study, and other unbound materials; pictures and art prints; phonograph recordings and transcriptions; and reels of microfilm and microcards. The library receives many current periodicals and newspapers regularly. It is a selective depository for California documents. Students have full access to the book stacks.

Information regarding application for study space, extended borrowing privileges and interlibrary loan services available to those actually in the process of writing theses may be obtained from the Circulation Department of the library.

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 college work per quarter while simultaneously completing requirements for graduation at their respective high schools. The college work thus completed is applicable only as college 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 application consists of the following:

1. A completed "Application for Admission—Early Admission Program."
2. A $10.00 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 his 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 in the Records office during the sophomore year. Units earned in one of these programs are counted only as elective credit towards requirements for graduation.

International Study

The California State Colleges offer academic year programs of study at a number of distinguished universities abroad. For 1969–70, the cooperating universities are: University of Aix-Marseille, France; Free University of Berlin and University of Heidelberg, Germany; University of Florence, Italy; Waseda University, Tokyo, Japan; University of Granada and University of Madrid, Spain; University

of Stockholm and University of Uppsala, Sweden; National University, Taiwan; Tel-Aviv University, Hebrew University, Israel. Academic work successfully completed at the cooperating universities abroad may be applied toward the degree requirements of the college in accordance with college regulations.

A selection among applicants from all California State Colleges is made on the basis of academic, linguistic, and personal qualifications. The criteria are: a. Upper division or graduate standing by the beginning of the academic year abroad; b. Academic achievements; c. Proficiency in the language of instruction; d. Faculty recommendations.

Programs in Israel, Italy, Japan, Sweden and Taiwan do not require previous linguistic preparation; applicants for all other programs must demonstrate adequate facility in the language of instruction at the host university.

Cost to the student includes round trip transportation from San Francisco to the host university, room and board for the academic year, and medical insurance. In 1969–70, these costs are: France, Germany, Spain, $2,300; Italy, Japan, Sweden, $2,500; Israel, Taiwan, $2,000. Payments may be scheduled throughout the year.

Application for the 1970–71 academic year should be made early in the Fall semester of 1969. Detailed information may be obtained from the Dean of Students, or by writing to the Office of International Programs, The California State Colleges, 1600 Holloway Avenue, San Francisco, California, 94132.

This college is interested in implementing new work-study or travel-study programs of its own in Central and South America for individual students as well as groups. Interested students should contact the Coordinator of Overseas Educational Programs or the Dean of Students.

TEACHER PREPARATION CENTER

Rodman F. Garrity, *Director*

Elementary Preparation
Barbara H. Lingenfelter, *Coordinator*
Elizabeth L. Tunison

Secondary Preparation
Dorothy M. Tucker, *Coordinator*
Gerald F. Corey

COLLEGE-WIDE TEACHER EDUCATION ADVISORY COMMITTEE

Rodman F. Garrity, *Chairman*
Allen Christensen
David Church
Gerald Corey
Charles Coulter
Diane Divelbess
Leonore Ewert
George Hart
Walter Hesse
David Horwitz
Alice Huffman
David Jaques
Dorothy Kiefer
Bernard Lane
Barbara Lingenfelter
Martie Lisowski
Ralph McCormic
John Murphy
Kathreen Prout
Edward Roche
Mary Etta Selle
Ralph Shaffer
Glenn Stewart
Frank A. Tennant
Halsey Taylor
Jean Thomasseau
Dorothy Tucker
Elizabeth Tunison
Donald Warhurst
Harold Wells
Mary Whitley
Thomas Wilson, Jr.
Robert Maurer

Ex-Officio Members:
Dean Albert J. Aschenbrenner
Dean Carl R. Englund
Dean Henry House
Dean Louis Kaufman
Dean Vincent E. Parker

The college is accredited by the State Board of Education to recommend qualified students for the Standard Teaching Credential—Elementary Specialization and the Standard Teaching Credential—Secondary Specialization. Information on admission and course requirements for the Standard Teaching Credentials is available from the Director of the Teacher Preparation Center and from members of the College-Wide Teacher Education Advisory Committee. Members of this committee act as departmental advisers to the prospective student.

Because teacher preparation is a college-wide responsibility, the Teacher Preparation Center is administered on that premise. All members of the Teacher Education Advisory Committee have a role to play in meeting the teacher preparation objectives. Faculty members on the committee hold a joint appointment in their department and the Teacher Preparation Center.

Credential Majors and Minors Offered

The prospective elementary or secondary teacher must choose a major and a single subject teaching minor. Majors and minors offered are:

ELEMENTARY MAJORS

Biology
Language Arts (Humanities)
Mathematics
Physical Sciences
Social Sciences

ELEMENTARY MINORS

Art
Biology
Chemistry
Economics
English
History
Mathematics
Music
Physical Education
Physical Science
Physics
Political Science

SECONDARY MAJORS

Agriculture
Biology
Business Management
Chemistry
English
History
Language Arts (Speech)
Mathematics
Physical Education
Physics

SECONDARY MINORS

Agriculture
Art
Biology
Business Education
Chemistry
Drama
Economics
English
History
Journalism
Mathematics
Music
Physical Education
Physics
Political Science
Speech

Courses Required for Credential Programs

The courses listed below are required to gain college recommendation for the Standard Teaching Credential, elementary or secondary specialization.

		Elem	*Sec*
TEP 301	Principles of Education (Elementary or Secondary)	3	3
TEP 410	Psychological Foundations of Education	5	5
TEP 420	Materials and Methods in Elementary Education	3	
421		3	
422		3	
TEP 430	Student Teaching (Secondary)		12
TEP 431	Student Teaching (Elementary)	12	

TEP 503	Secondary Curriculum Procedures and Methods		6
TEP 504	Seminar in Secondary Education		3
TEP 505	Philosophical-Sociological Foundations of Education	5	5
		34	34

Admission to Candidacy for a Teaching Credential

Admission to the college is not equivalent to being accepted to the teacher preparation program. A candidate for a teaching credential is selected through a three-step process involving college-wide teacher education committees. These committees supervise the teacher preparation program, review the qualifications of the candidate, and decide whether or not the candidate should be admitted to the program.

A candidate for a teaching credential must be granted approval by the teacher education committees to enter the teacher preparation program, to participate in student teaching, and to receive a recommendation for the credential.

To be admitted to candidacy for a teaching credential, the following action should be taken:

Step 1—Admission to the Teacher Preparation Program

a. Before a student may make formal application to the Teacher Preparation Program he must be enrolled in or have completed TEP 301 (Principles of Education).

b. In addition to meeting the college General Education Requirements, credential candidates may have to fulfill other General Education course requirements such as art, music, etc.

Step 2—Admission to Student Teaching

a. When a teacher candidate is eligible to apply for student teaching, he must make a formal application through the Teacher Preparation Center.

b. Student teaching is a full quarter assignment (12 weeks) at this college and is usually done in the last quarter before application for a credential.

c. The arrangements for student teaching are made by the Director of the Teacher Preparation Center with the assistance of the Elementary and Secondary Coordinators. The director and coordinators work closely with district level administrators in the placement of student teachers in each school district. The selection of master teachers is done by the college coordinators in consultation with school principals.

Step 3—Application for the Credential

a. The student must fulfill all college requirements for the credential he is seeking.

b. The student must have the approval of the College-Wide Teacher Selection Committee that a recommendation be made to the California State Department of Education that he be granted the Standard Teaching Credential.

Evaluation of the student's qualifications as a credential candidate is based on the following factors:

1. *Achievement.* Satisfactory performance in the area of English usage, reading, spelling, arithmetic, science, handwriting, and the social studies as indicated by scores on achievement tests.
2. *Personal Adjustment.* Evidence of satisfactory personal adjustment, habits, interests and attitudes as shown by evaluation instruments, observation, interview, and faculty ratings.
3. *Speech.* Demonstration of satisfactory speech quality and habits as indicated by speech test.
4. *Physical Fitness.* Evidence of good physical health, to be shown before the time of student teaching.
5. *Scholarship.* Satisfactory scholarship on all work accepted by the college toward curriculum requirements must be evident.
   a. Undergraduates applying for the program must have an overall grade point average of 2.50, and must maintain at least this minimum average.
   b. In all courses taken for graduate credit an overall grade point average of 2.75 must be maintained.
6. *General Education Requirements.* Satisfactory grades and progress toward completing specific and degree requirements in general education.
7. *Professional Attitude.* Evidence of ability and willingness to work with pupils, parents, and school officials, through experience in working with youth activities.

Entrance into the teacher preparation program is prerequisite to taking certain professional courses and to student teaching.

Description of Courses

TEP 107 Introduction to Education (3)

Nature of the teaching profession. Qualifications of successful teachers. Analysis of duties and functions of elementary and secondary school teaching. School law and certification requirements. Opportunities for advancement. Observation of teaching situations in public schools. 3 lectures.

TEP 301 Principles of Education (3)

Purposes, organization, and development of the public school in America. Emphasis on the elementary and secondary school curriculum through intensive study and school visitations. 3 lectures.

TEP 401 Teaching Minority Group Children (4)

Modifications in traditional teaching techniques and approaches in working with minority or disadvantaged children. Extended observation and participation in atypical schools. Research and critical appraisal of prevailing methods. 4 lecture-discussions. Prerequisite: TEP 301 or consent of instructor.

TEP 410 Psychological Foundations of Education (5)

The nature of growth and development, mental hygiene, principles and theories of learning, guidance practices, tests and measurements. Includes field work in the public schools. 5 lecture-discussions. Prerequisite: PSY 202 or equivalent.

TEP 420, 421, 422 Materials and Methods in Elementary Education (3) (3) (3)

An integrated study of curriculum materials and methods of teaching in the elementary school, including audio-visual techniques. General methods of teaching with special attention to instruction in the social studies, music, art, physical education, communication arts, mathematics, sciences, and reading. 3 lectures. Prerequisite: Admission to teacher education program.

TEP 430 Student Teaching (Secondary) (3–12)

Student teaching includes participation, teaching, and allied activities under the direction of a selected regular teacher in a public school with consultation from college supervisors. The application for student teaching must be approved one quarter prior to registration for this course.

TEP 431 Student Teaching (Elementary) (3–12)

Observation and teaching under direction of a selected regular teacher in an elementary school. Participation in a wide variety of representative public elementary school activities. The application for student teaching must be approved one quarter prior to registration for this course.

TEP 503 Secondary Curriculum Procedures and Methods (6)

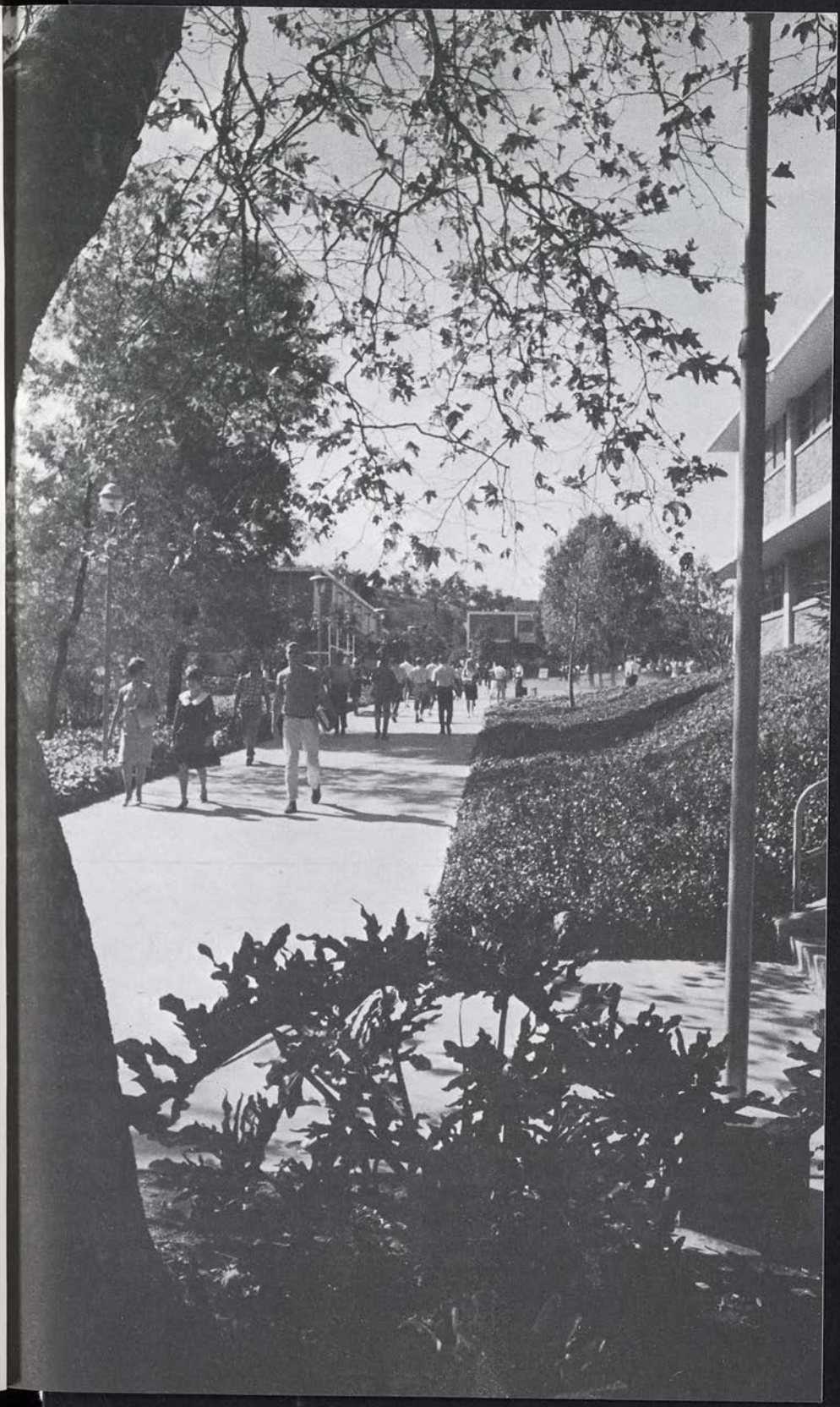
Curriculum practices, instructional procedures and materials. Visual and auditory methods and materials of value for classroom teaching. Laboratory sections in student's major and minor fields will be taught by joint appointment faculty in the respective major and minor departments. 4 lectures, 2 two-hour activities. Prerequisite: Graduate standing and admission to the teacher preparation program.

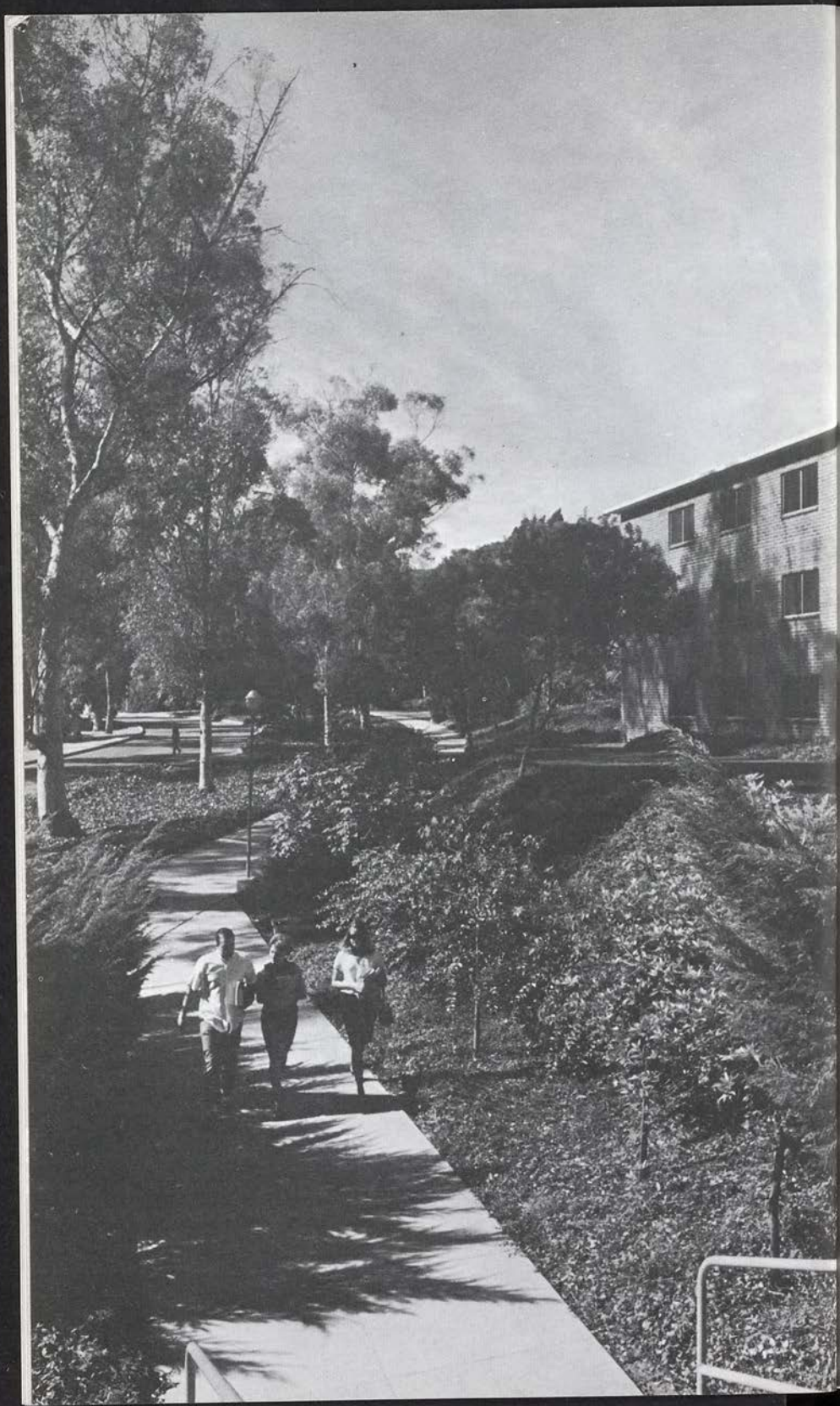
TEP 504 Seminar in Secondary Education (3)

Critical analysis of problems of teaching and supervising in the secondary school; recent developments in the curriculum; reports of professional groups and current bibliography from professional journals. 3 lecture-discussions. Corequisite: Concurrent enrollment in secondary student teaching.

TEP 505 Philosophical-Sociological Foundations of Education (5)

The role of education and teaching in America, synthesizing the contribution of philosophical, sociological and comparative studies; influence of social structure on schools; American cultural values and their influence on education. 5 lecture-discussions. Prerequisite: Graduate standing and permission of instructor.





STUDENT SERVICES AND ACTIVITIES

STUDENT ACTIVITIES AND ATHLETICS . . . 85

Student Government . . . 85

Student Organizations . . . 85

Athletics . . . 86

Eligibility for Activities and Athletics . . . 86

SERVICES . . . 88

Health and Medical . . . 88

Counseling . . . 88

Career Placement . . . 88

Employment . . . 89

Financial Aid . . . 89

Scholarships . . . 90

Loan Programs . . . 93

STUDENT RESIDENCE HALLS . . . 96

FEES AND EXPENSES . . . 97

STUDENT CONDUCT . . . 99

Student Discipline Procedure . . . 99

Causes for Disciplinary Action . . . 100

STUDENT ACTIVITIES AND ATHLETICS

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 develop meaningful participation in the life of the academic community.

Student Government

All students are members of the Associated Students of California State Polytechnic College, Kellogg-Voorhis, Pomona, Incorporated, and pay a membership fee which entitles the student to full participation in the activities of the association. Membership also includes subscriptions to the twice-weekly newspaper, *Poly Post*, and to the general college magazine, *Opus*. The self-governing student association develops student-sponsored activities of maximum value and interest to the college community.

The government of student affairs and responsibility for property of the Associated Students, Inc. are vested in the Student Senate and Executive Cabinet, the members of which are elected annually. In addition, boards and committees supervise publications, athletics, activities, finances, the college union, and Poly Vue. Councils of representatives of the various departmental student organizations participate in student government on behalf of each of the academic schools.

Student Organizations

Clubs and organizations involve all departments and activities, and the opportunity exists for every student to take an active part in club life. The college does not recognize either national or local social fraternities or sororities.

PUBLICATIONS

Poly Post, the official newspaper of the Associated Students, Inc., is published twice weekly during the school year. *Madre Tierra* is the yearbook record of student activities carried on during the year. A general magazine, *Opus*, features art, photography articles and examples of student literary effort.

POLY VUE

Poly Vue is the annual college open house held in the spring. The event shows parents and friends the yearly activities and progress of the college, 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 journalism Press 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 productions include quarterly one-act and three-act plays; musical events include Christmas and Easter programs and a Road Show tour of California communities. Intercollegiate competition as well as local events are featured in a strong forensics program.

Athletics

Intercollegiate competition is held under the rules and auspices of the National Collegiate Athletic Association. In most sports, conference competition is maintained in the California Collegiate Athletic Association. A full program of intercollegiate competition is offered in football, basketball, baseball, track, golf, tennis, cross country, swimming, water polo, soccer, and gymnastics.

An extensive intramural program is an integral part of the college, including such team sports as touch football, basketball, volleyball, and softball. Individual sports such as tennis, badminton, horseshoes, track and field events, swimming, handball, boxing, and wrestling also are a part of intramural competition.

Eligibility for Activities and Athletics

Students with a cumulative grade point average of less than 2.0 may not participate on intercollegiate teams nor may they hold positions of leadership in student organizations or student government groups. However, students on academic probation may participate in such activities as club membership, intramurals, and music providing they do not travel or officially represent the college.

The 2.0 cumulative grade point average is meant to be a minimum standard and certain groups may set higher standards for specific positions or areas of responsibility that require commitment of considerable time and energy.

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 College Policies and Procedures Statement for the Conduct of Intercollegiate Athletics, including the following:

1. Competition on a varsity team is open to a student in regular standing in a degree curriculum who, during the season of competition, is carrying at least 12 quarter units selected to provide substantial progress toward his educational objective.

2. The student must have at the beginning of his competition in any sport at least a 2.0 cumulative grade point average in all college work attempted.

3. The student must have passed a minimum of 36 quarter units between seasons of competition.

4. Freshmen are not eligible for varsity competition in football, basketball, baseball, or track.

5. Transfer students from four-year colleges, in order to be eligible, must have a calendar year of residence at this college.

6. Junior college transfers are immediately eligible for varsity competition if they are regularly admitted to a degree program and have a 2.0 cumulative grade point average in all college work attempted. Transfers with one year of junior college competition in a sport are permitted three years of varsity competition in that sport. Transfers with two years of junior college competition are permitted two years of varsity competition.

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. Full-time enrollees may utilize the health services daily Monday through Friday, between 8 a.m. and 5 p.m. Submission of the health history and physical examination form is mandatory except when prohibited by religious beliefs.

Counseling

Professional counselors are available in the Counseling Center for the purpose of assisting students in the development of self-discipline, ability to achieve meaningful interaction with others, and methods for solving personal, social, vocational or academic problems. Both individual and group counseling are utilized. The Center conducts special programs for study and reading problems, as well as for test anxiety. A counselor is available for emergencies when the Center is closed.

Academic and occupational guidance is provided by a faculty adviser in the student's major department. Personal and social concerns identified by this faculty advisor are referred to the professional staff in the Counseling Center.

Career Placement

A centralized placement service is available to all students of the college. No guarantee of placement is made to any student, but a sincere effort is made to help the student find employment.

Career placements are effected through an extensive on-campus interview program. Many industrial, agricultural, and business representatives visit the college to interview seniors. A followup program conducted by the Placement office includes contacting both the graduate and employer to appraise the effectiveness of the instructional programs in relation to employer needs and to determine the satisfaction of employer and employee.

TEACHER PLACEMENT

Every candidate for a teaching credential must register with the Placement office before or during the quarter prior to completion of the credential requirements. Registration includes the preparation of personal data and the listing of references for the confidential teacher placement folder. This folder is maintained permanently by the Placement office for use whenever the teacher wishes to seek a new position. Cooperation of the candidate in keeping information in the folder up-to-date is necessary for the most effective service.

Teacher placement service is available only to candidates in the college teacher training program.

Employment

PART-TIME EMPLOYMENT

The college 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 colleges where regular full-time employes 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 referrals for interviews are arranged by the Placement office.

SUMMER EMPLOYMENT

Students are encouraged to take 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 office receives many summer job listings. In addition, many business and industry recruiters interview undergraduates for summer employment, which often leads to permanent employment.

Financial Aid

The college offers a variety of financial aid programs to assist qualified students in meeting educational expenses. Aid programs include scholarships, grants, loans and student employment. Applicants for aid are normally expected to have saved $300 or more to defray expenses of the academic year.

The Parents' Confidential Statement is required of all dependent applicants for National Defense Loans, U.S. College Work-Study,

and College Scholarships and all applicants for Educational Opportunity Grants. The statement is available at the Office of Financial Aid and high schools. It should be submitted to the College Scholarship Service one month prior to the application deadline. The standard fee for this service is $2.50.

Students who have previously filed a Parents' Confidential Statement and are already participating in these programs are required to complete a Renewal Form prior to the next academic year. This form is available in the Office of Financial Aid and should be submitted to the College Scholarship Service one month prior to the application deadline. The standard fee for this service is $2.00.

All programs of financial aid are subject to change because of funds available and revision of loans and programs.

Scholarships

CALIFORNIA STATE SCHOLARSHIPS

All California residents who have not reached their 24th birthday are encouraged to apply for a California State Scholarship to cover the costs of required fees. Applications are available from high schools, junior colleges, the Cal Poly Financial Aid Office, or the California State Scholarship and Loan Commission, 520 Capitol Mall, Sacramento, Calif. 95814. Applications are submitted directly to the Commission.

COLLEGE SCHOLARSHIPS

Most of the scholarships offered by the college are awarded to sophomore, junior, and senior students who have distinguished themselves in areas of academic performance, co-curricular activity, or a combination of both. Most awards are restricted to students majoring in particular areas of study, and applications for these are reviewed by the college's scholarship and loan committee and the appropriate departmental faculty members. Minimum grade-point average requirements vary with the award, and most award programs require demonstration of need.

Applications and full information may be obtained from the Financial Aid office. Scholarships and awards currently available are:

School of Agriculture

ANY MAJOR

Los Angeles County Pomona Grange No. 37—$200

San Bernardino Pomona Grange No. 32—$150

AGRICULTURAL BIOLOGY
Chet Pencille Memorial—$100 and $200

AGRICULTURAL BUSINESS
Enos Spencer Reid Memorial—$200

AGRONOMY
California Fertilizer Association—$100 (2 awards)
Kellogg Supply (Soils)—$125

ANIMAL SCIENCE
Sutton-Frost—$150

FRUIT INDUSTRIES
Jim Bastady—$100
Lemon Men's Club—$300 and $200
Sunkist Growers—$150
Central California and Tulare Sunkist—$300
Foothill Sunkist Managers Club—$150
Sunkist Managers Club of San Diego and Orange Counties—$150
Tri-County Sunkist Managers—$150

LANDSCAPE ARCHITECTURE
Jack Evans Memorial—$100

ORNAMENTAL HORTICULTURE
Bandini Fertilizer—$100
California Park and Recreation Society—$375
L.A. Chapter, California Association of Nurserymen—$125
Miles Kellam Memorial—$100
Kellogg Supply Co.—$125
California Association of Nurserymen—$100
Harry E. Rosedale Memorial—$100

PARK ADMINISTRATION
California Park and Recreation Society—$375
Wagner Landscape Contractors—$100

School of Arts

ANY MAJOR PREPARING FOR A TEACHING CAREER IN CALIFORNIA PUBLIC SCHOOLS
California Congress of Parents and Teachers, Inc.—$500
American Federation of Teachers (Jerry Voorhis Local 1601)—$150

PHYSICAL EDUCATION MAJORS: EITHER INCOMING FRESHMEN OR PRESENTLY ENROLLED STUDENTS
California Association for Health, Education and Recreation—$100 (2 awards)

School of Business Administration

ACCOUNTING
Becker CPA Review Course—$100

BUSINESS MANAGEMENT
Business Scholarship—$75

FINANCE, INSURANCE, AND REAL ESTATE
American Society of Insurance Management—George Farver Memorial—$250

School of Engineering

AEROSPACE ENGINEERING
Millard D. Shriver—$250

CHEMICAL ENGINEERING
California Coastal Section of Society of Petroleum Engineers of A.I.M.E.—$250

CIVIL ENGINEERING
Engineering and Grading Contractors—$100 (2)

ELECTRICAL AND ELECTRONICS ENGINEERING
Bourns, Inc.—$500 (2)
Western Electric—$500

INDUSTRIAL ENGINEERING
Foundry Educational Foundation—$500 (4)
Society of Die Casting Engineers—$200

MECHANICAL ENGINEERING
Alcoa—$750

Special Categories
American Society for Quality Control, San Bernardino Section—$100
Arabian Horse Association of Southern California—$250
Cal Poly Women's Club—$100
Covina—West Covina Altrusa Club—$120
San Fernando Valley Arabian Horse Association—$250
Soroptimist Club of Pomona—$150

A variety of business and service organizations provide scholarships for qualified students. In these cases the application and selection procedures are handled by the sponsoring agency. A list of current noninstitutional scholarships is on file in the Financial Aid office.

GRANTS

The Federal Government has established a grant-in-aid program to assist students who would not normally attend college because of financial hardship. *Educational Opportunity Grants* are restricted to students from low-income families. The amount of financial assistance a student receives is based upon his financial resources, those of his parents, and the cost of attending the college. Although the grants range from $200 to $800 per year, no more than one-half of the total financial assistance received by the student from *all* sources may be in the form of an Educational Opportunity Grant. The Parents' Confidential Statement is required of all applicants. Application deadline for consideration for the next college year is June 1.

Loan Programs

NATIONAL DEFENSE STUDENT LOAN PROGRAM

The college participates with the Federal Government and the State of California in making available loans to students under provisions of the National Defense Education Act.

Entering freshmen as well as students in advanced standing in any field of study are eligible, although the law provides that special consideration be given to students with superior academic background who plan to teach in elementary and secondary schools.

The maximum loan to one individual is $1,000 per academic year, and no more than $5,000 total. Loans must be repaid with 3 per cent interest over a period of 10 years, beginning one year after the individual ceases to be a full-time student in an institution of higher education. However, a borrower may have 10 per cent of the loan and the interest thereon cancelled for each full year of fulltime public or elementary or secondary school teaching, up to a maximum of five years and 50 per cent of the loan. A special 15 per cent cancellation opportunity is available to teachers in specially-designated schools for the culturally deprived.

All dependent applicants are required to file a Parents' Confidential Statement with College Scholarship Service.

Application deadline for consideration for the next college year is June 1.

FEDERALLY INSURED LOAN PROGRAM

The U.S. Office of Education has established a Guaranteed Loan Program to provide loans to students who would not generally qualify for National Defense Loans.

Full-time students who are residents of California may borrow up to $1,000 per academic year from a bank or other financial institution and not be obligated to begin repayment until ten months after graduation. Loans must be repaid at 7 per cent simple interest.

For families in which the annual income is under $15,000, the U.S. Office of Education will pay all of the interest (7 per cent) while the student is in school and 3 per cent during the repayment period.

SHORT-TERM LOANS

A number of student loan funds provide emergency assistance of a temporary and minor nature related to educational expenses. Loans from these funds are available to registered full-time students of good academic standing who have been in attendance at the college at least one full quarter. Emergency short-term loans are normally repaid during the same quarter they are received. Applications should be made to the Financial Aid office.

The character and integrity of the student are the primary qualifications for obtaining a loan. Evidence of need must be shown for such temporary assistance. Even though need is shown, students who have spent funds far beyond necessary school expenses will not be considered for loans.

Short-term loan funds have been established by the following:

Aerospace Engineering Alumni—Faculty
Animal Science Club
Associated General Contractors of America
Associated Students, Inc.
Athletic and Recreation Turfgrass Association
California Fertilizer Association
California Retired Teachers' (Laura Settle)
Cal Poly Alumni Association
Cal Poly Student Wives Club
Cal Poly Women's Club
Don Davis Memorial
Dr. C. D. N. Gilfillan Memorial
Bill Hamilton, Jr. Memorial
Karl Hassler Memorial
Phillip H. Henry Memorial
Katherine and Edwin Job
Dr. John F. Lamiman
Lemon Men's Club
Sam B. McMurray Memorial
William Mowry Memorial
Ornamental Horticulture Alumni Association
Waid Palmer Memorial
Chet Pencille Memorial
Pomona Rotary Club
Senior Class
Southern California Meter Association
Southern California Turfgrass Council
Terminix Educational Foundation
West End Soil Conservation District
Alex M. Wilson Memorial
Jack Woodruff Memorial
Michael D. Young Memorial

WORK-STUDY EMPLOYMENT

Under the terms of the Higher Education Act of 1965, the college participates in the U.S. Work-Study Program which provides employment opportunity for eligible students from lower income families. Employment provisions are the same as for other student employment on campus. Rates of pay vary from $1.50 per hour to $2.76 per hour depending on the job requirements and the skills of the worker. While attending classes, qualified students may work up to 15 hours a week.

STUDENT RESIDENCE HALLS

The college on-campus residence program includes significant emphasis upon 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. House 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, and residents are supplied with clean sheets weekly. Students supply their own pillows, blankets, towels, 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. No meals are served on college holidays.

New students interested in on-campus housing should request a housing application at the time of application for admission to the college. Contracts issued for the academic year provide for both room and board. Residence hall fees are $353 per quarter, during the 69-70 academic year. Payments may be made in periodic installments in accordance with the schedule available from the Housing office.

Privately-owned and operated off-campus housing is available for both men and women students. The college does not inspect or supervise these facilities. Single women students under age 21 must live on campus or at home unless a written parental responsibility statement is filed with the Dean of Women, prior to registration. Inquiries about off-campus housing should be made in person at the Housing office.

FEES AND EXPENSES

Tuition is not charged to legal residents of California; however, fees for various materials, activities, and services are charged. Tuition is payable by nonresidents and foreign-visa students in addition to fees required of other students. *All fees are subject to change by the Trustees of the California State Colleges.*

SERVICES FEE AND TUITION

Residents of California

Material and Service fee (over 6 units)	$29.00
(6 units or less)	15.00

Nonresidents

In addition to Materials and Service fee:

Tuition (15 or more units) maximum charge	$297.00
(less than 15 units) per unit	20.00

Foreign-Visa Students as Prescribed by Regulations

In addition to Materials and Service fee:

Tuition (15 or more units) maximum charge	$85.00
(less than 15 units) per unit	5.75

MISCELLANEOUS FEES

Application to college (charged of all applicants—payable by check or money order at time of applying—*nonrefundable*)	$10.00
Change of program	1.00
Check returned for any cause	2.00
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)	10.00
Late registration	5.00
Library	See schedule in library
Transcript of record (no charge for first copy)	1.00
Parking fee	
Nonreserved spaces (per quarter):	
Each student enrolled for more than six units	9.00

Each student enrolled for six units or less	4.00
Each alternate car in addition to fee for first vehicle	1.00
Special groups, per week	1.00
Associated Students, Inc., membership (not a state fee):	
Each student enrolled for over six units	
Fall quarter	10.00
Winter, spring, and summer quarters, each	5.00
Each student enrolled for six units or less	
Fall quarter	5.00
Winter, spring, and summer quarters, each	3.00

Dependent on the time of withdrawal from college, a student may be entitled to a partial refund of fees if applied for at the time of withdrawal.

STUDENT EXPENSES

Estimated expenses for a legal California resident student living in a campus residence hall are $481 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 $1,450 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 (fall quarter, $10; winter, spring, and summer quarters, $5 each)	$10.00
Materials and service fee (per quarter)	29.00
Room and board (19 meals per week)	353.00
Books and supplies (estimated)	80.00
Parking	9.00
Estimated total expenses per quarter	$481.00

Provision should be made for personal expenses which average about $150 per quarter.

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 college authority, which includes the prerogative of dismissing students whose conduct is inimical to the aims of an institution of higher education.

Student Discipline Procedure

If a student violates local, state, or federal laws or college regulations, he is referred to the office of the Dean of Students, and an investigation of the situation is made. The student in question will be given a written notice of the specific charges and grounds, which, if proven, would justify warning, probation, suspension, or expulsion. The student then has an opportunity to select a hearing before the Dean of Students, the Student Court, or a faculty committee. At the hearing he has the opportunity to state his case and to present a defense against the charges including oral testimony or written affidavits of witnesses on his behalf. After the hearing, the Dean of Students, or his designated representative, may take one of the following actions: (1) give the student an official warning, (2) process a formal probation, suspension, or expulsion action according to provisions of Title 5, *California Administrative Code*, Sections 41302 and 41303, or (3) dismiss the case.

The period for which the student may be placed on probation or suspended shall not exceed 12 months. No fees paid by or for such student for the quarter in which he is suspended shall be refunded. If the student is readmitted before the close of the quarter in which he is suspended, no additional fees shall be required of the student on account of his suspension.

Disciplinary action varies with the severity of the violation. If the unacceptable behavior involves use of motor vehicles, the student may be restricted from driving or parking on campus. If the unacceptable behavior involves matters pertaining to on-campus housing or dining, the student may be restricted from living or

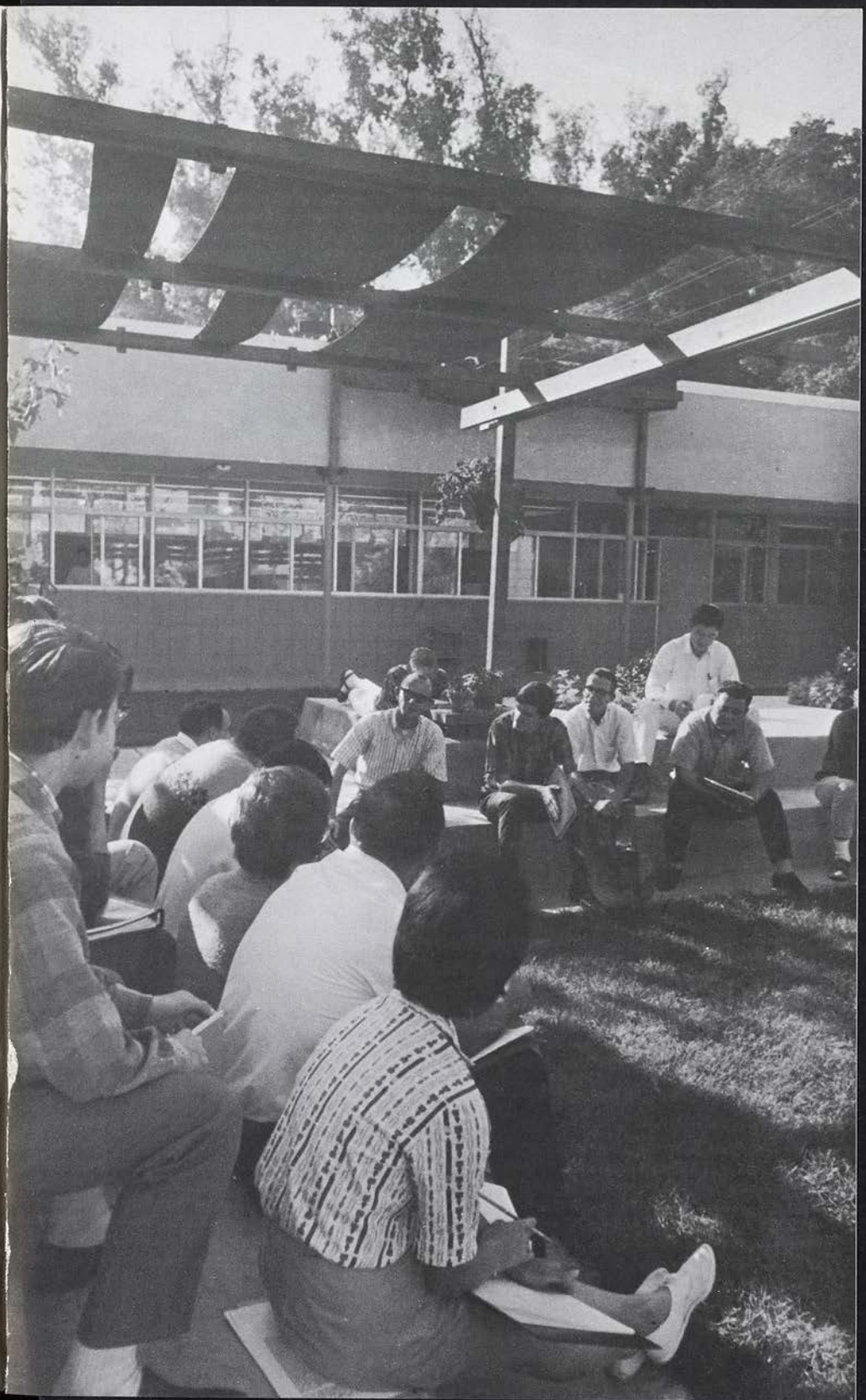
dining on campus. Students on disciplinary probation may be denied the opportunity to participate on intercollegiate teams or to hold positions of leadership in student organizations or student government groups.

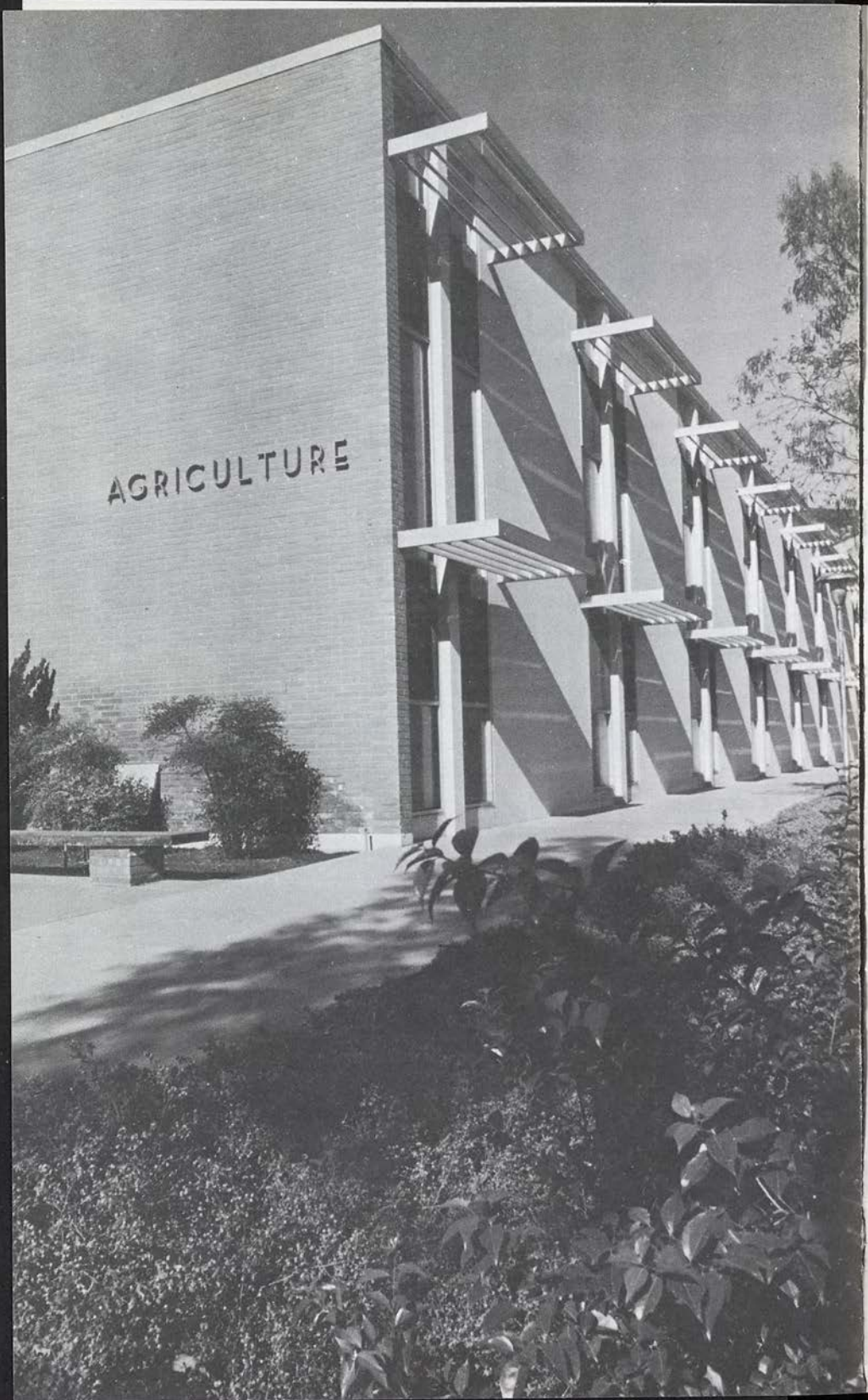
Causes for Disciplinary Action

Students may be placed on disciplinary probation, suspended, or expelled for one or more of the following causes:

(1) Disorderly, unethical, vicious, or immoral conduct.
(2) Misuse, abuse, or destruction of state, Foundation, or personal property.
(3) Violations of motor vehicle laws, especially where grossly serious violations or repeated minor violations are involved.
(4) Infringing upon the rights of others to pursue their normal activities as students or employees of the college.

Among the specific causes for which the college will take such disciplinary actions are: the bringing or drinking of alcoholic beverages on campus; being intoxicated on campus; being arrested for cause by a public law enforcement agency; use, possession, distribution or sale of illegal drugs or narcotics including marijuana and LSD; repeated minor violations of college rules and regulations, including those pertaining to driving and parking of vehicles.




AGRICULTURE

SCHOOL OF AGRICULTURE

AGRICULTURAL BUSINESS MANAGEMENT . . . 106
AGRICULTURAL ENGINEERING . . . 112
ANIMAL SCIENCE . . . 114
ENVIRONMENTAL DESIGN . . . 121
FOODS AND NUTRITION . . . 127
INTERNATIONAL AGRICULTURE . . . 131
ORNAMENTAL HORTICULTURE . . . 134
PLANT AND SOIL SCIENCE . . . 140
RELATED AGRICULTURE . . . 153

SCHOOL OF AGRICULTURE

Carl R. Englund, *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, and California is, in turn, the nation's agricultural 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 —Agricultural Biology, Agricultural Business Management, Agronomy, Animal Science, Foods and Nutrition, Fruit Industries, Landscape Architecture, Ornamental Horticulture, Park Administration, Soil Science, and Urban Planning—leading to the Bachelor of Science Degree in Agriculture, and one major—Latin American Agriculture—leading to a Bachelor of Science Degree in International Agriculture. Students interested in agricultural education may choose a program leading to a Standard Teaching Credential—Secondary Specialization with a major in agriculture.

Facilities on or near the campus make possible practical laboratories for the various majors. The college 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. Acreage at both the Kellogg and Voorhis campuses is available for pastures, crops, groves, and ornamental plantings.

To assure each student of occupational competence, the college 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.

AGRICULTURAL BUSINESS MANAGEMENT DEPARTMENT

William P. Rowley, *Chairman*
Richard C. Bradshaw
David E. Cole
William C. Hughes
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.

To satisfy a growing need in the areas of agricultural marketing, credit, and service to producers, the diversity of the major provides a well-rounded background. 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 enterprises further insure 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.

Typical employment areas for the graduate of Agricultural Business Management include land appraisal, banking, produce buying, chemical sales, governmental agencies, farm equipment sales, food distribution, and public relations.

The curriculum has proved stimulating for those students pursuing graduate studies in marketing, business, and economics. In addition, students with an aptitude for mathematics should consult with their adviser concerning graduate study in agricultural economics. Fellowships and assistantships are available for many graduate schools.

Curriculum in Agricultural Business Management

Freshman	*F*	*W*	*S*
Introduction to Agricultural Business (ABM 101)	3		
Agricultural Credit (ABM 103)		3	
Construction Fundamentals (AE 121)	2		
Utility Systems (AE 122)			2
Freshman Composition (ENG 104, 105)	3	3	
Health Education (PE 107)	2		
Basic Mathematics (MAT 101) or Mathematical Analysis (MAT 108)		3	
Business Mathematics (MAT 103) or Mathematical Analysis (MAT 109)			3
Physical Education (PE 141)	½	½	½
Fundamentals of Earth Science (PSC 101) or College Chemistry (CHM 105) and Laboratory (CHM 142)		4	
Fundamentals of Physics (PHY 102) or Organic Chemistry (CHM 211) and Laboratory (CHM 251)			4
Fundamentals of Chemistry (CHM 103) or College Chemistry (CHM 104) and Laboratory (CHM 141)	4		
General Psychology I (PSY 202)			3
Electives and courses to complete major	3	3	4
	17½	16½	16½

Sophomore			
Wholesaling of Agricutural Products (ABM 206)	3		
Advertising and Promotion of Agricultural Products (ABM 225)		3	
Agricultural Salēs and Service Management (ABM 202)		3	
Job Instruction Training (ABM 203)			2
Salesmanship (MKT 208)	4		
Principles of Economics (EC 201, 202, 203)	3	3	3
Public Speaking (SP 200)			3
Report Writing (ENG 216)			3
Basic Biology (BIO 115)	3		
Physical Education (PE 141)	½	½	½
Principles of Accounting (ACC 124, 125) or Management Accounting (ABM 324) and Enterprise Accounting (ABM 326)	4	4	
Electives and courses to complete major		4	4
	17½	17½	15½

Junior			
Retailing of Agricultural Products (ABM 325)	3		
Agricultural Marketing (ABM 304)			3
Agricultural Economics (ABM 311)		3	
American Civilization (AMC 301, 302, 303)	3	3	3
Business Law (BUS 301)		3	
Descriptive Statistics (MAT 107) or Business Forecasting (BUS 314)		4	
Introduction to Data Processing (DP 211)	4		
†Humanities			3
Electives and courses to complete major	6	4	8
	16	17	17

† To be selected from the General Education list.

Senior	*F*	*W*	*S*
Senior Project (ABM 461, 462)	2	2	
Undergraduate Seminar (ABM 463)			2
Personnel Management (ABM 402)			3
Land Appraisal (ABM 406)	3		
Transportation of Agricultural Commodities (ABM 416)		3	
Agricultural Labor-Management Relations (ABM 418)			3
Agricultural Prices and Government Control (ABM 403)			3
Human Relations (PSY 314)		3	
Introduction to Philosophy (PHL 201)	3		
The Bible as Literature (ENG 110)			3
Electives and courses to complete major	8	7	2
	16	15	16

Curricular Options

Agricultural Economics

This option stresses preparation for the management of farm businesses, agricultural credit institutions and the many other related businesses in which greater knowledge of economic analysis and decision making is required. The option is of particular value to the student planning advanced degree work in agricultural economics.

Courses to Complete Major

Sophomore

Agricultural Production Courses (8)
(Select from AS 111, AGR 111, FI 230, OH 131, AS 227, AGB 101)

Junior

MAT 204 Introduction to Mathematical Analysis (3)
EC 308 Money and Banking (4)
ABM 312 Agricultural Economics (3)
ABM 328 Agricultural Enterprise Management (4)

Senior

EC 311 Price and Income Analysis (4)
EC 312 Price and Income Analysis (4)
ABM 313 Agricultural Policy (4)
ABM 331 Statistical Analysis for Agriculture (4)

Food Distribution

This 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.

Courses to Complete Major

Freshman

AGB 101 Agricultural Law (3)
FN 121 Introduction to Foods (3)

Sophomore

OH 121 Nursery Operations (4)
FI 230 General Fruit Production (3)

Junior

AS 325 Meats Utilization (3)
AGR 224 Harvesting and Marketing (4)
AS 335 Meats Processing (3)
FN 224 Food Procurement (3)

Senior

ABM 404 Case Studies in Food Distribution (2)
BUS 307 Management Principles and Theory (4)
ABM 301 Economics of Food Distribution (3)
ABM 413 Food Merchandising (3)

Management

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.

Courses to Complete Major

Freshman

AS 111 Animal Agricultural Science ..... (3)
AGR 111 Introduction to Plant Science ..... (3)

Sophomore

SS 221 General Soils ..... (4)
AGB 101 Agricultural Law ..... (3)

Junior

AGR 224 Harvesting and Marketing ..... (4)
FIN 307 Fundamentals of Risk and Insurance ..... (4)
BUS 302 Business Law ..... (3)

Senior

ABM 313 Agricultural Policy ..... (4)
ABM 328 Enterprise Management ..... (4)

Description of Courses

ABM 101 Introduction to Agricultural Business (3)

The field and scope of agricultural business. Fundamental concepts, tools, and practice. 3 lectures.

ABM 103 Agricultural Credit (3)

Principles in the acquisition and use of credit in establishing and operating the agricultural business. Practices and problems in the extension of credit and collection of accounts by business dealing in agricultural supplies and products. 3 lectures.

ABM 202 Agricultural Sales and Service Management (3)

Supervision of people who sell to and serve farmers. Selecting, training, directing, and evaluating personnel. Methods of payment, use of advertising, promotion, incentives and service. 3 lectures.

ABM 203 Job Instruction Training (2)

The principles and techniques of instructing mechanical or technical jobs; job breakdown and job description as applied to agricultural enterprises. 2 lectures.

ABM 206 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. 3 lectures.

ABM 225 Advertising and Promotion of Agricultural Products (3)

Industry-sponsored agricultural advertising programs, including the tools of publicity, merchandising and public relations. Detailed examination of local types of advertising media and rates as they are used for short, seasonal promotions. Advertising provisions of California agricultural marketing orders are reviewed. 2 lectures, 1 three-hour laboratory.

ABM 301 Economics of Food Distribution (3)

Economic factors in food distribution: pricing and price determination; state and federal regulations; mergers and acquisitions; trade restraints; and scale economics. 3 lectures. Prerequisite: ABM 325

ABM 304 Agricultural Marketing (3)

Economic and historical aspects of marketing agricultural products. Various marketing institutions, their problems and possible solutions. Current trends and developments, with emphasis on California products and marketing structure. 3 lectures. Prerequisite: EC 201

ABM 311 Agricultural Economics (3)

Use of economic principles to analyze problems in agriculture. Agriculture's role in the economy and policies affecting our agricultural resources. 3 lectures. Prerequisite: EC 202

ABM 312 Agricultural Economics (3)

Study of resource economics; agricultural production analysis through the use of intermediate economic theory. 3 lectures. Prerequisite: ABM 311

ABM 313 Agricultural Policy (4)

Current agricultural policies and proposals. The consequences of alternative agricultural policies for the farmer and society. 4 lectures.

ABM 324 Management Accounting (4)

Fundamental processes of double-entry accounting considered as a tool of agricultural management with emphasis on practical application. 3 lectures, 1 three-hour laboratory.

ABM 325 Retailing of Agricultural Products (3)

Principles of buying, receiving, storing, and handling agricultural products for profitable retail store operations. Costs, facilities, techniques, and methods. Store operations—supermarket, shopping centers, etc. Field trips and case studies. 2 lectures, 1 three-hour laboratory.

ABM 326 Enterprise Accounting (3)

Methods of accounting for income, costs, and profit for separate enterprises in diversified agricultural business to achieve most profitable enterprise combinations. 3 lectures. Prerequisite: ABM 324

ABM 328 Agricultural Enterprise Management (4)

Methods of measuring profits in agricultural production and business, sources of economic information, land appraisal and description, sources of farm credit and capital, land leases and rental budgeting techniques. 3 lectures, 1 three-hour laboratory.

ABM 331 Statistical Analysis for Agriculture (4)

Application of statistical tools and techniques employed in an agricultural economic analysis. Delineation of specific agricultural problems using statistical techniques. 3 lectures, 1 three-hour laboratory. Prerequisite: ABM 311, MAT 107

ABM 402 Personnel Management (3)

Immediate supervisor-worker relationships for greater productivity and increased job satisfaction; impact of technology; union-management relationships; and skills of face-to-face supervision. 3 lectures.

ABM 403 Agricultural Prices and Government Control (3)

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. 3 lectures. Prerequisite: EC 202

ABM 404 Case Studies in Food Distribution (2)

Actual case problems in financing, organization, management, store location, operations, personnel, labor relations, company growth, mergers, and integration. 2 lectures. Prerequisite: ABM 325

ABM 406 Land Appraisal (3)

Principles, methods and techniques of appraising real property for loans, purchase and sale, tax assessments, condemnations and other purposes. 3 lectures.

ABM 413 Food Merchandising (3)

Retail agricultural marketing practices with emphasis on the selling and promotion functions. Display methods; related products and tie-in merchandising; customer motivation and traffic studies. 3 lectures.

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, containerization potentials, and regulations including agricultural exemptions and incentives. 3 lectures.

ABM 418 Agricultural Labor-Management Relations (3)

Study of existing union contracts pertinent to the agricultural industry. Responsibilities of management and labor. Trends and practices. 3 lectures.

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 standing.

AG 400 Special Problems for Advanced Undergraduates (1-2)

Individual or group investigation, research, studies, or surveys of selected problems. Total credit limited to 4 units.

AGRICULTURAL ENGINEERING DEPARTMENT

Haven Q. Conard, *Chairman*
Theodore L. Lieb
Floyd V. Matthews, Jr.
Charles M. Stark

The Agricultural Engineering department classes are valuable to students in many majors in the School of Agriculture. Courses are offered in power and machinery, buildings and structures, electrification, soil and water conservation, and agricultural mechanics. In addition, the college fleet of agricultural and construction equipment for instruction and farm use is managed and maintained by the department.

Instructional facilities include laboratories with appropriate equipment, tools, and supplies.

Description of Courses

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 (2)

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. 1 lecture, 1 three-hour laboratory.

AE 125 Landscape Construction (2)

Construction techniques for landscaping applications. Materials strength tests. Basic structural engineering as applied to concrete, brick, stone, asphalt, plastic, and metal construction. Economic management of equipment and labor. 1 lecture, 1 three-hour laboratory. Prerequisite: AE 124

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 221 Machinery Applications (2)

Basic principles of machines. Materials and methods of construction and repair. Selection, operation, adjustment, maintenance, trouble-shooting of machinery for soil preparation, planting, weed control, fertilizing, harvesting, and materials handling.

Field testing and evaluation. Machinery management. 1 lecture, 1 three-hour laboratory. Prerequisite: AE 241 or equivalent.

AE 227 Tractor Power (2)

Thermodynamic principles of internal combustion engines, gasoline, diesel, and LPG. Power transmission: wheeled, track, and utility units. Drawbar, hydraulic, and pneumatic power. Tractor selection, use, maintenance, and trouble-shooting. Power measurement, testing, and evaluation. 1 lecture, 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: AE 122, MAT 101 or 102

AE 240 Irrigation (4)

Principles and practices of irrigation. Irrigation design engineering. Pumps, wells, water conveyance and measurement. Surface, sub-surface 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 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 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.

ANIMAL SCIENCE DEPARTMENT

Harry B. McLachlin, *Chairman*
K. Douglas Butler
Allen C. Christensen
Homer D. Fausch
Jack T. Gesler
Eugene K. Keating
Mack H. Kennington
Edward A. Lugo, Jr.
Edward A. Nelson
Robert H. Packard
Tom W. Westing

A four-year curriculum leading to a Bachelor of Science degree in Animal Science with an option in Pre-Veterinary Science and concentrations in Animal Production, Meats Science, and Agricultural Business is offered in the Animal Science 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 commercial feeder cattle of all breeds; the Kellogg herd of Arabian horses; flocks of purebred Rambouillet, Suffolk, and Hampshire sheep; a herd of Minnesota No. 1, 2, 3 and crossbred swine; 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 Kellogg Unit Foundation.

Curriculum in Animal Science

Freshman	*F*	*W*	*S*
Feeds and Feeding (AS 101, 102)	2	3	
Elements of Market Beef (AS 131)	4		
Elements of Swine Production (AS 122)		4	
Elements of Sheep Production (AS 123)			4
Freshman Composition (ENG 104, 105, 106)	3	3	3
Basic Biology (BIO 115)	3		
Basic Biology Laboratory (BIO 145)	2		
General Zoology (ZOO 134, 135)		4	4

	F	*W*	*S*
Mathematics (MAT 101 or 108, 102 or 104‡ or 109)		3	3
Health Education (PE 107)			2
Physical Education (PE 141)	½	½	½
Electives and courses to complete major	1		
	15½	17½	16½

Sophomore

Meat Animal Slaughter and Cutting (AS 227 or 325*)	3		
Approved Animal Science Courses‡	4	4	3
Physiology of Domestic Animals (VS 205)			3
†Humanities	2		
Genetics (BIO 303)		3	
College Chemistry (CHM 104, 105)	3	3	
College Chemistry Laboratory (CHM 141, 142)	1	1	
Principles of Economics (EC 201, 202)		3	3
Physical Education (PE 141)	½	½	½
Electives and courses to complete major	4	4	8
	17½	18½	17½

Junior

Advanced Livestock Feeding (AS 303)	2		
Animal Breeding (AS 304)	3		
Animal Parasitology (VS 302)		3	
Organic Chemistry (CHM 211, 251)	4		
Biochemistry (CHM 327)		4	
Bacteriology (BAC 221)		4	
American Civilization (AMC 301, 302, 303)	3	3	3
General Psychology (PSY 202)			3
Public Speaking (SP 200)			3
Electives and courses to complete major	4	4	8
	16	18	17

Senior

Senior Project (AS 461, 462)	2	2	
Undergraduate Seminar (AS 463)			2
Animal Nutrition (AS 402)		4	
Soil Science (SS 221 or 231‡)	4		
Economics (BUS 301 or ABM 103, 311, 304‡)			3
†Humanities		3	3
Management Accounting (ABM 324)	4		
Agricultural Enterprise Management (ABM 328)		4	
†Humanities		2	
Electives and courses to complete major	5		6
	15	15	14

* Women Animal Science majors will substitute alternate.
† To be selected from the General Education list.
‡ Students should select appropriate courses with the approval of their adviser.

Curricular Option and Concentrations

Pre-Veterinary Science

The option in Pre-Veterinary Science prepares students to enter schools of veterinary medicine or graduate school through completing the major with additional courses in the basic sciences.

Courses to Complete Major

Sophomore

CHM 113 Chemical Principles ..... (3)
CHM 153 Ionic Equilibria ..... (1)
PHY 121, 122, 123 College Physics (12)

Junior

CHM 221 Quantitative Chemistry ..... (4)
CHM 328 Biochemistry ..... (4)
ZOO 323 Embryology ..... (4)
ZOO 422 Histology ..... (4)

Agricultural Business

A student may elect to complete his major by taking a concentration of 24 units of courses in Agricultural Business and related business courses.

Animal Production

The major in animal science may be completed by taking a concentration of 24 units in Animal Production and related agricultural courses approved by the department.

Meats Science

A student may elect to complete his major by taking a concentration of 24 units of courses in Meats Science and related science courses.

Description of Courses

Animal Science

AS 101 Feeds and Feeding (2)

Identification and classification of feeds; simple use of food nutrients, protein, fat and carbohydrates; methods of preparing feeds; relative values of common feeds for each class of livestock; the use of by-product feeds. 2 lectures.

AS 102 Feeds and Feeding (3)

Digestion and utilization of feeds; feeding standards and computation of standard rations for livestock; economy in feeding, and purchasing feeds by nutritive values; important vitamins and minerals and feed sources thereof. 2 lectures, 1 three-hour laboratory. Prerequisite: AS 101

AS 111 Animal Agricultural Science (3)

Designed for non-agricultural majors as an orientation course pertaining to breed identification, production, marketing and economics of agricultural animals. 3 lectures.

AS 122 Elements of 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 Elements of Sheep Production (4)

Sheep operations in the United States. Emphasis on breeds and adaptation to California conditions. Principles of selecting, culling, and judging sheep; market classes and marketing sheep. Home slaughter and carcass cuts. Factors affecting wool value. 3 lectures, 1 three-hour laboratory. Prerequisite: AS 101

AS 124 Basic Equitation (2)

The fundamentals of the art of equitation. A consideration of equip-

ment used in training and riding, care of and safety precautions with riding horses, and basic equine anatomy as it pertains to equitation. 2 three-hour laboratories.

AS 131 Elements of Market Beef Production (4)

Survey of market beef production in the United States with emphasis on Southern California. Beef cattle terms. Study of central market and functions. Grades and classes of market cattle and carcasses. Importance of by-products. Breed characteristics. 3 lectures, 1 three-hour laboratory.

AS 223 Market Swine Production (4)

Management of the swine herd and care of pigs until weaning. Selection of feeder pigs. Feeding and managerial practices involved in developing the finished product. Market channels, cycles, production cost analysis, hog slaughter, carcass grading, and pork processing. 3 lectures, 1 three-hour laboratory. Prerequisite: AS 102, 122

AS 225 Elements of 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 226 Livestock Judging (2)

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

AS 227 Meat Animal Slaughter and Cutting (3)

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

AS 232 Sheep and Wool Production (4)

Management of commercial sheep operations. Breeding, lambing, selection, culling, marketing, shearing, grading, packing, and judging wool. Disease and parasite control. Range management. 3 lectures, 1 three-hour laboratory. Prerequisite: AS 102, 123

AS 233 Commercial Beef Production (4)

Grading and selection of stocker and feeder cattle; necessary margin. Factors affecting economy and efficiency of gain. Disease problems and control. Feeder production on winter range, silage, irrigated pasture, spoilage, hay, by-products. Supplemental feeding. 3 lectures, 1 three-hour laboratory. Prerequisite: AS 102, 131

AS 234 Horseshoeing (3)

Fundamentals of horseshoeing, anatomy and physiology of the horse's foot, pastern and legs. Trimming feet, fitting, nailing shoes. Normal shoeing, corrective shoeing. 1 lecture, 2 three-hour laboratories.

AS 303 Advanced Livestock Feeding (2)

Nutritional requirements for maintenance, growth, fattening, reproduction and lactation. Calculation of efficient and economical rations. Sources and composition of nutrients. Biological and replacement value of feeds. Recent developments in feeding. 2 lectures. Prerequisite: AS 102

AS 304 Animal Breeding (3)

Physiology of reproduction, application of genetics to animal breeding. Systems of mating animals, use of inbreeding, crossbreeding, and selection as applied to farm animals. 3 lectures. Prerequisite: BIO 303

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 to the livestock industry. 2 lectures, 1 three-hour laboratory. Prerequisite: VS 206

AS 306 Experimental Animal Methodology (4)

Breeding, feeding, management and experimental techniques of 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 equivalent, BAC 221

AS 325 Meats Utilization (3)

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

AS 328 Textile Fibers and Products (3)

Study of textile fibers of animal origin, their properties, capabilities, and means of identification as well as by-products of the animal industry, their importance and methods of merchandising and marketing. 2 lectures, 1 three-hour laboratory.

AS 329 Advanced Horse Production (3)

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. 2 lectures, 1 three-hour laboratory. Prerequisite: AS 225

AS 332 Beef Cattle Husbandry and Improvement (3)

Feeding and managing the breeding herd. Investment requirements and cost of production. Equipment, disease problems, and selection. Record keeping and performance testing. Fitting and marketing sale cattle. Breeding systems and bloodlines. 2 lectures, 1 three-hour laboratory. Prerequisite: AS 233

AS 335 Meat Processing (3)

Manufacturing of processed meats, with emphasis on sanitation, sausage formulation, quality control, and smokehouse operations. 1 lecture, 2 three-hour laboratories. Prerequisite: AS 227

AS 336 Meat Classification and Grading (2)

Factors related to carcass quality, conformation, and finish, including meat classification, grading, and judging 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 337 Wool Technology and Marketing (3)

Factors which determine commercial value of fleeces. Clean fleece weight for grade and relative importance of quality, length, soundness, purity, crimp, color, and condition. Markets and wool marketing. Management practices affecting wool value. 2 lectures, 1 three-hour laboratory. Prerequisite: AS 232

AS 338 Wool Judging (1)

Judging and scoring fleeces on the basis of grade, class, yield, quality, etc. Preparation for intercollegiate judging contests. 1 three-hour laboratory. Prerequisite: AS 232

AS 339 Basic Horse Training Techniques (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 329

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: AS 102 and CHM 328

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 412 Mammalian Endocrinology (4)

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 421 Meat Technology (3)

Characteristics of meat and meat products as related to processing operation, manufacture, and marketing. 2 lectures, 1 three-hour laboratory. Prerequisite: AS 227, CHM 211, 251

AS 422 Commercial Feedlot Operations (3)

Management of the commercial feedlot. Selection of feeder cattle; procurement of feedstuffs; economical rations; disease control; livestock and equipment financing; recordkeeping and feeder-owner agreements; and cattle marketing. 2 lectures, 1 three-hour laboratory.

AS 423 Livestock Marketing (3)

Livestock marketing practices and procedures. Observations of the public market. 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 agricultural products and their application to animal production. 2 three-hour laboratories. Prerequisite: CHM 327

AS 441 Advanced Livestock Judging (2)

Intensive practice in livestock judging in preparation for livestock judging team to compete in intercollegiate contests. 2 three-hour laboratories. Prerequisite: AS 226

AS 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.

AS 463 Undergraduate Seminar (2)

Student study and presentation of new methods and developments of practices and procedures in the fields of specialization in Animal Science. 2 lectures. Prerequisite: Senior standing.

AG 400 Special Problems for Advanced Undergraduates (1-2)

Individual or group investigation, research, studies, or surveys of selected problems. Total credit limited to 4 units.

Dairy Husbandry

DH 230 General Dairy Husbandry (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.

Poultry Industries

PI 131 Poultry Principles (4)

Detailed consideration of avian anatomy and physiology as it affects production. Breeds, breeding, strain selection, incubation of poultry. Nutrition, feeds and micro-ingredient additives in poultry feeding. Sanitation, prevention, control, and treatment of disease. 3 lectures, 1 three-hour laboratory.

PI 231 Poultry Production (4)

The fundamentals of poultry production. Consideration of ranch layout, housing systems, brooding, broiler,

egg, turkey, game birds, ducks, geese management and production programs, and record keeping in the poultry business. 3 lectures, 1 three-hour laboratory. Prerequisite: PI 131

PI 332 Poultry Marketing (4)

The fundamentals of poultry marketing. Channels through which the product moves. Processing, buying, selling, and maintenance of quality products. Economic merchandising and management problems involved in marketing. 3 lectures, 1 three-hour laboratory. Prerequisite: PI 231

Veterinary Science

VS 205 Physiology of Domestic Animals (3)

Physiological processes of the more important organs of the animal body. 3 lectures. Prerequisite: ZOO 134

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 302 Animal Parasitology and Disease Control (3)

Study of factors contributing to problems and control of animal sanitation, disease and parasites. 3 lectures. Prerequisite: ZOO 134

ENVIRONMENTAL DESIGN DEPARTMENT

Jere S. French, *Acting Chairman*

David E. Bess
Richard J. Chylinski
Bruce J. Conroy
Gerhardt H. Felgemaker
Sherman W. Griselle
Charles R. Haugh
Henry Kordus
John T. Lyle
John M. Roberts
D. Rodney Tapp
Chester A. Volski
Bernard B. Zimmerman

The Department of Environmental Design offers majors in the fields of Landscape Architecture and Urban Planning, and an option in Architecture. These three environmental design programs provide a broad range of occupational choice from positions with the many offices engaged in private practice to civil service opportunities with city, county, state, and federal governments.

One of the major assets of the curriculum is a common core of courses for all students in the three environmental design fields. These core courses provide the means whereby design specialists learn to work together and benefit from their mutual contributions.

In Landscape Architecture, the areas of materials, design fundamentals, and drawing form a broad base on which the advanced courses build. The curriculum of the last two years enters into progressively more complex areas of landscape design, construction, and planning.

The program in Landscape Architecture is accredited by the American Society of Landscape Architects and approved by the California Board of Landscape Architects.

The Urban Planning major provides a well-rounded program of study and experiences in the fields of concern to the planner, with an emphasis on planning as a three-dimensional design field in which space and people are the prime elements of concern. As an urban or city planner, the graduate will understand how to translate human needs and the economic, political, and social forces into a satisfactory, effective urban form.

Architecture is the science and art of building, closely related to technology as well as to economic, political, social, and aesthetic disciplines. The student selecting the option in architecture is provided with a four-year program of study encompassing the many disciplines involved.

Curriculum in Environmental Design

Freshman	*F*	*W*	*S*
Introduction to the Professions (ENV 113)			2
Graphics (ENV 144, 145)	2	2	
Theory of Design (ENV 121, 142, 143)	2	2	2
Freshman Composition (ENG 104, 105)	3	3	
†Humanities			3
Life Science (BIO 110)		3	
Health Education (PE 107)	2		
Physical Education (PE 141)	½	½	½
†Physical Sciences or College Physics ‡ (PHY 121, 122, 123)	4	4	4
Mathematics (MAT 101, 102 or 108 ‡, 109 ‡, 107 *)	3	3	3
*Report Writing (ENG 216)			3
Electives and courses to complete major	1		
	17½	17½	17½

Sophomore			
Basic Design (ENV 227, 228, 229)	3	3	3
Perspective (ENV 241, 242)	2	1	
Graphics (ENV 273)			1
Surveying (AE 131)	2		
Land Planning (UP 222)		3	
Public Speaking (SP 200)			3
Principles of Economics (EC 201, 202)	3	3	
Physical Education (PE 141)	½	½	½
*Research and Analysis (UP 205, 206)		2	3
*Graphics (ENV 271, 272)	1	1	
Electives and courses to complete major	6	4	7
	17½	17½	17½

Junior			
American Civilization (AMC 301, 302, 303)	3	3	3
General Psychology (PSY 202)		3	
California State and Local Government (PLS 223)	4		
*Introduction to Data Processing (DP 211)		4	
*Systems Analysis (DP 222)			4
Electives and courses to complete major	11	7	7
	18	17	14

Senior			
Senior Project (ENV 461, 462)	2	2	
Undergraduate Seminar (ENV 463)			2
Environmental Design (ENV 431, 432, 433)	4	4	4
History of Environmental Design (ENV 424, 425)	3	3	
†Humanities	3	3	
*Conference Techniques and Group Discussion (SP 307)			3
*Urban Sociology (SOC 401)		3	
*Human Relations I (PSY 314)			3
Electives and courses to complete major	4		1
	16	15	13

* Core courses for Urban Planning majors and Architecture option students.
† To be selected from the General Education list with adviser's approval.
‡ Courses for Architecture option.

Curricular Specializations

Landscape Architecture Major

Courses to Complete Major

Freshman

BOT 116—Plant Environments (3)
OH 233—Plant Materials III (4)
ART 244—Fundamentals of Drawing (2)

Sophomore

AE 132—Surveying (2)
AE 231—Materials and Creative Construction (3)
OH 231, 232—Plant Materials I, II (8)
OH 336—Native Plant Materials (3)

Junior

LA 324—Intermediate Landscape Design (12)
LA 337, 338, 339—Landscape Construction Drawing (9)
LA 327, 328—Planting Design (5)
LA 348, 349—Mechanics and Strength of Materials (2)
ENV 374—Graphics (1)
SS 221—General Soils (4)
OH 253—Horticulture Management (4)

Senior

PA 415, 431—Contracts, Specifications and Estimating (7)
ABM 324—Management Accounting (4)

Urban Planning Major

Courses to Complete Major

Sophomore

UP 201—Law and Administration (2)
UP 202—Theory and Methodology (2)
UP 221—Community Facilities (3)

Junior

UP 321—Land Use and Transportation (3)
UP 322—Planning Studies (3)
UP 323—Urban Renewal (3)
BUS 301—Business Law (3)
EC 301—Public Finance (4)
GEO 312—Economic Geography (4)

Senior

UP 465, 466—Urban Planning Implementation (4)
PLS 324—Political Parties (4)
SP 230—Forensics Workshop (1)
PLS 314—Public Administration (4)

Architecture Option

Courses to Complete Major

Sophomore

AE 132—Surveying (2)
ME 201, 202—Statics and Strength of Materials (6)
CE 307—Elementary Structural Analysis (3)

Junior

ARC 311, 312, 313—Architectural Design (12)
ARC 314—Residential Environment (3)
ENV 374, 375, 376—Graphics (3)

Senior

ARC 401—Professional Practice (4)
ARC 411, 412—Architectural Mechanics (6)

Description of Courses

Architecture

ARC 311, 312, 313 Architectural Design (4) (4) (4)

Architectural design and theory; design of buildings; architectural design problems of increasing complexity. 2 lectures, 2 three-hour laboratories. Prerequisite: ENV 229, taken in sequence.

ARC 314 Residential Environment (3)

The interaction of aesthetic, economic, technological, and social determinants structuring the form of a dwelling unit and the residential community. 2 lectures, 1 three-hour laboratory. Prerequisite: ENV 229

ARC 401 Professional Practice (4)

Architectural contracts, legal aspects of practice, specification writing, and business relations. 4 lectures. Prerequisite: Senior standing in major.

ARC 411 Architectural Mechanics (3)

Heating, ventilating, air conditioning, and plumbing of buildings. 3 lectures. Prerequisite: ARC 313

ARC 412 Architectural Mechanics (3)

Lighting, electrical work, and acoustics of buildings. 3 lectures. Prerequisite: ARC 313

Environmental Design

ENV 113 Introduction to the Professions (2)

The role of the architect, landscape architect and urban planner in contemporary society. 2 lectures.

ENV 121, 142, 143 Theory of Design (2) (2) (2)

Form, space, color, and the relation to three-dimensional problems as applied to landscape architecture, architecture, and urban planning. ENV 121: 1 lecture, 1 three-hour laboratory; ENV 142, 143: 2 three-hour laboratories. Must be taken in sequence.

ENV 144, 145 Graphics (2) (2)

Equipment, materials, and techniques of drafting; graphic symbols and procedures. Communication through plans and drawings. 2 three-hour laboratories. Must be taken in sequence.

ENV 227, 228, 229 Basic Design (3) (3) (3)

Fundamental concepts in the analysis and solution of spatial problems as related to human needs. 1 lecture, 2 three-hour laboratories. Prerequisite: ENV 143, 145

ENV 241, 242 Perspective (2) (1)

Mechanical and sketching perspective. ENV 241: 2 three-hour laboratories; ENV 242: 1 three-hour laboratory. Prerequisite: ENV 145 or ME 121

ENV 271, 272 Graphics (1) (1)

Graphic presentation techniques in environmental design. Laboratory exercises include preparation of models, drawings, maps, charts, graphs, duplicating techniques and the use of audio-visual aids. 1 three-hour laboratory. Prerequisite: ENV 145

ENV 273 Graphics (1)

Drawing and rendering in pencil, pastels, crayon, and charcoal. 1 three-hour laboratory. Prerequiste: ENV 241

ENV 374 Graphics (1)

Rendering in water color; skill in color mixing, the technique of color painting. 1 three-hour laboratory.

ENV 375 Graphics (1)

Freehand drawing; pen and ink and related media. Laboratory and/or outdoor sessions. 1 three-hour laboratory.

ENV 376 Graphics (1)

Advanced design graphics; selected presentation techniques. 1 three-hour laboratory. Prerequisite: Any two of ENV 271, 272, 273, 374, 375.

ENV 400 Special Problems for Advanced Undergraduates (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: Advanced undergraduate, or permission of instructor.

ENV 424, 425 History of Environmental Design (3) (3)

Man's attempt to create his own physical environment, emphasizing economic, political, social, ecological, and aesthetic relationships, with particular reference to architecture, landscape architecture, and urban planning. 2 lectures, 1 three-hour laboratory. Prerequisite: Senior standing in the department.

ENV 431, 432, 433 Environmental Design (4) (4) (4)

Design of the physical environment of urban and suburban areas. Methods and procedures of general community plans. Emphasis on conceptualization, synthesis, and execution through individual creative efforts and group work. Group work of students in Landscape Architecture, Architecture, and Urban Planning; stress on collaboration between the professions. 1 lecture, 3 three-hour laboratories. Prerequisite: LA 324, UP 323 or ARC 313

ENV 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 a formal report. Minimum 120 hours total time.

ENV 463 Undergraduate Seminar (2)

Methods, developments, ethics, office practice and procedures in the professions of environmental design. Discussions of environmental design problems. The role of the designer in society. 2 lectures. Prerequisite: Senior standing in the department.

Landscape Architecture

LA 224 Principles of Landscape Design (4)

Basic principles of design and the application of these principles in the solving of landscape design problems. For non-majors. 2 lectures, 2 three-hour laboratories.

LA 225 Park Design (4)

Exploration of program analysis and adaptation of principles and components of design to small and intermediate scale problems. 2 lectures, 2 three-hour laboratories. Prerequisite: LA 224

LA 324 Intermediate Landscape Design (12)

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: ENV 229, 273, 374. Limited to 4 units per quarter.

LA 327, 328 Planting Design (3) (2)

The association of plant materials according to form, color, texture and culture; their grouping, arranging, and relationship to structural materials. 2 lectures, 1 three-hour laboratory; 2 three-hour laboratories. Prerequisite: OH 231, 232; ENV 229 or LA 225

LA 337, 338, 339 Landscape Construction Drawing (3) (3) (3)

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. Preparation of a complete set of landscape construction drawings and documents. 1 lecture, 2 three-hour laboratories. Prerequisite: MAT 102, ENV 145, AE 122, 132

LA 348, 349 Mechanics and Strength of Materials (1) (1)

Basic forces and their components. Physical properties of construction materials. Shear and bending moment diagrams. Sizing of wood structural members. 1 lecture. Prerequisite: MAT 102, PHY 102

Urban Planning

UP 201 Law and Administration (2)

The relationship of law to urban planning. A review of state-enabling legislation. The planning function in government. 2 lectures.

UP 202 Theory and Methodology (2)

The historical development of urban planning. Review of utopian physical, economic, and social concepts in urban development. The logic of the planning process. Urban planning as a method of decision making. Introduction to the urban theorists and the evolving methodology of urban planning. 2 lectures. Prerequisite: ENV 113

UP 205, 206 Research and Analysis (2) (3)

Problems 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, 1 three-hour laboratory; and 1 lecture, 2 three-hour laboratories. Must be taken in sequence.

UP 221 Community Facilities (3)

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. 2 lectures, 1 three-hour laboratory.

UP 222 Land Planning (3)

Design of subdivisions and the development of urban land. Problems in street, block, lot, and utility design. Review of historical and recent trends in land planning. 1 lecture, 2 three-hour laboratories. Prerequisite: ENV 227

UP 321 Land Use and Transportation (3)

Introduction to the relationship and interaction between transportation planning and land use planning. Changes in land use patterns generated by transportation facilities, public policies, and alternative plans. Study of changes in transportation systems produced by technological advances. 1 lecture, 2 three-hour laboratories. Prerequisite: UP 202, or permission of the instructor.

UP 322 Planning Studies (3)

Review of typical planning studies and advanced methods of research and analysis. Study and formulation of new survey and projection techniques. 1 lecture, 2 three-hour laboratories. Prerequisite: UP 205, 321; UP 206 or concurrently.

UP 323 Urban Renewal (3)

The historical and legal background of urban renewal. Study of conservation, rehabilitation, and redevelopment practices. Problems involved in federal and local, public and private, renewal efforts. 1 lecture, 2 three-hour laboratories. Prerequisite: UP 201

UP 465, 466 Urban Planning Implementation (2) (2)

Review of zoning ordinances, subdivision regulations, and capital improvement programs. Implementation of a general plan. 2 lectures. Prerequisite: Senior standing in Urban Planning or permission of the instructor; must be taken in sequence.

FOODS AND NUTRITION DEPARTMENT

Ramiro C. Dutra, *Chairman*

Louise W. Ganster
Cheryl L. Loggins
Ruby L. Trow

The primary objective of the Foods and Nutrition curriculum is to prepare graduates for challenging and rewarding careers as professional dietitians, nutritionists, and food administrators in hospitals, education and social institutions, food research laboratories, businesses (airlines, resorts, etc.) experimental kitchens, and government agencies, including the armed forces. In addition to conventional courses, the curriculum includes a strong complement of courses in accounting and business management, and thus prepares the graduate for positions of leadership and responsibility in the fields of food management, sales, demonstration and advertisement.

Laboratory work is frequently supplemented by field trips to nearby commercial facilities, and classroom instruction is enriched by outstanding guest speakers.

The curriculum meets the academic standards of the American Dietetic Association and qualifies the graduate for admission to hospital internship, a requirement to become a professional hospital dietitian.

High school students planning to major in Foods and Nutrition are advised to build a background in foods, chemistry, and biology. Junior college students are advised to concentrate on chemistry (including organic), biology (including bacteriology), and communication skills.

Curriculum in Foods and Nutrition

Freshman	*F*	*W*	*S*
Introduction to Foods (FN 121)	3		
Nutrition (FN 235)		4	
Basic Biology (BIO 115)		3	
Basic Biology Laboratory (BIO 145)			2
College Chemistry (CHM 104, 105)	3	3	
College Chemistry Laboratory (CHM 141, 142)	1	1	
Freshman Composition (ENG 104, 105, 106)	3	3	3
Basic Mathematics (MAT 101)	3		
Basic Mathematics (MAT 102)			3
Health Education (PE 107)			2
Physical Education (PE 141)	½	½	½
Fundamentals of Physics (PHY 102)			4
General Psychology (PSY 202)		3	
Electives	3		3
	16½	17½	17½

Sophomore	*F*	*W*	*S*
Meals (FN 221)	4		
Food Procurement (FN 224)			3
Cultural Aspects of Food (FN 228)		3	
Dietetics (FN 236)			3
General Bacteriology (BAC 221)	4		
Organic Chemistry (CHM 211)	3		
Organic Chemistry Laboratory (CHM 251)	1		
Principles of Economics (EC 201, 202)	3	3	
Physical Education (PE 141)	½	½	½
Public Speaking (SP 200)		3	
†Humanities			3
Management Accounting (ABM 324)			4
Human Physiology (ZOO 235)		4	
Electives		4	2
	15½	17½	15½

Junior			
Food Technology (FN 302)		4	
Quantity Food Preparation (FN 331)	3		
Experimental Foods (FN 333)		3	
American Civilization (AMC 301, 302, 303)	3	3	3
Meats Utilization (AS 325)	3		
Food Microbiology (BAC 424)			4
Report Writing (ENG 216)			3
†Humanities		3	3
Biochemistry (CHM 327)	4		
General Psychology II (PSY 203)		3	
Horticultural Products (AGB 303)			3
Electives	3		
	16	16	16

Senior			
Senior Project (FN 461, 462)	2	2	
Undergraduate Seminar (FN 463)			2
Recent Advances in Food Science (FN 404)			2
Advanced Nutrition (FN 421)	4		
Diet Therapy (FN 423)			4
Food Equipment and Layout (FN 427)	4		
Food Chemistry and Toxicology (FN 432)		4	
Institutional Management (FN 436)			3
Personnel Management (ABM 402)		3	
Selected courses in Business Management	3	3	
Educational Psychology (PSY 312)	3		
Electives		5	6
	16	17	17

Description of Courses

FN 121 Introduction to Foods (3)

Elementary principles and practices in the selection and preparation of foods. Historical aspects of food science and its relationship to human health and progress. World's food supply and food habits. 2 lectures, 1 three-hour laboratory.

†To be selected from the General Education list.

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.

FN 224 Food Procurement (3)

Principles and problems in the purchasing of foods on retail and institutional scales. Economics of applied nutrition. Factors influencing consumer habits. 2 lectures, 1 three-hour laboratory. Prerequisite: FN 121

FN 228 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 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: High school chemistry or equivalent.

FN 236 Dietetics (3)

Qualitative and quantitative studies of the normal diets for persons of various ages and occupations. Planning and computation of diets. 2 lectures, 1 three-hour laboratory. Prerequisite: FN 205 or 235

FN 302 Food Technology (4)

Technical principles of food processing including pasteurization, sterilization, homogenization, dehydration, conventional freezing and freeze-drying as they relate to the preservation of various types of foods and beverages. Field trips. 3 lectures, 1 three-hour laboratory. Prerequisite: BAC 221 or equivalent.

FN 331 Quantity Food Preparation (3)

Economic and technical principles and problems involved in planning, preparing and serving foods to large groups. Field trips. 1 lecture, 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, 221

FN 404 Recent Advances in Food Science (2)

Critical evaluation of nutritional controversies. Guided survey of the literature, with emphasis on areas of conflicting or incomplete information. The problem of pseudoscientific literature and its effect on the public. 2 lectures. Prerequisite: Senior standing in Foods and Nutrition.

FN 421 Advanced Nutrition (4)

Qualitative, quantitative and intermediary metabolic studies of diets. 2 lectures, 2 three-hour laboratories. Prerequisite: CHM 327, FN 235

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 Equipment and Layout (4)

Selection, maintenance and arrangement of equipment and furnishings for food service departments with emphasis on materials, construction and specifications. 2 lectures, 2 three-hour laboratories. Prerequisite: FN 331

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 211, 251

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

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.

INTERNATIONAL AGRICULTURE DEPARTMENT

Milton M. Snodgrass, *Chairman*
Luis E. Tergas

Recent studies of world food resources and population trends indicate a growing crisis in world food production, processing, and distribution. The need for capable highly-trained international agriculture specialists is acutely felt throughout the world. The college is uniquely suited to offer the program in International Agriculture because of its outstanding agricultural facilities, faculty, and programs and its easy accessibility to the large number of U.S. firms with international agriculture interests located in Los Angeles County.

The International Agriculture program is designed to train specialists for agricultural positions in foreign countries such as Peace Corps volunteer, agricultural missionary, agriculture teacher, extension specialist, agricultural attache, or agricultural journalist. It also provides training for the student who plans to enter a foreign commercial agricultural operation as well as the foreign student who comes to the United States to study in a specialized agricultural field.

The student will elect an agricultural specialization of 18–20 units from one of the following: Agricultural Business Management, Agricultural Engineering, Agronomy, Animal Science, Foods and Nutrition, Fruit Industries, or Entomology.

The specific studies in agriculture 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 to agricultural courses, one-third of the International Agriculture student's work deals with an international core of world studies, and a specialization in one international area. The student will become fluent in at least one foreign language, will be familiar with the cultures of the world region in which he intends to work, and will undertake sufficient studies in the fields of science and mathematics, business and economics, communications, and the social sciences and humanities to make him an effective force in the foreign agriculture field.

Curriculum in International Agriculture

Freshman	*F*	*W*	*S*
World Agricultural Resources (IA 101)	3		
Basic Biology (BIO 115)	3		
Basic Biology Laboratory (BIO 145)	2		
Freshman Composition (ENG 104, 105)	3	3	
Elementary Spanish (SPN 101, 102, 103)	4	4	4
General Zoology (ZOO 134)			4
Mathematics (MAT 101, 102 or 104, 105, 108, 109)		3	3
Health Education (PE 107)	2		
Physical Education (PE 141)	½	½	½
Agricultural Botany (BOT 120)		4	
Public Speaking (SP 200)			3
*Electives and courses to complete major		3	3
	17½	17½	17½
Sophomore			
Agrarian Ecology (IA 201, 202)	3	3	
College Chemistry (CHM 104, 105)	3	3	
College Chemistry Laboratory (CHM 141, 142)	1	1	
Organic Chemistry (CHM 211)			3
Organic Chemistry Laboratory (CHM 251)			1
Intermediate Spanish (SPN 201, 202, 203)	3	3	3
Physical Education (PE 141)	½	½	½
Feeds and Feeding (AS 101, 102)	2	3	
Physiology of Domestic Animals (VS 205) or Animal Parasitology and Disease Control (VS 302)			3
Principles of Economics (EC 201, 202)	3	3	
Principles of Sociology (SOC 201) or Principles of Anthropology (ANT 201)			3
*Electives and courses to complete major	3		3
	18½	16½	16½
Junior			
Foreign Agricultural Production (IA 301)	3		
Foreign Agricultural Marketing (IA 302)		3	
Foreign Production and Marketing Seminar (IA 371, 372, 373)	1	1	1
American Civilization (AMC 301, 302, 303)	3	3	3
Basic Soil Science (SS 231)	4		
General Entomology (ENT 126)	4		
General Plant Pathology (PTH 223)			4
†Humanities			3
General Psychology I (PSY 202)		3	
History of Latin America (HST 304, 305)		4	4
*Electives and courses to complete major	1	2	1
	16	16	16
Senior			
Senior Project (IA 461, 462)	2	2	
Undergraduate Seminar (IA 463)			2
Irrigation (AE 240)	4		

* The student will elect an agricultural specialization of 18–20 units. Courses within each specialization must be approved by the student's adviser.
† To be selected from the General Education list.

	F	W	S
Introduction of Philosophy (PHL 201) or Logic and Semantics (PHL 202)		3	
Report Writing (ENG 216) or Technical Writing (ENG 219)			3
International Trade and Finance (EC 401) or Economic Development (EC 402)	4		
Inter-American Relations (PLS 454)		4	
†Humanities			3
*Electives and courses to complete major	6	6	7
	16	15	15

Description of Courses

IA 101 World Agricultural Resources (3)

World agricultural production and distribution, regional shortages and surpluses, from the standpoint of current need and future needs based on projected population data. 3 lectures.

IA 201 Agrarian Ecology (3)

Factors affecting agricultural production and distribution inherent in the Central American countries including geography, climate, population distribution, transportation, and communication. 3 lectures.

IA 202 Agrarian Ecology (3)

Factors affecting agricultural production and distribution inherent in the South American countries including geography, climate, population distribution, transportation, and communication. 3 lectures.

IA 301 Foreign Agricultural Production (3)

Agricultural production methods and equipment including soil management, pest and disease control and harvesting methods throughout the world. 3 lectures. Prerequisite: IA 201

IA 302 Foreign Agricultural Marketing (3)

The processing, distribution, and marketing of agricultural products throughout the world. 3 lectures. Prerequisite: IA 201, 202

IA 371, 372, 373 Foreign Production and Marketing Seminar (1) (1) (1)

Individual and group surveys to identify specific agricultural production problems in Central and South America followed by the application of problem-solving techniques. Taught in Spanish language. 1 lecture-discussion. Prerequisite: IA 301, 302, SPN 203 or demonstrated proficiency in Spanish language.

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 standing.

* The student will elect an agricultural specialization of 18-20 units. Courses within each specialization must be approved by the student's adviser.
† To be selected from the General Education list.

ORNAMENTAL HORTICULTURE DEPARTMENT

Oliver A. Batcheller, *Chairman*
Joel W. Carter
James L. Degen
James M. Griffin
Thomas J. Lockwood
Tom T. Yoshikawa

Ornamental Horticulture with its many related phases continues to be among the most rapidly-growing industries in California. With the tremendous increase in California's population the need for horticultural plantings and parks has and will continue to grow. The department provides work in two major areas, 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 an excellent background for students desiring to teach horticultural science, or to work in state and county arboretums. The college's campuses offer excellent opportunities for practical application of the principles and methods used in the industry.

The department has 12,000 square feet of greenhouse space, 5,000 feet of lath and saran shade, and five acres of growing grounds. Through the department's project program students may grow and market their own nursery stock, cut flowers, or potted plants, adding significantly to their educational experience.

The Park Administration major provides opportunities for students to obtain administrative and technical skills in park administration. Emphasis is placed on the operation, management, and administration of municipal parks, with consideration of county, state, and national parks. Field trips are taken to many types of parks in Southern California. Students are encouraged to take advantage of the summer trainee programs offered by many park departments.

The department coordinates part-time employment with the college for qualified students in planning and planting of the grounds, including landscaping for new college buildings.

Curriculum in Ornamental Horticulture

Freshman	*F*	*W*	*S*
Basic Horticultural Skills (OH 131)	4		
Plant Materials II (OH 232)		4	
Nursery Operations (OH 121)			4

	F	W	S
Utility Systems (AE 122)			2
Landscape Construction (AE 124, 125)	2	2	
Basic Biology (BIO 115)	3		
Basic Biology Laboratory (BIO 145)	2		
Agricultural Botany (BOT 120)		4	
Freshman Composition (ENG 104, 105)	3	3	
Report Writing (ENG 216)			3
General Entomology (ENT 126)			4
Basic Mathematics (MAT 101)		3	
Basic Mathematics (MAT 102)			3
Physical Education (PE 141)	½	½	½
Health Education (PE 107)	2		
	16½	16½	16½

Sophomore

Plant Materials I (OH 231)	4		
Plant Materials III (OH 233)			4
Specialized Plant Propagation (OH 222)		4	
Pest Control Equipment (AE 233)			3
Surveying Fundamentals (AE 131)		2	
Principles of Economics (EC 201, 202)		3	3
Principles of Landscape Design (LA 224)	4		
Park Design (LA 225)		4	
General Plant Pathology (PTH 223)	4		
Salesmanship (MKT 208)			4
College Chemistry (CHM 104, 105)	3	3	
Physical Education (PE 141)	½	½	½
†Humanities			3
College Chemistry Laboratory (CHM 141, 142)	1	1	
	16½	17½	17½

Junior

Diseases of Ornamental Plants (OH 327)			4
Native Plant Materials (OH 336)			3
Greenhouse Operation (OH 323)	4		
Pest Control Materials (AGB 231)		4	
Enterprise Accounting (ABM 326)		3	
Management Accounting (ABM 324)	4		
Business Law (BUS 301)		3	
Basic Soil Science (SS 231)		4	
Public Speaking (SP 200)	3		
Organic Chemistry (CHM 211)			3
Organic Chemistry Laboratory (CHM 251)			1
General Psychology I (PSY 202)		3	
Soil Fertility and Fertilizers (SS 233)			4
Electives	4		1
	15	17	16

Senior

Senior Project (OH 461, 462)	2	2	
Undergraduate Seminar (OH 463)			2
Advertising and Promotion of Agricultural Products (ABM 225)		3	

†To be selected from the General Education list.

	F	W	S
American Civilization (AMC 301, 302, 303)	3	3	3
Genetics (BIO 303)			3
Soil Analysis (SS 337)	2		
Plant Tissue Analysis (SS 338)			2
Planting Design (LA 327)	3		
Turf Management (PA 333)			3
Turf Management Laboratory (PA 334)			1
Ethics (PHL 204)	3		
†Humanities		3	
Electives	4	5	2
	17	16	16

Curriculum in Park Administration

Freshman

Basic Horticultural Skills (OH 131)			4
Plant Materials II (OH 232)		4	
Landscape Construction (AE 124, 125)	2	2	
Utility Systems (AE 122)			2
Basic Biology (BIO 115)	3		
Basic Biology Laboratory (BIO 145)	2		
Agricultural Botany (BOT 120)			4
Freshman Composition (ENG 104, 105)	3	3	
Report Writing (ENG 216)			3
Basic Mathematics (MAT 101, 102)	3	3	
Graphics (ENV 144)	2		
Health Education (PE 107)			2
Physical Education (PE 141)	½	½	½
Ethics (PHL 204)		3	
Electives	2		2
	17½	15½	17½

Sophomore

History of Parks (PA 214)	3		
Plant Materials I (OH 231)	4		
Plant Materials III (OH 233)			4
Surveying Fundamentals (AE 131)		2	
Surveying Applications (AE 132)			2
Principles of Economics (EC 201, 202)		3	3
General Entomology (ENT 126)			4
Principles of Landscape Design (LA 224)	4		
Park Design (LA 225)		4	
Physical Education (PE 141)	½	½	½
General Psychology I (PSY 202)		3	
College Chemistry (CHM 104, 105)	3	3	
College Chemistry Laboratory (CHM 141, 142)	1	1	
Electives	2		2
	17½	16½	15½

Junior

Arboriculture (PA 328)		3	
Management Accounting (ABM 324)		4	
Automatic Irrigation Systems (AE 321)			4
Business Law (BUS 301)		3	
Basic Soil Science (SS 231)		4	
Public Speaking (SP 200)	3		

†To be selected from the General Education list.

	F	W	S
American Civilization (AMC 301, 302, 303)	3	3	3
Planting Design (LA 327)	3		
Public Administration (PLS 314)			4
Plant Pathology (PTH 223)	4		
Native Plant Materials (OH 336)			3
Soil Fertility and Fertilizers (SS 233)			4
†Humanities	3		
	16	17	18

Senior

Senior Project (PA 461, 462)	2	2	
Undergraduate Seminar (PA 463)			2
Turf Management (PA 333)			3
Turf Management Laboratory (PA 334)			1
Recreation Concepts (PA 419)			3
Contracts, Specifications, Estimating (PA 431, 415)	4	3	
Park Administration I, II, III (PA 425, 426, 427)	4	4	3
Park Equipment Management (AE 421)	4		
Personnel Management (ABM 402)		3	
Diseases of Ornamental Plants (OH 327)			4
Electives	2	3	
	16	15	16

Description of Courses

Ornamental Horticulture

OH 121 Nursery Operations (4)

The nursery industry in California; the wholesale grower, the jobbers, the retail nursery, the garden center, and other nursery outlets. A study of nursery location, arrangement, organization, and operation. 3 lectures, 1 three-hour laboratory.

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 222 Specialized Plant Propagation (4)

Commercial specialized propagation including all types of grafting, budding, layerage, inarching, separations, divisions, and cuttings. Flask seeding. Use of the college facilities and frequent field trips to wholesale growers. 2 lectures, 2 three-hour laboratories. Prerequisite: OH 131, 231, BOT 120

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 231, 232, 233 Plant Materials I, II, III (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 253 Horticultural Management (4)

Selection, planting and cultural care of ground covers, shrubs, trees, and turf. 3 lectures, 1 three-hour laboratory.

OH 323 Greenhouse Operation (4)

The operation and management of forcing structures. Growing of com-

†To be selected from the General Education list.

mercial cut-flowers under glass, lath, cloth, and in the open. Experience in growing and management. 3 lectures, 1 three-hour laboratory. Prerequisite: OH 222, 231

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: BIO 145, PTH 223

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 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.

AG 400 Special Problems for Advanced Undergraduates (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.

Park Administration

PA 214 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 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. 1 lecture, 2 three-hour laboratories. Prerequisite: OH 131, 231

PA 333 Turf Management (3)

Considerations in the management of turf, including such specialized areas as golf courses, bowling greens, athletic fields and park lawns. 3 lectures. Prerequisite: Junior standing or consent of instructor.

PA 334 Turf Management Laboratory (1)

Practice in, and observation of, operational techniques in turf management. Includes identification of turf grasses and weeds infesting turf. Field trips to specialized turf areas. To be taken concurrently with PA 333. 1 three-hour laboratory.

PA 415 Contracts, Specifications, Estimating (3)

Cost finding and estimating, contracts and specifications, legal aspects pertaining to the landscape industry. 3 lectures. Prerequisite: Senior standing.

PA 419 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. Prerequisite: PA 426

PA 425 Park Administration I (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 city street trees. 3 lectures, 1 three-

hour laboratory. Prerequisite: PA 214, 328

PA 426 Park Administration II (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. Prerequisite: PA 425, PLS 314

PA 427 Park Administration III (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 431 Contracts, Specifications, Estimating (4)

Cost finding and estimating, contracts and specifications relative to construction in the landscape industry. Laboratory experience in estimating and writing specifications. 3 lectures, 1 three-hour laboratory. Prerequisite: Senior standing.

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.

PLANT AND SOIL SCIENCE DEPARTMENT

Robert L. Procsal, *Chairman*

Edward C. Appel, Jr.
Albert E. Canham
Gerald L. Croissant
Kenneth R. Hobbs
Theodore L. Lieb
Lloyd A. Newell
James A. Pomerening
George W. Schmitz
Luis E. Tergas

The Plant and Soil Science department offers four majors in agricultural production and protection—Crop Science, Soil Science, Agricultural Biology, and Fruit Industries.

The majors in Crop and Soil Science are designed to provide a broad and balanced program in the applied agronomic and related agricultural sciences as well as in the basic biological and physical sciences. The technical knowledge and operational skills acquired qualify graduates to pursue careers in farm management; with commercial seed, agricultural chemical and farm equipment companies; with agricultural product processing and marketing companies; and with agencies of the federal and state governments.

The Agricultural Biology curriculum combines the economic aspects of the agricultural and biological sciences. Protection of food and plants and the regulation of the environment is emphasized through the management of organisms affecting growth of crops and plants, plant products, man, and his buildings. In addition, a special course concentration is available for students who desire greater depth of study in Economic Entomology.

Agricultural biologists advise and supervise in the protection of agricultural crops and urban areas from insects, mites, nematodes, plant diseases, weeds, and vertebrate pests, and aid in preventing the introduction and spread of new and dangerous pests. Professional careers are available with county, state, and federal departments of agriculture and allied agencies.

The Fruit Industries program represents the only four-year college curriculum in the United States specializing in citrus production and marketing. Parallel, but less extensive offerings are offered on avocados, other subtropical fruits, and deciduous fruits. In addition to production, the instructional program stresses processing, marketing, and management.

Employment opportunities for graduates are found in orchard operation and management, commercial orchard pest control, fruit tree nurseries, laboratories for public and private agencies, fruit marketing and processing companies, teaching, and commercial businesses.

Curriculum in Agricultural Biology

Freshman	*F*	*W*	*S*
Agricultural Law (AGB 101)	3		
General Entomology (ENT 126)	4		
Basic Biology (BIO 115)	3		
Basic Biology Laboratory (BIO 145)	2		
General Botany (BOT 124, 125)		5	5
General Zoology (ZOO 135)			4
Freshman Composition (ENG 104, 105, 106)	3	3	3
Basic Mathematics (MAT 101, 102) or Mathematical Analysis (MAT 108, 109)		3	3
Health Education (PE 107)		2	
Physical Education (PE 141)	½	½	½
‡Electives and courses to complete major		4	1
	15½	17½	16½

Sophomore			
Economic Insect Pests (AGB 228, 229)		3	3
Plant Identification (AGB 224)	4		
Pest Control Materials (AGB 231)		4	
Vertebrate Pest Management (AGB 223)			4
Pest Control Equipment (AE 233)			3
College Chemistry (CHM 104, 105)	3	3	
College Chemistry Laboratory (CHM 141, 142)	1	1	
Report Writing (ENG 216)	3		
General Plant Pathology (PTH 223)	4		
Physical Education (PE 141)	½	½	½
Public Speaking (SP 200)			3
‡Electives and courses to complete major		6	4
	15½	17½	17½

Junior			
Produce Market Quality (AGB 325)	3		
Career Planning in Agricultural Biology (AGB 372)		1	
Organic Chemistry (CHM 211)	3		
Organic Chemistry Laboratory (CHM 251)	1		
Principles of Economics (EC 201, 202)		3	3
General Psychology I (PSY 202)	3		
Human Relations (PSY 314)		3	
†Humanities			3
‡Electives and courses to complete major	7	9	10
	17	16	16

†To be selected from General Education List.
‡Students concentrating in Economic Entomology will select at least 29 units with the approval of the adviser.

Senior	*F*	*W*	*S*
Senior Project (AGB 461, 462)	2	2	
Undergraduate Seminar (AGB 463)			2
Pest Control Practices (AGB 424)	3		
American Civilization (AMC 301, 302, 303)	3	3	3
*Biochemistry (CHM 327)	4		
Morphology of Immature Insects (ENT 334)		3	
Plant Production Electives	4		4
†Humanities		3	3
‡Electives and courses to complete major		6	4
	16	17	16

Curricular Option and Concentration

Agricultural Biology

This broadly-based option blends biology and agriculture, resulting in an economic approach to the improvement and protection of agricultural crops and their products. The professions serving agriculture and related industries in advisory and regulatory capacities with private and governmental organizations are emphasized.

Courses to Complete Major

Sophomore

AGR 233—Weeds and Weed Control (4)
SS 231—Basic Soil Science (4)

Junior

AGB 322—Plant Quarantine (4)
AGB 321—Fruit and Vegetable Standards (4)
ABM 324—Management Accounting (4)
ABM 402—Personnel Management or (3)
BUS 127—Office Management
Plant Pathology Electives (7)

Senior

SS 233—Soil Fertility and Fertilizers (4)

Economic Entomology

The Economic Entomology concentration is designed for students who desire careers requiring additional knowledge in the important study area of insects and other arthropods.

Curriculum in Agronomy

Freshman	*F*	*W*	*S*
Introduction to Plant Science (AGR 111)	3		
Cereal Crops (AGR 122)		4	
Vegetable Crop Production (AGR 226)			4
Agricultural Engineering (Select 2 courses from AE 121, 122, 123)		2	2
Tractors (AE 241)	2		
Basic Biology (BIO 115)		3	
Basic Biology Laboratory (BIO 145)		2	

*Animal Physiology (ZOO 324) or Plant Physiology (BOT 422) may be substituted.
†To be selected from General Education List.
‡Students concentrating in Economic Entomology will select at least 29 units with the approval of the adviser.

	F	*W*	*S*
Agricultural Botany (BOT 120)			4
Freshman Composition (ENG 104, 105)	3	3	
Basic Mathematics (MAT 101, 102)	3		3
Physical Education (PE 141)	½	½	½
Fundamentals of Chemistry (CHM 103)	4		
Electives and courses to complete major		2	3
	15½	16½	16½

Sophomore

Surveying Fundamentals (AE 131)	2		
College Chemistry (CHM 104, 105)	3	3	
College Chemistry Laboratory (CHM 141, 142)	1	1	
Principles of Economics (EC 201, 202)		3	3
General Entomology (ENT 126)			4
Health Education (PE 107)	2		
Physical Education (PE 141)	½	½	½
Harvesting and Marketing (AGR 224)		4	
Field Crops (AGR 221)	4		
Public Speaking (SP 200)			3
Basic Soil Science (SS 231)	4		
Soil Management (SS 232)		4	
Soil Fertility and Fertilizers (SS 233)			4
Electives and courses to complete major		1	2
	16½	16½	16½

Junior

Genetics (BIO 303)	3		
Crop Technology (AGR 322)		4	
Economic Insect Pests (AGB 228)		3	
Machinery Applications (AE 221)			2
Tractor Power (AE 227)		2	
Irrigated Pastures (AGR 333)			4
Weeds and Weed Control (AGR 233)			4
Management Accounting (ABM 324)	4		
Organic Chemistry (CHM 211)	3		
Organic Chemistry Laboratory (CHM 251)	1		
†Humanities			3
General Plant Pathology (PTH 223)		4	
General Psychology I (PSY 202)	3		
Soil Analysis (SS 337)	2		
Plant Tissue Analysis (SS 338)		2	
Electives and courses to complete major		2	4
	16	17	17

Senior

Senior Project (AGR 461, 462)	2	2	
Undergraduate Seminar (AGR 463)			2
Seed Production (AGR 331)	4		
Crop Diseases (AGR 421)	4		
Plant Breeding (AGR 404)			4
Pest Control Materials (AGB 231)		4	
Crop Farm Operation (AGR 437)		3	

†To be selected from the General Education list.

	F	W	S
American Civilization (AMC 301, 302, 303)	3	3	3
Biochemistry (CHM 327)	4		
†Humanities		3	3
Electives and courses to complete major		2	4
	17	17	16

Curriculum in Fruit Industries

Freshman

Citrus Production (FI 121, 122)	4	4	
Avocado Production (FI 123)			4
Agricultural Engineering (Select 2 courses from AE 122, 123, or 241)	2	2	
Basic Biology (BIO 115)		3	
Basic Biology Laboratory (BIO 145)		2	
Agricultural Botany (BOT 120)			4
Freshman Composition (ENG 104, 105)		3	3
General Entomology (ENT 126)	4		
Basic Mathematics (MAT 101)	3		
Fundamentals of Chemistry (CHM 103)			4
Basic Mathematics (MAT 102)		3	
Physical Education (PE 141)	½	½	½
Electives	3		
	16½	17½	15½

Sophomore

Citrus Pest Control (FI 221)	4		
Citrus Diseases (FI 226)			4
Fruit Propagation (FI 245, 246)		1	1
Surveying Fundamentals (AE 131)	2		
Tractor Power (AE 227)		2	
Irrigation (AE 240)	4		
Construction Fundamentals (AE 121)			2
Machinery Applications (AE 221)			2
Principles of Economics (EC 201, 202)		3	3
General Plant Pathology (PTH 223)		4	
Health Education (PE 107)		2	
Physical Education (PE 141)	½	½	½
Public Speaking (SP 200)	3		
Basic Soil Science (SS 231)	4		
Soil Management (SS 232)		4	
Soil Fertility and Fertilizers (SS 233)			4
	17½	16½	16½

Junior

Citrus and Avocado Marketing (FI 321)	3		
Fruit Processing and Handling (FI 322)		3	
Packinghouse Management (FI 323)			3
Management Accounting (ABM 324)	4		
Enterprise Accounting (ABM 326)			3
Personnel Management (ABM 402)			3

†To be selected from the General Education list.

	F	W	S
Genetics (BIO 303)		3	
Business Law (BUS 301)	3		
College Chemistry (CHM 104, 105)	3	3	
College Chemistry Laboratory (CHM 141, 142)	1	1	
Organic Chemistry (CHM 211)			3
Organic Chemistry Laboratory (CHM 251)			1
Business Communication (ENG 218)		3	
Plant Tissue Analysis (SS 338)			2
Electives	2	3	2
	16	16	17

Senior

Senior Project (FI 461, 462)	2	2	
Undergraduate Seminar (FI 463)			2
Orchard Management (FI 422)			4
Fruit Storage (FI 425)		2	
American Civilization (AMC 301, 302, 303)	3	3	3
Plant Physiology (BOT 322)		4	
Biochemistry (CHM 327)	4		
General Psychology I (PSY 202)	3		
Introduction to Modern Fiction (ENG 201)			3
†Humanities		3	
Introduction to Philosophy (PHL 201)			3
Electives	4	3	1
	16	17	16

Curriculum in Soil Science

Freshman

Introduction to Plant Science (AGR 111)	3		
Crop Production (AGR 122, 123 or 221, 226)		4	4
Animal Agricultural Science (AS 111)			3
Basic Biology (BIO 115)	3		
Basic Biology Laboratory (BIO 145)	2		
Freshman Composition (ENG 104, 105)	3	3	
Trigonometry (MAT 104)	3		
College Algebra (MAT 105)		3	
College Chemistry (CHM 104, 105)		3	3
College Chemistry Laboratory (CHM 141, 142)		1	1
General Entomology (ENT 126)			4
Physical Education (PE 141)	½	½	½
Electives	2	2	
	16½	16½	15½

Sophomore

Basic Soil Science (SS 231)	4		
Soil Management (SS 232)		4	
Soil Fertility and Fertilizers (SS 233)			4
Surveying Fundamentals (AE 131)	2		
Surveying Applications (AE 132)			2
General Botany (BOT 124, 125)	5	5	
General Plant Pathology (PTH 223)			4
Principles of Economics (EC 201, 202)	3	3	

†To be selected from the General Education list.

	F	W	S
Quantitative Analysis (CHM 221)		4	
Physical Geology (PSC 221)			4
Health Education (PE 107)	2		
Physical Education (PE 141)	½	½	½
Electives			3
	16½	16½	17½

Junior

Soil and Water Conservation (SS 333)		4	
Range Management (SS 336)			4
Soil Analysis (SS 337)	2		
Plant Tissue Analysis (SS 338)			2
Weeds and Weed Control (AGR 233)			4
Management Accounting (ABM 324)	4		
Irrigation (AE 240)	4		
College Physics (PHY 121)	4		
Organic Chemistry (CHM 211)		3	
Organic Chemistry Lab (CHM 251)		1	
Public Speaking (SP 200)			3
†Humanities	3	3	
Electives		5	4
	17	16	17

Senior

Senior Project (SS 461, 462)	2	2	
Undergraduate Seminar (SS 463)			2
Soil Chemistry (SS 431)	4		
Soil Physics (SS 432)		4	
Soil Classification and Survey (SS 433)			4
General Psychology (PSY 202)		3	
American Civilization (AMC 301, 302, 303)	3	3	3
General Bacteriology (BAC 221)	4		
†Philosophy	3		
Electives		5	7
	16	17	16

Description of Courses

Agricultural Biology

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 223 Vertebrate Pest Management (4)

Vertebrates injurious to buildings, agricultural crops, other plants, and products. Identification, biology, and economic importance. Control methods, pesticides, their uses and precautions. Related laws and regulations. 3 lectures, 1 three-hour laboratory.

†To be selected from the General Education list.

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 124

AGB 228 Economic Insect Pests (3)

Recognition and distribution of the important mites and insects attacking the major field, cereal, and truck crops. Hosts and identification of damage to various plant parts. Seasonal history, habits, and problems relating to recommended control measures. 2 lectures, 1 three-hour laboratory. Prerequisite: ENT 126

AGB 229 Economic Insect Pests (3)

Recognition and distribution of the important mites and insects attacking citrus, avocados, deciduous fruit, small fruit, berries, and nut trees. Hosts and identification of damage to various plant parts. Seasonal history, habits, and problems relating to recommended control measures. 2 lectures, 1 three-hour laboratory. Prerequisite: ENT 126

AGB 231 Pest Control Materials (4)

Economic entomology as it pertains to the development of pest control materials; properties and formulations of pesticides; insect, plant, and animal tolerances; application of and precautions for modern insecticides, including the most recent developments; related laws and regulations. 3 lectures, 1 three-hour laboratory. Prerequisite: ENT 126, CHM 103 or the passing of a placement test.

AGB 303 Horticultural Products (3)

Market quality factors as they affect selection and use of important fruits, vegetables, eggs, and honey. Includes parasitic and non-parasitic defects, maturity, ripening and handling considerations. Governmental agencies concerned with quality and wholesomeness of foods. For non-majors. 3 lectures.

AGB 321 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, their identification, cause, and legal tolerances. 3 lectures, 1 three-hour laboratory. Prerequisite: AGB 325.

AGB 322 Plant Quarantine (4)

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: ENT 126, PTH 223.

AGB 325 Produce Market Quality (3)

Identification, cause, and detection methods of quality and condition entities resulting from insects, mites, nematodes, birds, mammals, plant diseases, and non-parasitic factors important when marketing major fruits and vegetables. Maturity indexes, size designations, and methods of packing produce. 2 lectures, 1 three-hour laboratory. Prerequisite: PTH 223

AGB 332 Household Pests (3)

Pests attacking plant and animal products in dwellings, food serving, and processing establishments, warehouses, and other enclosures; recognition of pests, damage, habitats; means of control and exclusion; pesticides registered for use in controlling these pests; related laws and regulations. 2 lectures, 1 three-hour laboratory. Prerequisite: ENT 126

AGB 333 Household Pests (3)

A continuation of AGB 332 to include pests existing as nuisances in

homes or other enclosures of occupancy; dooryard pests, and pests attacking man and domestic animals, including pets, poultry, and wild animals whose ectoparasites also attack man. 2 lectures, 1 three-hour laboratory. Prerequisite: ENT 126

AGB 334 Insects Affecting Timber Products (3)

The major and minor insect pests and other arthropods of economic significance in the destruction of wood products; recognition of stages and damage; habits, seasonal history, and control of such pests. Laws and regulations affecting the structural pest control operator. 2 lectures, 1 three-hour laboratory. Prerequisite: ENT 126

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-hour laboratory. Prerequisite: ENT 126

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 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)

Methods of determining extent of pest populations in agricultural plantings. Relationships between controls, population dynamics and economic levels. Experimental plot design, design evaluation through statistical analysis and control results. Determination of presence of pests, economic thresholds. Evaluation of control programs. 2 lectures, 1 three-hour laboratory. Prerequisite: Senior standing.

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.

AG 400 Special Problems for Advanced Undergraduates (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.

Agronomy

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 130 General Field Crops (4)

Production, harvesting, and use of important California cereal and field crops. Production areas, varieties, disease, and pest control. 3 lectures, 1 three-hour laboratory.

AGR 221 Field Crops (4)

Growing of California field crops other than cereals, such as row-planned 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 (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 230 General Truck Crops (4)

Principles of production, harvesting, and marketing of major truck crops grown in California. Specific production problems relating to areas. 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 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 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: B10 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 Farm Operation (3)

Operation of commercial vegetable and field crop acreages. Land preparation, cultivation, planting, fertilization, and pest control. Familiarity with more specialized farm equipment. 2 lectures, 1 three-hour laboratory. Prerequisite: AGR 122, 221; AGR 224 or 226

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.

AG 400 Special Problems for Advanced Undergraduates (1-2)

Individual or group investigation, research, studies, or surveys of selected problems. Total credit limited to 4 units.

Fruit Industries

FI 121 Citrus Production (4)

Economic importance of the industry, orchard care and soil management including: pest control, cultivation, irrigation, weed control, fertilization and frost protection. 3 lectures, 1 three-hour laboratory.

FI 122 Citrus Production (4)

Citrus botany, commercial varieties and rootstocks, propagation and nursery methods, orchard planning and development, pruning, disease control and fruit handling procedures. 3 lectures, 1 three-hour laboratory.

FI 123 Avocado Production (4)

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

FI 131 Subtropical Fruits (4)

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

FI 132 Pomology (4)

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

FI 136 Small Fruit Production (4)

Specialized berry culture, varieties, production areas, propagation, pest and disease control, cultural practices and harvesting. 3 lectures, 1 three-hour laboratory.

FI 221 Citrus Pest Control (4)

Recognition of citrus pests, damage and seasonal history. Methods and materials used in control practices. Spray equipment operation and soil fumigation. 3 lectures, 1 three-hour laboratory. Prerequisite: ENT 126

FI 226 Citrus Diseases (4)

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

FI 230 General Fruit Production (3)

Characteristics of the fruit industry of California. Varieties and cultural practices used in selected commercial fruit crops including fruiting and growth habits and propagation. For students other than Fruit Industries majors. 3 lectures.

FI 231 Grape Production (4)

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

FI 245 Fruit Propagation I (1)

Nursery propagation of fruit plants. Budding, tipgrafting, cuttings, seedbed preparation, care and management of the nursery. 1 three-hour laboratory. Prerequisite: BIO 115

FI 246 Fruit Propagation II (1)

Topworking and grafting fruit plants. Types of grafts used, selection of propagating material. 1 three-hour laboratory. Prerequisite: BIO 115

FI 321 Citrus and Avocado Marketing (3)

Procedures in marketing citrus and avocados. Organization, importance, and function of cooperative and pri-

vate marketing corporations in the assembling, processing and distribution of these fruit crops. 3 lectures. Prerequisites: 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 422 Orchard Management (4)

Factors of management relating to the efficient operation of citrus and avocado orchards. Effect of cultural practices on production and quality of fruit. 3 lectures, 1 three-hour laboratory. Prerequisite: Senior standing.

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.

AG 400 Special Problems for Advanced Undergraduates (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.

Soil Science

SS 221 General Soils (4)

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. 3 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)

Management of western soils. Diagnosis and correction methods for problems of soil salinity, alkalinity, compaction, aeration, irrigation water quality and drainage. Soil-plant species adaptation and selection. Effect of soil characteristics on growth of agronomic, ornamental and tree crops. 3 lectures, 1 three-hour laboratory. Prerequisite: SS 221 or 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 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 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

SS 337 Soil Analysis (2)

Chemical analysis of soils as a means of diagnosing problems related to western soils. 1 lecture, 1 three-hour laboratory. Prerequisite: SS 221 or 231, CHM 105, 142

SS 338 Plant Tissue Analysis (2)

Chemical analysis of plant tissue as a guide to fertilization and crop production. 1 lecture, 1 three-hour laboratory. Prerequisite: CHM 105, 142 or 112, 152

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 (4)

Physical properties and their significance to soil behavior. Mechanical composition, density and porosity, water movement and retention, aeration. 2 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 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.

RELATED COURSES IN AGRICULTURE

AG 311 Fundamentals of Agricultural Science (3)

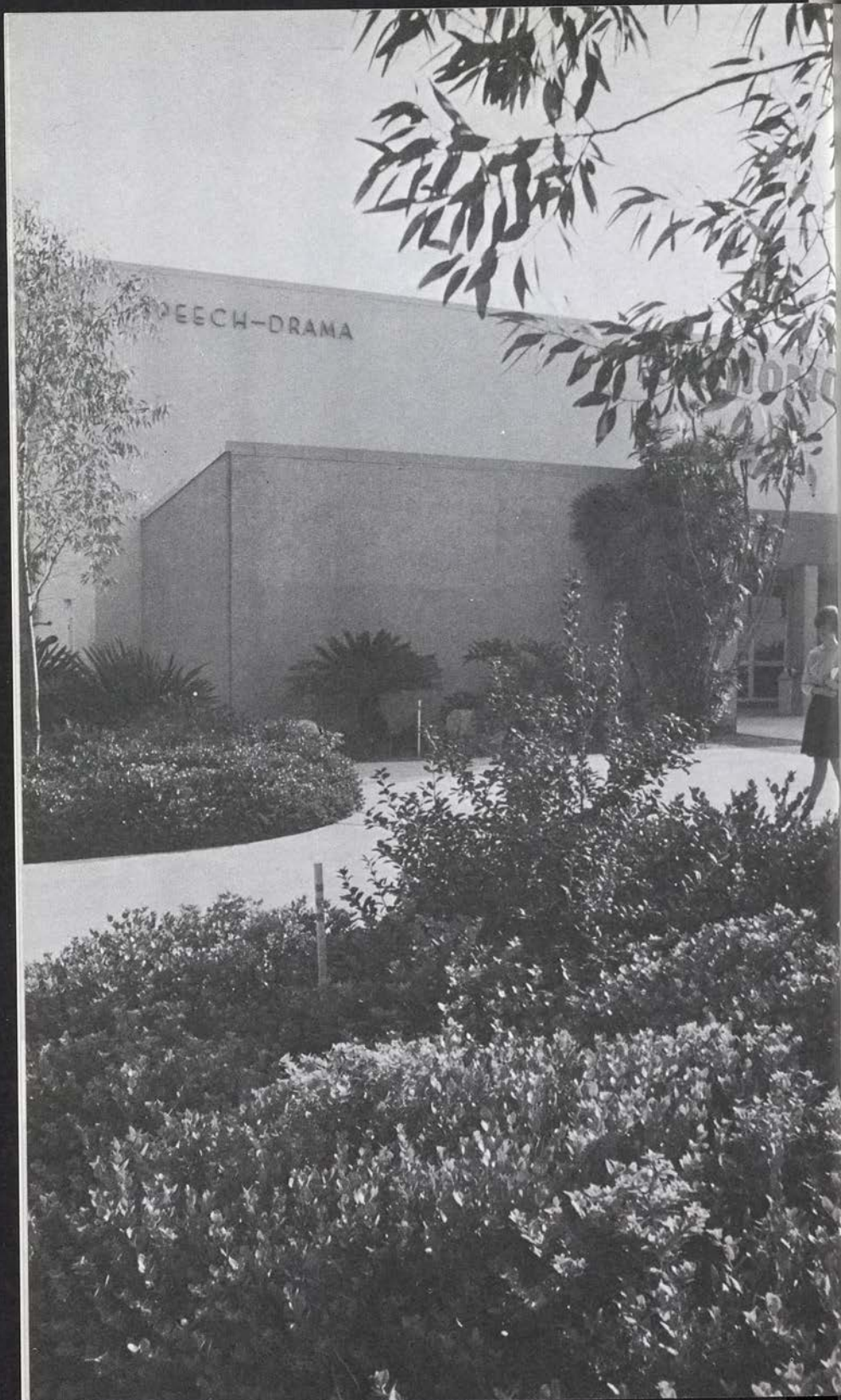
Overview of the plant and animal industries. Principles and practices in producing, processing, and distributing food and fiber. Concepts designed particularly for the discriminating consumer. 3 lectures.

AG 400 Special Problems for Advanced Undergraduates (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.

AG 650 Seminar in Agriculture (1-6)

Current findings and research problems in the field of agriculture and their application to the industry. 1 to 3 lectures. Prerequisite: Graduate standing. Maximum of six units may be earned.


PEECH-DRAMA

SCHOOL OF ARTS

COMMUNICATION ARTS . . . 160
ECONOMICS . . . 164
HISTORY . . . 169
LANGUAGE ARTS . . . 174
MUSIC AND ART . . . 186
PHYSICAL EDUCATION . . . 191
POLITICAL SCIENCE . . . 199
SOCIAL SCIENCES . . . 203

SCHOOL OF ARTS

Albert J. Aschenbrenner, *Dean*
Floyd H. Ross, *Associate Dean*
James E. Sutton, *Associate Dean*

The School of Arts serves several vital functions in the educational programs of the college.

Degree programs are offered in a wide range of liberal arts and social science areas. Bachelor of Arts degrees may be earned in English, History or Political Science. Bachelor of Science degrees are awarded for majors in Communication Arts, Economics, Language Arts, Physical Education, Social Sciences, and Social Service. Teacher credential programs are available in both elementary and secondary specializations with majors in Language Arts, Social Sciences, English, History, Speech, and Physical Education, and minors in Art, Economics, English, History, Music, Physical Education, Drama, Journalism, Political Science, and Speech.

Each curriculum within the school is designed to prepare its graduates for specific positions in their areas of specialization in keeping with the college's traditional philosophy of occupationally-oriented education.

An important college-wide function of this school is to provide all students of the college with instruction in certain basic and supporting offerings in general education. Thus, a major emphasis is upon preparing the college's 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 college are closely related to the academic program within the School of Arts. The Music and Art department contributes to the cultural and social development of students throughout the entire college. Student publications, which have college-wide participation of journalistically inclined students, are advised by faculty in the Communication Arts department. All students have the opportunity to participate in dramatic productions and competition in well-organized speech and forensics programs sponsored by the Speech and Drama sections of the Language Arts department. Intercollegiate and intramural athletics for both men and women are offered by the Physical Education department.

COMMUNICATION ARTS DEPARTMENT

Ben Thompson, *Acting Chairman*
Cecil B. Brown
Russell V. Lapp
Frank A. Tennant
Martin Wang

An increasingly complex society needs individuals to inform, interpret, and explain to the public the problems of that society. The Communication Arts major is designed to prepare students to fill communication positions in the mass media, business, industry, and education. Special characteristics of the program consist of several areas of concentration which combine with a core of basic communication courses to provide flexibility in career planning by the student.

Three concentrations emphasize Newspaper-Magazine Journalism, Public Relations, and Broadcast Journalism. An additional concentration, Specialized Communications, permits the student to prepare himself as a communication specialist in such areas as economics, science, government, and secondary education.

Students completing the major are qualified to take advantage of a variety of occupational opportunities and to pursue advanced study in professionally oriented graduate schools.

Curriculum in Communication Arts

Freshman	*F*	*W*	*S*
Freshman Composition (ENG 104, 105)	3	3	
Modern Theater Practice (TA 203)			3
†Physical Science		3	
Life Science (BIO 110)	3		
†Natural Sciences		3	
History of Civilization (HST 103)			4
Physical Education (PE 141)	½	½	½
Introduction to Mass Communications (COM 101)	3		
Reporting (COM 102)		3	
Photography (COM 131)	3		
Advanced Reporting (COM 202)			3
Electives and courses to complete major	3	4	6
	15½	16½	16½

Sophomore			
Contemporary Literature (ENG 206)			3
Public Speaking (SP 200)			3
Lettering and Layout (ART 240)	3		
†Basic Subjects		3	

†To be selected from the General Education list.

	F	W	S
General Psychology (PSY 202)			3
Logic and Semantics (PHL 202)		3	
†Natural Sciences	3	3	
History and Principles of Communications (COM 203)	3		
Techniques of Printing (COM 206)		3	
Editing (COM 305)			3
Principles of Government—Political Ideologies (PLS 102)	4		
Physical Education (PE 141)	½	½	½
Electives and courses to complete major	4	4	4
	17½	16½	16½

Junior

Advanced Composition—Non-fiction (ENG 303)	3		
Language and Human Behavior (ENG 313)		3	
Speech Composition (SP 311)			3
American Civilization (AMC 301, 302, 303)	3	3	3
Principles of Economics (EC 201, 202)	3	3	
Communications Law (COM 304)	3		
Editorial Writing (COM 310)		2	
Electives and courses to complete major	5	6	11
	17	17	17

Senior

Senior Project (COM 461, 462)	2	2	
Senior Seminar (COM 463)			2
Social Psychology (PSY 401)	3		
Communications Ethics (COM 401)	3		
Public Opinion, Propaganda and the Mass Media (COM 413)		3	
Electives and courses to complete major	8	11	14
	16	16	16

Curricular Concentrations

Broadcast Journalism

The major may be completed by taking a concentration of 18-29 units in Broadcast Journalism and related courses approved by the student's adviser. The concentration is designed for students planning careers in gathering and preparing news, features, and documentary materials for radio and television broadcasting.

Newspaper and Magazine Journalism

The major may be completed by taking a concentration of 18-29 units in Newspaper and Magazine Journalism and related courses approved by the student's adviser. The concentration is designed for students planning careers in editorial and supervisory assignments with newspapers, magazines and industrial publications.

Public Relations

The major may be completed by taking a concentration of 18-29 units in Public Relations and related courses approved by the student's adviser. The concentration is designed for students planning careers in public relations, advertising, and communications positions which require skills and knowledge in these areas.

Specialized Communications

The major may be completed by taking a concentration of 18-29 units in the student's designated area of specialization — such as economics, government, social services, education, and theater—and related courses approved by the student's adviser.

†To be selected from the General Education list.

Description of Courses

Communication Arts

COM 101 Introduction to Mass Communications (3)

Survey of contemporary mass media; communications theory, structure and interrelationships of newspapers, magazines, radio and television. Analyses of major media content. 3 lectures. Prerequisite: Satisfactory score on placement examination or ENG 4.

COM 102 Reporting (3)

Basic news gathering and writing techniques; use of news sources and documents; theory and practice of news leads and story organization. 2 lectures, 1 two-hour activity. Prerequisite: COM 101

COM 131 Photography (3)

Basic photography techniques, including taking, processing, and selecting good photos. For those who have had no or very limited experience in photography. 1 lecture, 2 three-hour laboratories.

COM 202 Advanced Reporting (3)

Interviewing techniques and in-depth reporting, including investigative, interpretive, personality and series stories; speeches and meetings. 2 lectures, 1 two-hour activity. Prerequisite: COM 102

COM 203 History and Principles of Communications (3)

History, background, and responsibilities of the mass media in the progress of man. Special emphasis on development of journalism in the United States. 3 lectures.

COM 206 Techniques of Printing (3)

Printing processes and the adaptability and possibilities of each; preparation of material for printing. 3 lectures.

COM 231 Photojournalism (3)

Photography for publication and public relations. Photo editing, picture stories and illustrations, photo marketing. 1 lecture, 2 three-hour laboratories. Prerequisite: COM 131, or permission of instructor.

COM 251 Communications Practice (2)

Production course for beginning staff members of college communications media. Minimum of 8 hours production activity a week. Prerequisite: Permission of instructor. Total credit limited to 6 units.

COM 301 Basic News Broadcasting (4)

Gathering, writing, editing, and programming news for the broadcast media, including audio and visual treatment for radio, television, and film. Prerequisite: COM 102 or permission of the instructor

COM 302 Advertising Copywriting, Layout and Production (3)

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, 1 two-hour activity.

COM 304 Communications Law (3)

The fundamentals and applications of libel and right-of-privacy laws as they affect the mass media. 3 lectures. Prerequisite: COM 203

COM 305 Editing (3)

Copy editing, headline writing, layout, and makeup. 3 lectures. Prerequisite: COM 101

COM 306 Sports Reporting (2)

Gathering material for and writing sports stories. 2 lectures. Prerequisite: COM 202

COM 307 Specialized Reporting (2)

Writing in such fields as education, travel, agriculture, science, arts, religion, politics. 2 lectures. Prerequisite: COM 202

COM 308 Business and Labor Reporting (2)

Gathering material for and writing stories pertaining to labor, business, and industry. 2 lectures. Prerequisite: COM 202

COM 309 Government, Courts, and Law Reporting (2)

Study and training in gathering and writing stories pertaining to government and courts; special emphasis on organization and court procedure. 2 lectures. Prerequisite: COM 202

COM 310 Editorial Writing (2)

Writing editorials; emphasis on the use of editorial comment. 2 lectures. Prerequisite: COM 202

COM 311 Business and Industrial Journalism (3)

The use of printed material in business and industry, including house organs, brochures, and pamphlets; writing and production of these publications. 3 lectures. Prerequisite: COM 206

COM 312 Publicity and News Bureau Operations (3)

The use of publicity in business, industry, and government; preparation of the news release; organization and operations of the news bureau. 3 lectures. Prerequisite: COM 202

COM 313 Public Relations (3)

The effects of organized information upon public thinking. Dissemination of ideas by commercial, industrial, social, and governmental organizations. Term project. 3 lectures. Prerequisite: ENG 105

COM 319 Advanced Technical Writing and Editing (4)

Principles and practices of technical writing and editing as employed by the technical writer in industry; preparation and editing of technical communications. Prerequisite: Permission of the instructor

COM 351 Advanced Communications Practice (2)

Production course for experienced staff members of college communications media. Minimum of 8 hours production activity a week. Prerequisite: Permission of instructor. Total credit limited to 6 units.

COM 400 Special Problems for Advanced Undergraduates (1–2)

Individual or group investigation, research, studies, or surveys of selected problems. Prerequisite: Senior standing or consent of the instructor. Total credit limited to 4 units with a maximum of 2 units per quarter.

COM 401 Communications Ethics (3)

A study of the responsibility of the mass mediums and the journalist in today's society. 3 lectures. Prerequisite: COM 304

COM 403 Community Newspaper Management (3)

The organization of the community newspaper, including study of advertising and circulation problems and relations with the community. 3 lectures. Prerequisite: COM 101, 302, or permission of instructor.

COM 413 Public Opinion, Propaganda, and the Mass Media (3)

Critical study and evaluation of the techniques of psychopolitical persuasion; mass media and public opinion in America; developments in international propaganda. 3 lectures. Prerequisite: Permission of the instructor.

COM 451 Editorial Practice (2)

Production course for students in editorial and management positions on college communications media or news bureau. Minimum of 8 hours production activity a week. Prerequisite: Permission of instructor. Total credit limited to 6 units.

COM 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.

COM 463 Undergraduate Seminar (2)

Study and discussion by students of recent developments in the student's major fields. 2 lectures. Prerequisite: Senior standing or permission of instructor.

ECONOMICS DEPARTMENT

Franklin Y. H. Ho, *Chairman*

Taha Al-Sabea
Sidney M. Blumner
Gertrude C. Boland
Robert T. Bray
George T. Galbreath
Ralph B. Hutchinson
David G. Jaques
David J. Park
Milton M. Shapiro
John T. Shieh
Dale G. Stallings
James E. Sutton
John J. Wilson

The Economics department serves all schools of the college by providing courses that contribute to the general education of all students and develops vocational proficiencies to meet the needs of Economics majors.

The curriculum in Economics, while maintaining a broad background of general education and traditional undergraduate economics courses, is oriented toward the development of skills and competencies in quantitative economic analysis. Technological and institutional changes in the economy are creating new demands for people with training in economics who also have sufficient mathematical and other skills to apply this knowledge to quantitative and qualitative problems.

The major in Economics has three objectives: first, prepare economic analysts for positions in business, industry, agriculture, and government; second, prepare students for research or management trainee positions in fields such as public administration, labor unions, industry, finance, and insurance; third, furnish undergraduate preparation for students who may wish to pursue graduate work in the field of economics.

The department also offers the appropriate courses in the Economics option within the Social Sciences major. This option is designed for students planning to teach economics in the public schools and for those seeking jobs in which a background in economics and other social sciences is advantageous but where quantitative skills are not required.

The Economics department offers minors for students seeking elementary and secondary teaching credentials.

Curriculum in Economics

Freshman	*F*	*W*	*S*
Principles of Economics (EC 201, 202, 203)	3	3	3
Principles of Accounting (ACC 124, 125)	4	4	
Accounting Practice (ACC 145)		1	
Introduction to Mathematical Analysis (MAT 108, 109, 204)	3	3	3
Freshman Composition (ENG 104, 105, 106)	3	3	3
Report Writing (ENG 216)			3
†Natural Sciences			3
Health Education (PE 107)	2		
Physical Education (PE 141)	½	½	½
Electives	1	2	1
	16½	16½	16½

Sophomore			
Price and Income Analysis I, II (EC 311, 312)	4	4	
Money and Banking (EC 308)			4
Fortran and Elementary Numerical Methods (MAT 119)		3	
Probability (MAT 123)	3		
Economic Statistics (EC 321, 322)		4	4
General Psychology (PSY 202)			3
†Natural Sciences	4	4	4
Physical Education (PE 141)	½	½	½
Public Speaking (SP 200)	3		
Electives	2	1	1
	16½	16½	16½

Junior			
Econometrics (EC 421)	4		
Economic Programming (EC 422)		4	
Economic Conditions Analysis (EC 423)			4
Public Finance (EC 301)		4	
Business and Government (EC 302)			4
American Civilization (AMC 301, 302, 303)	3	3	3
†Social Sciences	3		
†Literature	3		
Electives	3	5	5
	16	16	16

Senior			
Senior Project (EC 461, 462)	2	2	
Undergraduate Seminar (EC 463)			2
Labor Economics (EC 414)	4		
Managerial Economics (EC 413)		4	
†Humanities	3		3
Advanced Economics Electives		3	4
Electives	8	8	8
	17	17	17

†To be selected from the General Education list.

Description of Courses

EC 201, 202, 203 Principles of Economics (3) (3) (3)

How the economic system works. The forces which determine the efficiency of the allocation, utilization, and distribution of resources. The determinants of national income, output, prices, and employment. Applications of economic analysis. International economic problems. Courses to be taken in sequence. 3 lecture-discussions.

EC 205 Consumer Economics (4)

Principles of personal finance. The basic economics of personal money management; including budgeting, borrowing, spending, saving, investing, and insuring. 4 lecture-discussions. Prerequisite: EC 202

EC 213 Economic Problems (3)

Specific current economic problems selected with reference to the needs of the students. 3 lecture-discussions. Prerequisite: EC 202

EC 300 Development of Economic Doctrine (4)

The development of economic ideas or doctrines from the early Greek writers through the Classical and Neo-Classical schools to the present. 4 lecture-discussions. Prerequisite: EC 202

EC 301 Public Finance (4)

Principles of government financing and its various economic and social effects; collecting, spending and administration of public funds, particularly at state and local levels. 4 lecture-discussions. Prerequisite: EC 202

EC 302 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 303 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 305 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 308 Money and Banking (4)

Relation of money and banking to the general economy; interrelationships between money and banking and production and distribution. 4 lecture-discussions. Prerequisite: EC 202

EC 309 Economics of Capital Markets (4)

Analysis of the economic foundations upon which money and capital market transactions are based. Institutional and economic factors influencing the prices, uses, and sources of the flow of funds in equity and debt markets. 4 lecture-discussions. Prerequisite: EC 202, 308

EC 311, 312 Price and Income Analysis (4) (4)

Role of prices in organizing economic activities. Forces determining the general level of employment and income. Analysis of the behavior of households, firms, and market prices under various competitive conditions. Distribution of national income. Utilization and growth of the economy. 4 lecture-discussions. Courses to be taken in sequence. Prerequisite: EC 203

EC 313 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 319 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 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 lecture-discussions. Prerequisite: MAT 123 or equivalent.

EC 350 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 lectures. Prerequisite: EC 202, AMC 303

EC 400 Special Problems for Advanced Undergraduates (1-2)

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

EC 401 International Trade and Finance (4)

Role and basis of trade between nations. Mechanism of international financial transactions. Barriers to trade between nations and methods of facilitating trade. The position of the United States in international economic matters. 4 lecture-discussions. Prerequisite: EC 202

EC 402 Economic Development (4)

Pre-conditions 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 203 or 401, or permission of instructor.

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 413 Managerial Economics (4)

Use of economic analysis in formulating business policies; analysis of the social impact of management's role in the economy; integrated application of economic analysis and operations analysis to practical managerial problems. 4 lecture-discussions. Prerequisite: EC 202

EC 414 Labor Economics (4)

Macroeconomic analysis of industrial relations. Theories and facts in wage and employment determination. Philosophies and functions of organized labor and their changing aspects. The aggregate effects of collective bargaining on the economic efficiency and social welfare. Governmental policy in the labor-management relations. Problems of insecurities. 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 lecture-discussions. Prerequisite: EC 414

EC 421 Econometrics (4)

Introduction to quantitative model building, estimation, verification, and prediction of economic variables. 4 lecture-discussions. Prerequisite: EC 312 and EC 322 or equivalent.

EC 422 Economic Programming (4)

Optimization analysis and programming techniques, including various methods of linear programming, integer programming, quadratic programming, and dynamic programming. 4 lecture-discussions. Prerequisite: EC 202, MAT 204 or equivalent, or permission of instructor.

EC 423 Economic Conditions Analysis (4)

Techniques and procedures of statistical analysis of macroeconomic and microeconomic conditions. 4 lecture-discussions. Prerequisite: EC 421

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: Junior standing and EC 202

EC 432 Urban Economics (4)

Analysis of the level, distribution and stability of local income; analysis of local economic development problems of Southern California cities with 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; and current transport problems. 4 lecture-discussions. Prerequisite: EC 202

EC 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. Prerequisite: Senior standing.

EC 463 Undergraduate Seminar (2)

Intensive study of selected economic problems with the application of various techniques of analysis. 2 lectures. Prerequisite: Completion of senior project or permission of instructor.

EC 650 Seminar in Economics (1-3)

Special problems in selected areas of economics. Each seminar will be structured to meet the needs of individual students. Prerequisite: Graduate standing.

HISTORY DEPARTMENT

Werner H. Marti, *Chairman*

Anthony L. Brundage
Donald S. Castro
William M. Evans
John F. Freeman
Frederick B. Heath
John Kershaw
David L. Levering
Donald H. Pflueger
Ralph E. Shaffer
William A. Smith
Jerry L. Voorhis

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. Department 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 college.

The major provides a foundation for students seeking a Standard Secondary Teaching Credential in history and qualifies 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.

The major curriculum is structured to allow students to select groups of courses in areas of their historical interest and provides a special emphasis in the history of Southern California. In addition to such specialization, students are required to take courses in other areas of the social sciences.

Curriculum in History

Freshman	*F*	*W*	*S*
Freshman Composition (ENG 104, 105, 106)	3	3	3
History of Civilization (HST 101, 102, 103)	4	4	4
*Natural Sciences	3	3	3
Physical Education (PE 141)	½	½	½
Principles of Sociology (SOC 201, 202, 203) or Principles of Anthropology (ANT 201, 202, 203)	3	3	3
Health Education (PE 107)	2		
General Psychology I (PSY 202)			3
Electives		3	
	15½	16½	16½

*To be selected from the General Education list.

Sophomore	*F*	*W*	*S*
United States History (HST 201, 202)	4	4	
American Government (PLS 221, 222)	4	4	
Principles of Economics (EC 201, 202, 203)	3	3	3
Physical Education (PE 141)	½	½	½
*Natural Sciences	3	3	
Introduction to Philosophy (PHL 201)			3
*Mathematics			3
Electives			6
	14½	14½	15½
Junior			
*Humanities	3	3	3
Geography (300–400 level)	3		
General Psychology II (PSY 203)		3	
Political Science (300–400 level)			3
Anthropology, Philosophy or Sociology (300–400 level)	3		
History of California (HST 342)	4		
History of Asia (HST 301)	3		
†Area studies		4	4
§American History series		3	3
Electives		3	3
	16	16	16
Senior			
Senior Project (HST 461, 462)	2	2	
Undergraduate Seminar (HST 463)		2	
Europe in the 20th Century (HST 324)	4		
United States Since World War II (HST 406)	4		
‡European History series		4	4
§American History series		3	3
Public Speaking (SP 200)	3		
Economics, Geography or Political Science (300–400 level)			3
Electives	3	4	4
	16	15	14

Description of Courses

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 lectures.

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 lectures.

*To be selected from the General Education list.

†Select 6 units of History Area studies with the approval of the adviser from HST 302, 303, 304, 305, 307, 421.

‡Select 6 units of European History courses with the approval of the adviser from HST 320, 321, 322, 323, 330, 331, 420.

§Select 12 units of American History courses with the approval of the adviser from HST 206, 340, 341, 401, 402, 403, 404, 405, 410, 411.

HST 206 Great Men in History (3)

A biographical approach to the great men of history whose work has significantly influenced the course of world history. 3 lectures.

HST 210 The Negro in the New World (4)

Tracing contacts of African and European cultures. Slave trade and comparison of institutions of slavery and racial attitudes in North America to Latin America. Problems of black people in both areas from the termination of slavery to the present; consideration of the Pan-African movement and modern African reaction to racial problems in the Western Hemisphere. 4 lectures.

HST 301, 302, 303 History of Asia (3) (3) (3)

Historic background of the Far East, Southeast Asia, the Asian Sub-continent, and Southwest Asia. Political, social, and cultural developments. United States influence, interests, and responsibilities throughout Asia. 3 lectures. Prerequisite: Junior standing or permission of the 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 lectures. 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 origins of the power elites and their role in society; the Latin American university and the role of the student-intellectual in society and politics; the development of foreign interests in Latin America and their effect on economic and political development; the origins of the major twentieth century revolutions and their case studies (Mexico—1910, Bolivia—1952, and Cuba—1959). Future of Latin America—regional integration or disintegration, the role of the United States. 4 lecture-discussions. Prerequisite: Junior standing or permission of the instructor.

HST 320 Greece and Rome (4)

Ancient Greece, especially Athens, and ancient Rome from earliest times to 300 A.D., emphasizing political institutions, philosophy, and fine arts. Classical literature in translations. 4 lectures. Prerequisite: HST 101 or permission of instructor.

HST 321 Medieval History (4)

Cultural, social, intellectual, political, and economic history of Western Europe from 300 A.D. to 1500. 4 lectures. Prerequisite: HST 101 or permission of instructor.

HST 322 Early Modern Europe from 1450 to 1789 (4)

The political, social, cultural, and economic history of Europe from 1450 to the collapse of the *ancien regime*, including the Italian Renaissance, the Protestant Reformation, the discoveries of the world, the scientific revolution, France under Louis XIV, and the Enlightenment. 4 lecture-discussions. Prerequisite: HST 102 or permission of instructor.

HST 323 Modern Europe from 1789 to 1914 (4)

European political, social, cultural and economic developments from the collapse of the *ancien regime* (1789) to the beginning of World War I, and including the French Revolution, Napoleonic Europe, conservatism, liberalism, nationalism, and materialism. 4 lecture-discussions. Prerequisite: HST 103 or permission of instructor.

HST 324 Europe in the 20th Century (4)

The political, economic, and social forces which have influenced the great powers of Europe in the 20th century. The development of 20th century ideologies. 4 lectures. 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 lectures.

HST 331 History of Great Britain After 1640 (4)

Covers the political, social, economic and cultural history of modern Britain (1640 to the present). Special emphasis on the industrial revolution, social and political movements related to British democracy, and the imperial tradition. 4 lectures.

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 domestic American problems. Role of public opinion. 4 lectures. 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 lectures. Prerequisite: Junior standing.

HST 342 History of California (4)

The history of California from its Spanish beginnings to the present; relating the major state historical movements to the world and national scenes; cultural and intellectual developments are stressed along with political, social, and economic trends. 4 lectures.

HST 343 Regional History of Southern California (4)

The history of Southern California as a distinctive geographical, economic, cultural, social and political entity. The interplay of these forces upon the region's institutions which give the region its distinctiveness as well as its broader impact on the state, nation, and world. 4 lecture-discussions. Prerequisite: HST 342 or permission of instructor.

HST 344 Local History of Southern California (4)

Local history of Southern California, probing the roots of cities, their population, institutions, and their relationship to the overall development of the region. Examination of the 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)

A history of the roots and growth of cultism and radicalism in the political, social, and cultural life of Southern California are examined in depth with special attention to individuals and movements which reflect these phenomena. 4 lecture-discussions. Prerequisite: HST 342 or permission of instructor.

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 lectures.

HST 402 The Federal Union (4)

The American Revolution and Constitutional Era, the evolution of the nation through the age of Jackson. with attention to political, economic and social problems. 4 lectures. Prerequisite: HST 202.

HST 403 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 lectures. Prerequisite: HST 202.

HST 404 The Gilded Age and the Progressive Era 1868–1914 (4)

Major cultural changes wrought by industrialization in the United States and the resultant changes of American attitudes needed to successfully accommodate the business civilization. 4 lecture-discussions. Prerequisite: U.S. History Survey or American Civilization or permission of instructor.

HST 405 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; emphasizes domestic problems of the twenties and thirties, and international developments between the two wars. 4 lecture-discussions. Prerequisite: U.S. History Survey or American Civilization or permission of instructor.

HST 406 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 lectures. Prerequisite: Senior 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 lectures. Prerequisite: Junior standing or permission of the instructor.

HST 411 Social and Agrarian Reform (4)

American social and agrarian reform movements. Penal reform, land reform, women's rights, and peace movements; economic reforms in the 20th century. 4 lectures. 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. Compares problems of assimilation and critically analyzes the myth of the "melting pot." 4 lectures. Prerequisite: Junior standing, U.S. History or AMC 301, 302, 303.

HST 420 History of the Soviet Area (4)

A survey of modern Russian history with an emphasis on the post World War I period. The rise of communism and its subsequent spread throughout Eastern Europe and Asia. 4 lectures. Prerequisite: Junior standing or permission of instructor.

HST 421 History of Africa (4)

Twentieth century developments in Africa. Modern imperialism and the recent rise of nationalistic forces in this area. Political and economic trends; social, religious, and cultural factors in this area. 4 lectures. 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 is required. Prerequisite: Senior standing. Required minimum of 120 hours.

HST 463 Undergraduate Seminar (2)

Study and discussion by students of recent developments in the student's major fields. 2 lectures. Prerequisite: Senior standing or permission of instructor.

HST 470 History and Historians (4)

Great writers of history as well as the varying interpretations of history as a science, an art, a methodology, or philosophy. Critical and analytical treatment of the differing interpretations in an effort to determine their validity and relevance for the present. 4 lecture-discussions. Prerequisite: senior standing or permission of instructor.

LANGUAGE ARTS DEPARTMENT

C. Edwin Harwood, *Chairman*
Virginia H. Adair
Samuel I. Bellman
Sydney R. Bobb
John R. Butterworth
Alexander H. Chorney
David A. Church
Jane Delson
John P. Durham
Leonore H. Ewert
Joseph R. Farrell
Ross F. Figgins
Milton L. French
John F. Fulbeck
Ruth M. Harmer
Theodore C. Humphrey
Carola M. Kaplan
Jacqueline S. Lindauer
George E. Mitchell
Ralph C. McCormic
Paul M. Newman
Frances H. Pollock
Larry K. Robinson
Michael P. Schon
Alfred E. Sheldon, Jr.
Sidney Shrager
Ben Siegel
Joseph H. Stodder
Richard W. Suter
Halsey P. Taylor
Esther B. Wagner
James M. Ware
Theodore N. Weissbuch
Walter R. Whitney
Lillian Wilds
Aubrey V. Wilson
Rudolf Zrimc

The Language Arts department offers two degree programs: (1) the major in English, leading to a Bachelor of Arts degree, which equips undergraduates for graduate study and, when conjoined with the program for the secondary teaching credential, prepares students for a career in teaching on the secondary level; (2) the major in Language Arts, leading to a Bachelor of Science degree, which offers three curricular options in Humanities, Speech, and Theater Arts.

The curriculum for the English major is patterned as follows: 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.

The Humanities option provides for students desiring an elementary specialization teaching major in Language Arts. The Language Arts curriculum also provides for teaching credential minors in drama, English, and speech.

In addition, the department offers elementary and intermediate sequences in French, Spanish, and German, plus sequences in French and Hispanic civilizations which may be studied in the French or Spanish languages.

Curriculum in English

Freshman	*F*	*W*	*S*
Freshman Composition (ENG 104, 105)	3	3	
Freshman Composition: Methods of Literary Study (ENG 107)			3
Western Literary Heritage (ENG 111 or 112)			3
History of Civilization (HST 101, 102, or 103)	4		
The Visual Arts (ART 110) or Foundations of Modern Art (ART 312)			3
†Natural Sciences	5	4	3
†Mathematics		3	
Health Education (PE 107)		2	
Physical Education (PE 141)	½	½	½
Electives	3	3	3
	15½	15½	15½

Sophomore			
Survey of British Literature (ENG 207, 208, 209)	3	3	3
Survey of American Literature (ENG 211, 212, 213)	3	3	3
†Philosophy			3
Public Speaking (SP 200)		3	
†Natural Science	3		
General Psychology I (PSY 202)			3
Principles of Economics (EC 201, 202)	3	3	
Survey of Music Literature (MU 204)		3	
Physical Education (PE 141)	½	½	½
Electives	3		3
	15½	15½	15½

Junior			
The English Drama to 1890 (ENG 307)	3		
The Novel in English Before 1880 (ENG 305)		3	
The English Poem (ENG 309)			3
Advanced Composition (ENG 302 or 303)		3	
The Development of Modern English (ENG 311)		3	
The Grammars of English (ENG 312)	3		
Language and Human Behavior (ENG 313)			3
American Civilization (AMC 301, 302, 303)	3	3	3
Major course elective (300–400 level)			3
Electives	6	3	3
	15	15	15

Senior			
Senior Project (ENG 461, 462)	2	2	
Undergraduate Seminar (ENG 463)			2
Chaucer (ENG 401)	3		
Shakespeare I (ENG 403)	3		
Shakespeare II (ENG 404)		3	
Milton (ENG 402)	3		
Literary Criticism (ENG 405)		3	
Advanced major courses (300–400 level)		3	6
Electives	5	5	8
	16	16	16

†To be selected from the General Education list.

Curriculum in Language Arts

Freshman	*F*	*W*	*S*
Freshman Composition (ENG 104, 105)	3	3	
Freshman Composition: Methods of Literary Study (ENG 107)			3
Western Literary Heritage (ENG 111 or 112 or 113)			3
Physical Education (PE 141)	½	½	½
Health Education (PE 107)			2
History of Civilization (HST 101 or 102 or 103)	4		
Introduction to Mass Communications (COM 101)	3		
†Natural Sciences		4	
†Mathematics			3
†Art		3	
Electives and courses to complete major	7	6	6
	17½	16½	17½

Sophomore			
Physical Education (PE 141)	½	½	½
Contemporary Literature: Issues and Controversies (ENG 206)			3
Public Speaking (SP 200)		3	
Modern Theater Practice (TA 203)	3		
General Psychology I (PSY 202)			3
Principles of Economics (EC 201, 202)	3	3	
†Philosophy			3
†Natural Sciences	4	4	3
†Music			1
Electives and courses to complete major	6	6	3
	16½	16½	16½

Junior			
Advanced Composition (ENG 302 or 303 or LAN 301)			3
Language and Human Behavior (ENG 313)		3	
American Civilization (AMC 301, 302, 303)	3	3	3
Speech Composition (SP 311)	3		
Electives and courses to complete major	10	11	10
	16	17	16

Senior			
Senior Project (LAN 461, 462)	2	2	
Undergraduate Seminar (LAN 463)			2
Shakespeare I (ENG 403)		3	
Speech Techniques in Society (SP 403)			3
Electives and courses to complete major	14	11	11
	16	16	16

†To be selected from the General Education list.

Curricular Options

Humanities

The Humanities option is designed for students who plan to teach in elementary schools. It includes work in foreign languages, speech, philosophy, and English composition, language, and literature.

Courses to Complete Major

Sophomore

ENG 212, 213—American Literature ..... (6)
FR or SPN or GER—Foreign Language ..... (9)

Junior

PHL 304—World Religions ..... (3)
ENG 304—Development of the Short Story ..... (3)
SP 307—Conference Techniques and Group Discussion ..... (3)
ENG 309—The English Poem ..... (3)
ENG 311—The Development of Modern English ..... (3)
ENG 312—The Grammars of English ..... (3)

Senior

LAN 416—Children's Literature ..... (3)
LAN 419—Creative Dramatics and Storytelling ..... (3)

Speech

The Speech option prepares students for obtaining a secondary school teaching minor in speech and related subjects at the secondary level. It includes preparation in the methods and techniques of public address, oral interpretation, and forensics.

Courses to Complete Major

Freshman

SP 102—Voice and Diction ..... (3)

Sophomore

SP 203—Oral Interpretation ..... (3)
SP 204—Argumentation ..... (3)
SP 230—Forensics Workshop ..... (2)

Junior

SP 300—Advanced Public Speaking ..... (3)
SP 302—Advanced Voice and Diction ..... (3)
SP 305—Advanced Argumentation ..... (3)
SP 307—Conference Techniques and Group Discussion ..... (3)
SP 308—Speech Criticism ..... (3)

Senior

SP 312—Public Address and the American Tradition ..... (3)
SP 416—Rhetorical Theory ..... (3)
SP 443—Advanced Projects in Oral Interpretation ..... (3)
SP 444—Advanced Projects in Forensics ..... (4)

Theater Arts

The Theater Arts option prepares students for obtaining a secondary school teaching minor in drama and related subjects at the secondary level. It includes preparation in the theory and history of drama and in the techniques of theater production.

Courses to Complete Major

Freshman

TA 131, 132—Technical Production I, II ..... (6)
TA 133—Theory of Acting ..... (3)
TA 143—Makeup ..... (1)

Sophomore

TA 234—Technique of Acting ..... (2)
TA 235—Play Production ..... (3)
TA 244—Rehearsal and Performance ..... (2)

Junior

TA 334—Theory of Directing ..... (3)
TA 336—Technique of Directing (2)
TA 331—Advanced Acting ..... (3)
TA 332—Stage Lighting ..... (3)
ENG 308—The Modern Drama ..... (3)

Senior

TA 411, 412—History of the Theater I, II ..... (6)
TA 441—Advanced Projects in Theater ..... (2)

Description of Courses

English

ENG 4 Preparatory English (3)

For the student who needs additional work in basic usage before he enters English 104. Frequent writing of short papers. Readings. 3 lectures.

ENG 101 English as a Second Language (3)

Intensive English for foreign students. Audio-lingual drill in pronunciation and structure. Controlled composition. 3 lectures.

ENG 102 English as a Second Language (3)

English composition for foreign students. Frequent exercises in reading and composition. Audio-lingual drill on selected problems in structure. 3 lectures. Prerequisite: Satisfactory score on placement examination or ENG 101.

ENG 103 English as a Second Language (3)

English composition for foreign students. Introduction to forms of exposition and logic. Technique of the term paper. Readings and compositions. Drill on selected problems in structure. 3 lectures. Prerequisite: ENG 102

ENG 104 Freshman Composition (3)

The fundamentals of English usage. Frequent papers, chiefly expository. Readings. 3 lectures. Prerequisite: Satisfactory score in placement examination or ENG 4

ENG 105 Freshman Composition (3)

Frequent expository writing with stress on organization. Technique of the term paper. Readings. 3 lectures. Prerequisite: ENG 104

ENG 106 Freshman Composition (3)

Frequent papers, primarily critical and evaluative. Readings in various literary types. 3 lectures. Prerequisite: ENG 105

ENG 107 Freshman Composition: Methods of Literary Study (3)

For Language Arts majors and other recommended students, in lieu of ENG 106. Readings in contemporary fiction, drama, and poetry. Frequent papers. 3 lectures. Prerequisite: ENG 105

ENG 110 The Bible as Literature (3)

Old and New Testament narrative, poetry, and wisdom literature in the King James Version. 3 lectures. Prerequisite: ENG 104

ENG 111 Western Literary Heritage I (3)

Readings in literature of the ancient world from the beginning to the sixth century after Christ, with emphasis on the history of ideas. 3 lectures. Prerequisite: ENG 105

ENG 112 Western Literary Heritage II (3)

Readings in literature of the medieval period from the sixth through the fifteenth century, with emphasis on the history of ideas. 3 lectures. Prerequisite: ENG 105

ENG 113 Western Literary Heritage III (3)

Readings in Continental literature of the Renaissance to 1700, with emphasis on the history of ideas. 3 lectures. Prerequisite: ENG 105

ENG 201 Introduction to Modern Fiction (3)

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 Language Arts majors. 3 lectures. Prerequisite: ENG 105

ENG 202 Introduction to Modern Drama (3)

Readings chiefly in 20th century drama, with emphasis on man's search

for knowledge, self-understanding, and values. May not be elected by Language Arts majors. 3 lectures. Prerequisite: ENG 105

ENG 203 Introduction to Poetry (3)

Readings chiefly in modern poetry; some biographical and critical material. Emphasis on man's search for knowledge, self-understanding, and values. May not be elected by Language Arts majors. 3 lectures. Prerequisite: ENG 105

ENG 206 Contemporary Literature: Issues and Controversies (3)

Writings that reflect significant social, religious, and political issues of our time. Such authors as John Cheever, J. D. Salinger, James Baldwin, John Osborne, Rolf Hochhuth. 3 lectures. Prerequisite: ENG 105

ENG 207, 208, 209 Survey of British Literature (3) (3) (3)

British literature, as related to the history of ideas, from its beginning to the present, with emphasis on the major works. 3 lectures. Prerequisite: 3 units of literature.

ENG 211, 212, 213 Survey of American Literature (3) (3) (3)

Philosophical, religious, political, and literary ideas in American writing from Colonial times to the present. 3 lectures. Prerequisite: 3 units of literature.

ENG 216 Report Writing (3)

Report-writing techniques. Research, organization, and preparation of specialized and technical information. Regular written reports. 3 lectures. Prerequisite: ENG 105

ENG 218 Business Communication (3)

Writing effective business letters and memoranda with emphasis on clarity and on reaction-evoking techniques. Letters of application and resumés. 3 lectures. Prerequisite: ENG 105

ENG 219 Technical Writing (2)

The principles of technical writing with extensive practice in the preparation of technical materials in the various forms common to the engineering fields. 2 lectures. Prerequisite: ENG 105

ENG 302 Advanced Composition—Fiction (3)

The fundamentals of short story writing. Exercises in plotting, characterization, dialog, description, narration, and point of view. Minimum of two stories. Readings. Discussion and analysis of stories and exercises. 3 lectures. Prerequisite: Permission of instructor; 3 units of 200-level literature.

ENG 303 Advanced Composition—Non-fiction (3)

Study of current practices in written composition. Exercises in various types of exposition and magazine article writing. 3 lectures. Prerequisite: Permission of instructor; 3 units of 200-level literature.

ENG 304 The Development of the Short-Story (3)

Critical analysis; history and evaluation of form. 3 lectures. Prerequisite: 3 units of 200-level literature.

ENG 305 The Novel in English Before 1880 (3)

Development of the novel in England and America to the rise of Naturalism. 3 lectures. Prerequisite: 3 units of 200-level literature.

ENG 306 Modern Novel (3)

Realism and its variants in the 19th and 20th centuries, from French and Russian beginnings. 3 lectures. Prerequisite: 3 units of 200-level literature.

ENG 307 English Drama to 1890 (3)

From tropes to Shaw. Background material presented especially to meet the needs of the prospective secondary teacher. 3 lectures. Prerequisite: 3 units of 200-level literature.

ENG 308 Modern Drama (3)

Continental, British, and American dramatic trends from the rise of Nat-

uralism. 3 lectures. Prerequisite: 3 units of 200-level literature.

ENG 309 The English Poem (3)

Critical analysis and evaluation of genres and single works, excluding the drama. 3 lectures. Prerequisite: 3 units of 200-level literature.

ENG 310 Modern British and American Poetry (3)

Advanced analysis of language and forms of poetry, chiefly from the 20th century. 3 lectures. Prerequisite: 3 units of 200-level literature.

ENG 311 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: 3 units of 200-level literature.

ENG 312 Grammars of English (3)

Principles and methods of linguistics as they relate to modern English. Examination of systems used to describe the language: traditional, structural, and transformational grammars. 3 lectures. Prerequisite: 3 units of 200-level literature.

ENG 313 Language and Human Behavior (3)

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: 3 units of 200-level literature.

ENG 401 Chaucer (3)

Study of Chaucer's principal works, with special emphasis on *The Canterbury Tales* and *Troilus and Criseyde*. Consideration of cultural background. 3 lectures. Prerequisite: 3 units of 300-level literature.

ENG 402 Milton (3)

Paradise Lost, Samson Agonistes. Prose and minor poems. Historical background. 3 lectures. Prerequisite: 3 units of 300-level literature.

ENG 403 Shakespeare I (3)

Selected plays through *Hamlet*. 3 lectures. Prerequisite: 3 units of 300-level literature.

ENG 404 Shakespeare II (3)

Selected plays after *Hamlet*. 3 lectures. Prerequisite: 3 units of 300-level literature.

ENG 405 Literary Criticism (3)

Analysis of the works of selected major critics, with emphasis on the moderns. Application of principles in original critical essays. 3 lectures. Prerequisite: 3 units of 300-level literature.

ENG 406 Major American Writers (3)

Intensive reading in such writers as Melville, Robinson, O'Neill, and Hemingway. 3 lectures. Prerequisite: 3 units of 300-level literature.

ENG 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.

ENG 463 Undergraduate Seminar (2)

Study and discussion by students of recent developments in the student's major fields. 2 lectures. Prerequisite: Senior standing or permission of instructor.

ENG 471 Major English Poets 1500–1660 (3)

Readings from such poets as Spenser, Sidney, Greville, Jonson, Donne, Herbert. 3 lectures. Prerequisite: 3 units of 300-level literature.

ENG 472 Major English Poets of the Restoration and 18th Century (3)

Readings from such poets as Dryden, Pope, Blake, Burns. 3 lectures. Prerequisite: 3 units of 300-level literature.

ENG 473 Major English and American Poets of the 19th Century (3)

Readings from such poets as Wordsworth, Keats, Tennyson,

Browning, Whitman, Dickinson. 3 lectures. Prerequisite: 3 units of 300-level literature.

ENG 476 Major Novelists of the 19th Century (3)

Readings from such writers as Balzac, Dickens, Melville, Flaubert, Dostoyevski, Tolstoy. 3 lectures. Prerequisite: 3 units of 300-level literature.

ENG 478 Major Prose Writers of the 18th Century (3)

Readings from such writers as Swift, Voltaire, Johnson, Rousseau, Burke, Lessing, Gibbon. 3 lectures. Prerequisite: 3 units of 300-level literature.

ENG 479 Major Prose Writers of the 19th Century (3)

Readings from such writers as Newman, Emerson, Ruskin, Arnold, Henry Adams. 3 lectures. Prerequisite: 3 units of 300-level literature.

ENG 483 Contemporary American Novel (3)

Structure and theme in the American novel since 1945. Such writers as Bellow, Capote, Ellison, Malamud, Roth, Styron. 3 lectures. Prerequisite: 3 units of 300-level literature.

Foreign Languages

FR 101, 102, 103 Elementary French (4) (4) (4)

Designed to familiarize the beginner with the essentials of the spoken and written language. Fundamentals of grammar; reading of elementary texts. 4 lectures.

FR 201, 202, 203 Intermediate French (3) (3) (3)

Review of grammar; readings of moderate difficulty; conversation. 3 lectures. Prerequisite: FR 103 or equivalent.

FR 207, 208, 209 French Civilization (3) (3) (3)

French culture of the past and present, including art, music, social customs, and world outlook. Conducted in English and French. 3 lectures. Prerequisite: One year of college French.

GER 101, 102, 103 Elementary German (4) (4) (4)

Essentials of the spoken and written language. Fundamentals of grammar; reading of elementary texts. 4 lectures.

GER 201, 202, 203 Intermediate German (3) (3) (3)

Further practice in reading, speaking, and writing German. Reading of selected literary works. 3 lectures. Prerequisite: GER 103 or equivalent.

SPN 101, 102, 103 Elementary Spanish (4) (4) (4)

Designed to familiarize the beginner with the essentials of the spoken and written language. Fundamentals of grammar; reading of elementary texts. 4 lectures.

SPN 201, 202, 203 Intermediate Spanish (3) (3) (3)

Review of grammar; readings of moderate difficulty; conversation. 3 lectures. Prerequisite: SPN 103 or 2 years of high school Spanish.

SPN 207, 208, 209 Hispanic Civilization (3) (3) (3)

The culture of Spain and Latin America, including art, music, history, social customs, and world outlook. Conducted in English and Spanish. 3 lectures. Prerequisite: One year of college Spanish.

Language Arts

LAN 301 Advanced Academic Composition (3)

Short, formal communications of rhetorical excellence: the memo, ab-

stract, review, explication; brief professional report and recommendation; the committee paper. 3 lectures. Prerequisite: 3 units of 200-level literature.

LAN 400 Special Problems for Advanced Undergraduates (1-2)

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

LAN 416 Children's Literature (3)

Readings in myth and folklore and in children's classics from the 18th century to the present. 3 lectures. Prerequisite: 3 units of 200-level literature.

LAN 419 Creative Dramatics and Storytelling (3)

Theory and practice in improvisational dramatic activities; dramatization of children's stories; techniques of storytelling and adapting the story to play form. 2 lectures, 1 two-hour activity.

LAN 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.

LAN 463 Undergraduate Seminar (2)

Reports of senior projects, discussions of professional articles of an appropriate level. 2 lecture-discussions. Prerequisite: Completion of senior project.

LAN 650 Seminar in Language Arts (1-3)

Topics in advanced areas of language, literature, speech, drama, or journalism according to the needs and interests of the students enrolled. Each seminar will have a sub-title reflecting its content. 1, 2, or 3 lecture-discussions. Prerequisite: Graduate standing and instructor's approval. May be repeated for a total of 9 units.

Speech

SP 102 Voice and Diction (3)

Physiology, mechanics, and function of the vocal mechanism; phonetics and enunciation; exercises and drills to improve the quality, flexibility, and effectiveness of the voice, leading to good usage of standard American speech. 3 lectures.

SP 200 Public Speaking (3)

Theory and practice in speech organization, composition, and delivery. Use of research materials. 3 lectures. Prerequisite: ENG 105

SP 203 Oral Interpretation (3)

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. Exercises in microphone technique and public performance. 3 lectures.

SP 204 Argumentation (3)

Principles of argumentation; methods of logical proof. Obtaining and organization of evidence, construction of the written brief, analysis of fallacies, and rebuttal technique. Application of principles of argumentation to professional speaking. 3 lectures. Prerequisite: SP 200

SP 230 Forensics Workshop (1-2)

Intercollegiate and intramural competition in debate, oratory, oral interpretation, extemporaneous speaking, and impromptu speaking. Independent projects in specialized fields. 1 or 2 laboratories. May be repeated for not more than 6 units.

SP 300 Advanced Public Speaking (3)

Advanced techniques of public speaking as applied to business and pro-

fessional speaking. Oral reports, panels, speech analysis, persuasion, and argumentation. 3 lectures. Prerequisite: SP 200

SP 302 Advanced Voice and Diction (3)

Advanced theory and principles of voice production: analysis of the sounds of speech and the structure and function of the vocal mechanism; application of phonetic principles to problems of articulation and pronunciation, exercises in voice production for public performance. 3 lectures. Prerequisite: SP 102

SP 305 Advanced Argumentation (3)

Philosophies and principles of argumentative discourse. Empirical and theoretical research in argumentation. 3 lectures. Prerequisite: SP 204

SP 307 Conference Techniques and Group Discussion (3)

Variables of communication within problem-solving groups; development of conference and discussion skills. Emphasis on format rather than on group psychology. 3 lectures. Prerequisite: SP 200

SP 308 Speech Criticism (3)

Critical approaches to the analysis and evaluation of public address. Development of evaluative standards and methods for classroom application. 3 lectures. Prerequisite: SP 200, 300, and 311

SP 309 Small Group Communication (3)

Philosophies and principles governing small group communication. Empirical and theoretical research in small group communications. 3 lectures. Prerequisite: SP 307

SP 311 Speech Composition (3)

Stylistic and organizational skills of public address, written speeches, speech vocabulary, organization, analysis of current public addresses, and speeches for special occasions. 3 lectures. Prerequisite: SP 200

SP 312 Public Address and the American Tradition (3)

Techniques and strategies of major speeches affecting significant political, economic, social and religious issues in the United States: 1750-1920. Important trends in American public address. 3 lectures. Junior standing or permission of instructor.

SP 403 Speech Techniques in Society (3)

Analysis and performance of persuasive discourse; emotional appeals, propaganda techniques, and audience analysis; written reports on propagandistic and persuasive techniques in modern society. 3 lectures. Prerequisite: SP 200

SP 416 Rhetorical Theory (3)

Major theories of rhetoric from the classical to the modern; application to contemporary communication techniques. 3 lectures. Prerequisite: SP 200

SP 443 Advanced Projects in Oral Interpretation (1-3)

Planning, directing and producing programs, play and choral readings, and other special projects. 1 to 3 laboratories. May be repeated for not more than 6 units. Prerequisite: SP 203 or permission of instructor.

SP 444 Advanced Projects in Forensics (1-3)

Participation and competition in upper division intercollegiate forensics, special projects for professional organizations, directing the high school forensics program and other independent projects in public address. 1 to 3 laboratories. Prerequisite: SP 230 or permission of instructor. May be repeated for not more than 6 units.

Theater Arts

TA 131 Technical Production (3)

Principles of backstage organization, scenery construction, and property construction. Crew work on current productions. 1 lecture, 2 three-hour laboratories.

TA 132 Technical Production (3)

Principles and technique of stage lighting, elementary scene design, scenery painting, and sound. Crew work on current productions. 1 lecture, 2 three-hour laboratories.

TA 133 Theory of Acting (3)

Theory and practice of acting with special attention to basic approaches to acting, including improvisation, motivation, concentration, and character development. 2 lectures, 1 three-hour laboratory.

TA 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.

TA 203 Modern Theater Practice (3)

Survey and analysis of theater practice, including dramatic structure, financial organization, styles and forms of dramatic expression (including cinema and television), production methods, theory of acting and directing, interrelation of the components of theatrical expression, and dramatic criticism. 3 lectures. Prerequisite: ENG 105 or permission of instructor.

TA 234 Techniques of Acting (2)

Intensive exercises in basic acting techniques with emphasis on body movement, pantomime, stage business, and character projection. 2 three-hour laboratories. May be repeated for a maximum of six units by permission of instructor. Prerequisite: TA 133

TA 235 Play Production (3)

Application of principles of play production and organization to practical theater situations. Crew supervision, backstage organization and administration, publicity and box office operation. Technical drawing for the theater. 2 lectures, 1 three-hour laboratory. Prerequisite: TA 131 or permission of instructor.

TA 244 Rehearsal and Performance (1-2)

Practical experience by participation in theatrical production. Technical crews, theater management, and acting. 1 or 2 three-hour laboratories. May be repeated for not more than 6 units.

TA 331 Advanced Acting (3)

Intensive study in styles and forms of acting, with special attention to mastery of technique and comparative study of theories of acting. 2 lectures, 1 three-hour laboratory. Prerequisite: TA 133

TA 332 Stage Lighting (3)

Theory and practice in stage lighting. Composition, design, switchboard design, instrument selection and purchasing, production planning. Students will serve as crew members and supervisors for departmental productions. 2 lectures, 1 three-hour laboratory. Prerequisite: TA 132 or permission of instructor.

TA 334 Theory of Directing (3)

Theory and practice in play selection, analysis and direction, composition, movement, coaching, and ground plans. 2 lectures, 1 three-hour laboratory. Prerequisite: TA 234

TA 336 Technique of Directing (2)

Intensive exercises in directing. Blocking, coaching, rhythm and tempo, scene development and polish, and mastery of significant theatrical styles. 2 three-hour laboratories.

TA 337 Scene Design (3)

Theory and technique of scene design, including working drawings, perspectives, painter's elevations and ground plans. Techniques of scenery construction and painting. 1 lecture, 2 three-hour laboratories. Prerequisite: TA 131 or permission of instructor.

TA 338 Children's Theater (3)

Backgrounds of children's theater; study of basic elements of dramatic expression; investigation of source materials for children's plays; principles and methods of play production for children; practical experience in play production including costuming, stage

setting, property construction and makeup. 2 lectures, 1 three-hour laboratory.

TA 401 Playwriting and Dramatic Structure (3)

Intensive study of dramatic structure as applied to theater practice. Theory and practice in playwriting and criticism. 3 lectures.

TA 411 History of the Theater I (3)

Survey of dramatic art and production from the Greeks to the present. Application of historic principles and styles to contemporary play production and criticism. 3 lectures.

TA 412 History of the Theater II (3)

Dramatic art and theater production from 1700 to the present. Application of historical principles and styles to contemporary play production and criticism. 3 lectures.

TA 441 Advanced Projects in Theater (1-3)

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 to 3 three-hour laboratories. May be repeated for not more than 6 units.

MUSIC AND ART DEPARTMENT

Philip R. Browne, *Chairman*

Charles A. Coulter
Diane Divelbess
Walter W. Glaser
James E. Mooney
Kathreen R. Prout
Lowell K. Weeks
Karl E. Winchell

Courses in the Music and Art department are designed to provide opportunities for students to further their proficiencies in vocal and instrumental performance and to develop concepts and skills in two and three dimensional art forms.

Students interested in music or art are given a broad insight into these fields through courses in fundamentals, theory, literature, and history. Elementary and secondary teaching credential candidates may select a music or art minor. Department advisers must be consulted before the student is officially enrolled in either minor.

Audio-visual courses provide a cultural background and furnish many kinds of skills and techniques necessary to success in teaching, advertising, sales, and other professional activities.

Description of Courses

Music

MU 100 Music Fundamentals (4)

Introduction to music theory for the general college student. Notation, rhythm, melody, scales, keyboard work. No previous experience required. 4 lectures.

MU 111, 112, 113 Class Piano I (1) (1) (1)

Beginning class piano instruction. Development of ability to play simple chords in all keys and to harmonize simple melodies using these chords. Transposition of simple melodies. Technical studies. 1 activity period.

MU 141, 341 Stage Orchestra (1) (1)

Study of dance, jazz and show music. Participation in annual Road Show. Previous experience required. For advanced credit, leadership and solo abilities must be demonstrated. Consent of instructor required. 1 activity period. Total credit limited to 8 units.

MU 150 Varsity Band (1)

Performance activities designed primarily for rallies, sports events and college activity functions. Previous experience and consent of instructor required. 1 activity period. Total credit limited to 8 units.

MU 151, 351 Marching Band (1) (1)

Marching and playing for athletic events and parades. Previous experience required. Advanced credit only for those with demonstrated instrumental proficiency and leadership qualities. 1 activity period. Total credit limited to 4 units.

MU 152, 352 Concert Band (1) (1)

Training and experience in wind band repertoire, traditional and contemporary. Previous band experience and consent of instructor required. For advanced credit, student must demonstrate instrumental proficiency and leadership qualities. 1 activity period. Total credit limited to 8 units.

MU 153, 353 Symphony Orchestra (1) (1)

Training and experience in performance of music from all periods. Previous orchestral experience required. Open to all string players; wind players by consent of instructor only. Advanced credit limited to those with demonstrated leadership and solo ability. 1 activity period. Total credit limited to 12 units.

MU 161, 361 A Cappella Choir (1) (1)

A cappella singing for both men and women. Standard and contemporary vocal literature. Advanced credit limited to those with demonstrated leadership or solo ability. 1 activity period. Total credit limited to 6 units.

MU 201 Music Theory (3)

Elements of music theory; construction of major and minor scales; intervals, rhythms, sight-singing, musical terms, syllable work. 3 lectures. Prerequisite: MU 100 or equivalent.

MU 202 Musicianship (3)

A continuation of music theory, but with emphasis on application of fundamentals learned. Drill in harmonic, melodic, and rhythmic dictation. 3 lectures. Prerequisite: MU 201

MU 203 Elementary Harmony (3)

Analysis and writing of four-part harmony, arranging and basic composition. 3 lectures. Prerequisite: MU 202

MU 204 Survey of Music Literature (3)

Introduction to the great composers in Western civilization and their music. Basic forms, styles and aesthetics of music. Lectures, recordings, films. General college elective. 3 lectures.

MU 211, 212, 213 Class Piano II (1) (1) (1)

Second year of class piano. Continued development of music reading skills, playing by ear and transposing; emphasis on music for recreational uses in the home, church, and community. 1 activity period. Prerequisite: MU 113

MU 231 String Instrument Fundamentals (1)

Fundamentals of playing all string instruments with emphasis on the violin, but including viola, violoncello, bass. No previous experience necessary. For music minors or those interested in learning how to play a string instrument. 1 activity period.

MU 232 Brass Instrument Fundamentals (1)

Fundamentals of playing all brass instruments with emphasis on the trumpet, trombone, baritone, French horn or tuba. No previous experience necessary. For music minors or those interested in learning how to play a brass instrument. 1 activity period.

MU 233 Woodwind Instrument Fundamentals (1)

Fundamentals of playing a woodwind instrument. Includes study of clarinet, flute, oboe, bassoon, saxophone and related instruments. No previous experience required. For music minors or those who wish to learn how to play a woodwind instrument. 1 activity period.

MU 237 Voice Fundamentals (1)

Fundamental techniques of singing. Problems of tone production, breathing, diction, repertoire, and song interpretations. 1 activity period. May be repeated for a total of 3 units.

MU 307 Conducting and Scoring (4)

Techniques of conducting and arranging for instrumental and vocal groups. Analysis of scores, baton technique, orchestration. 4 lectures. Prerequisite: MU 203

MU 310 History of Jazz (3)

An introductory survey of jazz; its historical background and its development in the United States. Emphasis is on origins, musical resources, and evolution. Lectures, demonstrations, recordings, and films. 3 lectures.

MU 340 Instrumental Ensembles (1)

Rehearsal and performance of small ensemble groups including woodwinds or brass or strings. Open to qualified players capable of advanced performance. 1 activity period. May be repeated for a maximum of 8 units.

MU 360 Vocal Ensembles (1)

Rehearsal and performance of small vocal groups. May be organized into men's or women's glee clubs. Open to qualified singers. 1 activity period. May be repeated for a maximum of 8 units.

MU 364 Madrigal Singers (1)

Vocal training in the study of and performance of motets, madrigals and modern works. Performance for civic groups, road show and concerts. Previous vocal experience required. Consent of instructor required. 1 laboratory period. Total credit limited to 6 units.

MU 401 Music Literature for Children (3)

Music literature especially suited for (but not limited to) children. Instrumental, vocal, and piano music recordings are played, studied, and evaluated. Songs for children played and sung by teacher and students. 3 lectures.

MU 402 History of Musical Styles (3)

Music from ancient times to the present with emphasis on changing styles. Sociology, customs, physical development of instruments and lives of composers in relation to the development of musical forms and styles in various periods. Research and assigned listening experiences. 3 lectures. Prerequisite: MU 204; MU 405 or 406

MU 405 Music in the Romantic Period (3)

The growth of Romanticism in Western musical cultures from 1825 to 1900. Analysis of scores, research and listening experiences. 3 lectures. Prerequisite: MU 204

MU 406 Music in the Twentieth Century (3)

Form, style and idiom in Western music from 1900 to the present. Impressionism, neo-classicism, atonal, 12-tone music and music of America. Analysis of scores, research and listening experiences. 3 lectures. Prerequisite: MU 405

Art

ART 110 The Visual Arts (3)

Appreciation and understanding of the visual arts. A comprehensive survey of the relationships within the arts as well as their respective and collective relationship to the structure of society. 3 lectures.

ART 134 Art Materials and Skills (3)

Development of appreciative and creative skills. Variety of materials used, with an emphasis on two dimensional design concepts. Selecting, organizing, guiding, and evaluating individual and group activities. 1 lecture, 2 two-hour activities.

ART 135 Craft Materials and Skills (3)

Basic projects with various craft materials. Ceramics, metal, textiles, wood, and leather. Development of three-dimensional skills and concepts through the materials, and their properties. Evaluative criteria applied to craft materials. 1 lecture, 2 two-hour activities.

ART 212 History of Western Art (3)

Survey of the development of Western Art from prehistoric times to the Renaissance. 3 lectures.

ART 213 History of Western Art (3)

Survey of the development of Western Art from the Renaissance to

the 20th century. 3 lectures. Prerequisite: ART 212

ART 220 Fundamentals of Sculpture (3)

Exploration of the fundamentals of sculpture involving modeling or carving clay, plaster, wood, stone and metal. 3 two-hour activities.

ART 236 Crafts Design (3)

Development of concepts, methods, and skills in basic craft media such as ceramics, wood, and metal construction plus optional individually-elected projects. 2 lectures, 1 three-hour laboratory.

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 Potters' wheel. 3 two-hour activities.

ART 240 Lettering and Layout (3)

Development of appreciative and skillful usages of alphabets and layout, forming, spacing letters in popular media. Emphasis on development of selective skills in visual communications. 1 lecture, 2 two-hour activities.

ART 241 Printmaking (3)

Methods and techniques of printmaking. Basic exposure to approaches in relief, intaglio, photographic and silk screen processes. 1 lecture, 2 two-hour activities. Prerequisite: ART 134

ART 244 Fundamentals of Drawing (1-2)

Analysis and practice in functional drawing, basic design, and study of form. Development of individual techniques. 1 or 2 two-hour activities. May be repeated for a total of 3 units.

ART 247 Acrylic Painting (3)

Methods and techniques with acrylics. Emphasis on form and composition. 1 lecture, 2 two-hour activities. Prerequisite: ART 134 or permission of instructor.

ART 249 Transparent Watercolor Painting (3)

Methods and techniques with transparent watercolor. Outdoor sketching and studio projects. 1 lecture, 2 two-hour activities. Prerequisite: ART 134 or permission of instructor.

ART 310 History of Primitive Arts (3)

Survey of the visual and plastic arts of those cultures outside the sphere of Western and Oriental art history. The arts of Oceania, Africa, and the Americas. 3 lectures. Recommended: ART 110, ANT 202

ART 312 Foundations of Modern Art (3)

Analysis of the foundations of the visual arts in modern life, equating the development of contemporary forms with those of other cultural forces. 3 lectures.

ART 314 History of Art of the United States (3)

Survey of the art of the United States from colonial times to the present. Includes European tradition and the Academy, Frontier art forms, Regionalism, Social Realism to merging with the International Art Style. 3 lectures. Recommended: ART 110, 212, 213

ART 337 Three-Dimensional Design (3)

Theory and application of aesthetic elements and principles of three-dimensional forms and their relationship to human need, involving the rise of sculpture and ceramics. 3 two-hour activities.

ART 339 Two-Dimensional Design (3)

Elements and principles of two-dimensional design related to projects for specific functions. 3 two-hour activities. Prerequisite: ART 134 or ENV 143 or permission of instructor.

ART 345 Intermediate Drawing (1-2)

The development of method and technique in figurative and perspec-

tive drawing. Emphasis on the individual solution of problems in compositions. 1 or 2 two-hour activities. Prerequisite: ART 244. May be repeated for a total of 3 units.

ART 400 Special Problems in Art (1-2)

Individual or group investigation, research, studies, or surveys of selected problems. 1 or 2 three-hour laboratories. Prerequisite: Senior standing or consent of instructor. Total credit limited to 4 units with maximum of 2 units per quarter.

ART 439 Advanced Painting (3)

Group and individual projects requiring solution in terms of established art principles and applied art theory. Traditional and experimental approach with the emphasis on individual development. 3 two-hour activities. Prerequisite: ART 247 or 249 or permission of instructor.

ART 446 Advanced Drawing (1-2)

Development of individual concepts and styles through projects involving experimental and traditional drawing methods and media. 1 or 2 two-hour activities. Prerequisite: ART 345. May be repeated for a total of 3 units.

Audio-Visual Techniques

AV 400 Special Problems for Advanced Undergraduates (1-2)

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

AV 440 Educational Television Production Workshop (4)

Theory and practice of educational television with emphasis on practical experience in the various aspects of production; planning, writing, graphics, directing, and studio operations. 2 lectures, 2 three-hour laboratories. May be repeated for a total of 12 units.

AV 441 Automated Instructional Procedures (3)

Automated instructional materials. Theory of programmed learning, current applications, and the state of the art. Laboratory experiences include evaluation and testing of existing programs and machines, construction of sample materials by the student. 1 lecture, 2 two-hour activities.

PHYSICAL EDUCATION DEPARTMENT

Donald E. Warhurst, *Acting Chairman*
V. Barney Anooshian
James Bell
Donald R. Bethe
Kenneth H. Cochrane
Raymond C. Daugherty
Lynne Emery
Barbara H. Ford
Jack Frost
Diana M. Gallardo
Otto F. Gasser
Donald L. Halderman
Robert F. Hand
Leon S. Jackson
Dorothy L. Kiefer
Jessie I. Klinger
Frank D. Lansford
Gregory H. Marks
Daniel E. Peterson
Thomas A. Rupp
John H. Scolinos
Robert B. Stull
Magnus Syverson

Two curricular options, Physical Education and Recreation, are available to students majoring in Physical Education.

The department prepares both men and women for secondary teaching in the fields of physical education, health, safety education, and driver training. By proper selection of elective courses, the student can also prepare for work in recreation and in social work.

The department curriculum provides for students desiring a physical education teaching major and minor in the secondary school and a minor in the elementary school.

The department also provides required and elective courses in physical education and health to meet the general education needs of all students and operates an intramural sports program and the intercollegiate athletic programs.

Curriculum in Physical Education

Freshman	*F*	*W*	*S*
Freshman Composition (ENG 104, 105, 106)	3	3	3
Basic Mathematics (MAT 101)		3	
Health Education (PE 107)			2
Safety and First Aid (PE 121)		2	
Physical Education (PE 141)	½	½	½
Introduction to Recreation (PE 126)	3		
Swimming and Water Sports, Theory and Practice (PE 123)			2
Basic Biology (BIO 115)		3	
Basic Biology Laboratory (BIO 145)			2
Fundamentals of Earth Science (PSC 101)	4		
Fundamentals of Physics (PHY 102)		4	
Fundamentals of Chemistry (CHM 103)			4
Introduction to Dance (PE 124)	3		
*Techniques and Skills of Weight Training, Soccer and Badminton (PE 157) (M)	3		
*Analysis of Tennis and Volleyball (PE 147) (W)	1		
*Analysis of Basketball and Badminton (PE 148) (W)		1	
*Analysis of Soccer and Swimming (PE 149) (W)			1

*Alternative requirements for men and women.

	F	W	S
Electives and courses to complete major (M)		1	3
Electives and courses to complete major (W)	2		2
	16½	16½	16½

Sophomore

†Literature	3		
†Literature, Philosophy, Art or Music		3	3
Principles of Economics (EC 201, 202)	3	3	
Principles of Physical Education (PE 201)	3		
Public Speaking (SP 200)	3		
Human Anatomy (ZOO 234)		4	
Human Physiology (ZOO 235)			4
Physical Education (PE 141)	½	½	½
General Psychology (PSY 202)			3
*Techniques and Skills of Tumbling, Apparatus and Volleyball (PE 257) (M)		3	
*Analysis of Archery and Gymnastics (PE 247) (W)	1		
*Analysis of Field Hockey and Golf (PE 248) (W)		1	
*Analysis of Softball and Track and Field (PE 249) (W)			1
Electives and courses to complete major (M)	4	3	6
Electives and courses to complete major (W)	3	5	5
	16½	16½	16½

Junior

American Civilization (AMC 301, 302, 303)	3	3	3
Health Science (PE 313)			3
Direction of Physical Education Activity (PE 341)	1		
Motor Learning and Human Performance (PE 322)			3
*Techniques and Skills of Wrestling, Golf, Tennis (PE 357) (M)			3
*Officiating (PE 337 or 338 or 339) (M)		2	
*Turf Management (PA 333) (M)	3		
*Individual Sports Theory (PE 324) (W)	3		
*Basketball and Volleyball Theory (PE 325) (W)		3	
Electives and courses to complete major (M)	10	12	5
Electives and courses to complete major (W)	10	11	8
	17	17	17

Senior

Senior Project (PE 461, 462)	2	2	
Undergraduate Seminar (PE 463)			2
Adaptive Physical Education (PE 406)			4
*Social Dance Theory (PE 446) (W)	2		
*Folk and Square Dance Theory (PE 447) (W)		2	
*Modern Dance Theory (PE 448) (W)			2
*Care and Management of Athletic Equipment (PE 418) (M)	3		
Electives and courses to complete major (M)	11	14	10
Electives and courses to complete major (W)	12	12	8
	16	16	16

†To be selected from the General Education list.
*Alternative requirements for men and women.

Curricular Options

Physical Education

This option emphasizes the skills and knowledge required for the Standard Teaching Credential with Secondary Specialization.

Courses to complete major

Sophomore

FN 205—Nutrition and Physical Activity ..... (3)
PE 225—Gymnastics Theory (M) (3)
PE 232—Intramural Sports ..... (3)

Junior

PE 302—Kinesiology ..... (4)
PE 303—Physiology of Exercise (4)
PE 342, 343—Direction of Physical Education Activity ..... (2)
*PE 326—Field Sports Theory (W) ..... (3)
*PE 321—Football Theory (M) .. (3)
*PE 323—Baseball Theory (M) .. (3)
*PE 333—Track and Field Theory (M) ..... (3)

Senior

PE 425—Tests and Measurements in Physical Education .. (3)
PE 432—Athletic Training and Massage ..... (3)
*PE 422—Basketball Theory (M) (3)
*PE 333—Track and Field Theory (W) ..... (3)
*PE 225—Gymnastics Theory (W) ..... (3)

Recreation

Emphasis is placed upon skills required for employment in public, industrial, and commercial recreational programs.

Courses to complete major

Freshman

ART 135—Craft Materials and Skills ..... (3)

Sophomore

SOC 201, 202—Principles of Sociology ..... (6)
PE 222—Recreational Games ..... (2)
PE 224—Administration of Recreation ..... (3)
PE 245—Advanced Swimming and Lifesaving ..... (2)

Junior

PE 300—Safety Education ..... (3)
PE 301—Introduction to Special Services in Recreation ..... (3)
PE 316—Social and Outdoor Education ..... (3)
PE 328—Pre-adolescent Movement Patterns (W) ..... (3)

Senior

PE 400—Special Problems for Advanced Undergraduates ..... (2)
PE 423—Field Work in Recreation ..... (4)

Description of Courses

PE 107 Health Education (2)

Personal hygiene and health education; investigation of the principles which promote attitudes and practices for optimum physical and mental health. Fire prevention and public safety; alcohol and drugs. 2 lectures.

PE 121 Safety and First Aid (2)

A standard American Red Cross first aid course. Instruction and practice in the immediate and temporary care of injuries and sudden illness. 1 lecture, 1 two-hour activity.

* Alternative requirements for men and women.

PE 123 Swimming and Water Sports Theory and Practice (2)

Supervision of pool activities. Swimming instruction and safety. Teaching and coaching swimming and water polo. 1 lecture, 1 two-hour activity. Prerequisite: Demonstrated swimming ability.

PE 124 Introduction to Dance (3)

Fundamental knowledge and skills in dance, including rhythm analysis and social recreation dance. 1 lecture, 2 two-hour activities.

PE 126 Introduction to Recreation (3)

Games and activities suitable for a community recreation program. 1 lecture, 2 two-hour activities.

PE 141 Physical Education (½)

Activities involving areas of physical fitness, aquatics, dance, individual and team sports and recreational approaches to sport with an emphasis on the development of understanding the interaction of physical and social aspects of activity within our culture. Prerequisite: Physical fitness for men and fundamental movement for women are prerequisite to other activity sections. 2 activity periods.

PE 142 Adaptive Activities (½)

Group and individual exercise based upon individual needs in posture, body mechanics, nutrition, post-injury and illness, and cardiac cases. Course taken in lieu of PE 141 upon recommendation of college physician. 2 activity periods. Total credit limited to 3 units.

PE 147 Analysis of Tennis and Volleyball (1) (W)

Analysis of strategy and skill of tennis and volleyball with application of principles of movement. 4 one-hour activity periods.

PE 148 Analysis of Basketball and Badminton (1) (W)

Analysis of strategy and skill of basketball and badminton with application of principles of movement. 4 one-hour activity periods.

PE 149 Analysis of Soccer and Swimming (1) (W)

Analysis of strategy and skill of soccer and swimming with application of principles of movement. 4 one-hour activity periods.

PE 151 Competitive Athletics (1)

May be substituted for required physical training by those qualified to compete in intercollegiate sports program. 10 hours activity. Total credit limited to 6 units.

PE 154 Dance Production (1)

Intermediate and advanced dance technique with an emphasis on composition and production in the area of dance, free exercise, gymnastics, etc. May be substituted for PE 141 by students talented in exhibition activities. 10 hours activity. Total credit limited to 6 units.

PE 157 Techniques and Skills of Weight Training, Soccer and Badminton (3) (M)

An examination of techniques and skills of weight training, soccer, and badminton with application to professional needs. 6 one-hour activity periods.

PE 201 Principles of Physical Education (3)

Orientation, history and concept of physical education as a profession. 3 lectures.

PE 221 Wrestling Theory (3)

Analysis of strategy and skill of wrestling with application of principles. 2 lectures, 1 two-hour activity.

PE 222 Recreational Games (2)

Development of a repertoire of group and individual quiet games for use by people confined to small areas. 1 lecture, 1 two-hour activity.

PE 224 Administration of Recreation (3)

Supervision and administration of recreation with consideration of facilities, budget, equipment maintenance, public relations, and special activities.

2 lectures, 1 two-hour activity. Prerequisite: PE 126

PE 225 Gymnastics Theory (3)

Analysis of strategy and skill of gymnastics with application of principles. 2 lectures, 1 two-hour activity. Prerequisite: PE 141 (Gymnastics)

PE 231 Skin and SCUBA Diving (3)

Use of SCUBA apparatus and its application in the underwater environment. Completion of this course leads to certification in SCUBA diving. 2 lectures, 1 two-hour activity. Prerequisite: Consent of instructor.

PE 232 Intramural Sports (3)

Principles and policies underlying programs of intramural sports in schools and community centers. 2 lectures, 1 two-hour activity.

PE 235 Analysis of Water Polo (3) (M)

Analysis of strategy and skill of water polo with application of principles. 2 lectures, 1 two-hour activity.

PE 245 Advanced Swimming and Lifesaving (2)

Lifesaving techniques. The Senior Red Cross Life Saving and the Water Safety Instructor's certificates will be issued to those students who qualify. 1 lecture, 1 two-hour activity.

PE 247 Analysis of Archery and Gymnastics (1) (W)

Analysis of strategy and skill of archery and gymnastics with application of principles of movement. 4 one-hour activity periods.

PE 248 Analysis of Field Hockey and Golf (1) (W)

Analysis of strategy and skill of field hockey and golf with application of principles. 4 one-hour activity periods.

PE 249 Analysis of Softball and Track and Field (1) (W)

Analysis of strategy and skill of softball and track and field with application of principles. 4 one-hour activity periods.

PE 257 Techniques and Skills of Tumbling, Apparatus and Volleyball (3) (M)

An examination of techniques and skills of tumbling, apparatus and volleyball with application of professional needs. 6 one-hour activity periods.

PE 300 Safety Education (3)

Principles and practices of safety as applied to home, fire, industrial, school, community, and traffic situations. Accident prevention. 3 lectures.

PE 301 Special Services in Recreation (3)

Orientation to field of hospital recreation, employee's recreation, commercial recreation, and industrial recreation. 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 movements for the analysis and evaluation of selected physical education activities. 3 lectures, 1 two-hour activity. Prerequisite: ZOO 235 and consent of instructor.

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. 4 lectures. Prerequisite: PE 302

PE 310 Philosophy of Physical Education (3)

The nature, significance and development of sport and physical education and its place in human society as related to the major philosophical systems. 3 lectures.

PE 312 Physical and Psychological Development (3)

Principles and background concerning the interaction of psychological and physical development. Implications for physical education and so-

cial-emotional development. 3 lectures. Prerequisite: PE 107, PSY 202

PE 313 Health Science (3)

Advanced scientific background in the essential elements of the physiological functioning of the normal, healthy human body. 2 lectures, 1 two-hour activity. Prerequisite: PE 107

PE 316 Social and Outdoor Education (3)

Techniques in the development of leadership for recreational activities particularly as applied to outdoor camping. Social development and integration of individuals into group programs. 3 lectures.

PE 320 Driver Education and Driver Training (3)

Recommended procedures used in training drivers of high school ages. Attitudes and practices. 3 lectures. Prerequisite: PE 300

PE 321 Football Theory (3) (M)

Analysis of strategy and skill in football with application of principles. 2 lectures, 1 two-hour activity.

PE 322 Motor Learning and Human Performance (3)

Scientific background in the essential elements of perceptual and motor learning with an emphasis on developmental phases and implications for physical education and sports training. 3 lectures. Prerequisite: PE 302, PSY 202

PE 323 Baseball Theory (3) (M)

Analysis of strategy and skill in baseball with application of principles. 2 lectures, 1 two-hour activity.

PE 324 Individual Sports Theory (3) (W)

The advanced analysis of golf, tennis, badminton and archery with an emphasis on the application to patterns of motor learning. 2 lectures, 1 two-hour activity.

PE 325 Basketball and Volleyball Theory (3) (W)

The advanced analysis of basketball and volleyball with an emphasis on the application to patterns of motor learning. 2 lectures, 1 two-hour activity.

PE 326 Field Sports Theory (3) (W)

The advanced analysis of field sports with an emphasis on the application to patterns of motor learning. 2 lectures, 1 two-hour activity.

PE 328 Developmental Movement for Children (3)

Analysis and practice of basic skill movements used in rhythms, sports, and gymnastics. 2 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 (2)

Analysis of principles and techniques of officiating sports in season (football, soccer, water polo and women's activities). 1 lecture, 1 two-hour activity.

PE 338 Officiating (2)

Analysis of principles and techniques of officiating sports in season (basketball, gymnastics, swimming and women's activities). 1 lecture, 1 two-hour activity.

PE 339 Officiating (2)

Analysis of principles and techniques of officiating sports in season (baseball, track and field, wrestling and women's activities). 1 lecture, 1 two-hour activity.

PE 341, 342, 343 Direction of Physical Education Activity (1) (1) (1)

Required of all majors in physical education. Experience in the supervision of physical education classes under the direction of the faculty. 2 one-hour periods.

PE 344 Driver and Traffic Safety Education (3)

Methods, materials, and resources for effective teaching of driver instruction in secondary schools. Includes behind-the-wheel experience in teaching beginners to drive. 2 lectures, 1 two-hour activity.

PE 355 Driving Simulators (4)

Operation, preventive maintenance, and teaching techniques of simulators. Includes experience in teaching and coordinating classroom and simulator/dual-control car programs. 3 lectures, 1 two-hour activity.

PE 357 Techniques and Skills of Wrestling, Golf and Tennis (3) (M)

An examination of techniques of wrestling, golf and tennis with application of professional needs. 6 one-hour activity periods.

PE 400 Special Problems for Advanced Undergraduates (1-2)

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

PE 406 Adaptive Physical Education (4)

Growth and development patterns; their relation to special and regular physical education programs; needs and methods for administering a recreation program for the handicapped. Analysis of postural divergencies and procedures for prevention and correction. 4 lectures. Prerequisite: PE 303

PE 411 Administration of Traffic Safety Programs (3)

Principles and practices of administering secondary school driver instruction programs. Includes legal aspects of driver education and driver training. 3 lectures. Prerequisite: PE 300 and 320

PE 418 Care and Management of Athletic Equipment (3) (M)

The planning, budgeting, purchasing, care and maintenance of all equipment, outdoor activity areas, and the physical plants. 2 lectures, 1 two-hour activity.

PE 422 Basketball Theory (3) (M)

Analysis of strategy and skill in basketball with application of principles. 2 lectures, 1 two-hour activity.

PE 423 Field Work in Recreation (4)

Observation and participation in a community or industrial recreation program, 1 lecture, 3 two-hour activities. Prerequisite: Senior standing, PE 224 or departmental approval.

PE 425 Tests and Measurements in Physical Education (3)

Physical tests of skill, strength, speed, agility and endurance as a measurement of self and group progress in achieving physical efficiency. 2 lectures, 1 two-hour activity.

PE 426 Instrumentation and Research Measurement (3)

Instrumentation procedures, experimental design and analysis of factors relating to human performance. 2 lectures, 1 two-hour activity. Prerequisite: PE 425

PE 427 Advanced Analysis and Theory of Sports (3)

Advanced analysis of strategy and skills in basketball, football, baseball, or track and field. 2 lectures, 1 two-hour activity. Prerequisite: Satisfactory completion of the appropriate basic analysis course; one year of intercollegiate experience, or permission of instructor.

PE 432 Athletic Training and Massage (3)

Prevention, examination, and care of athletic injuries, methods of taping, bandaging, and therapeutic exercises applied to athletic injuries, diets, training room equipment, protective devices, and supplies. 2 lectures, 1 two-hour activity.

PE 446 Social Dance Theory (2)

The advanced analysis of social dance with an emphasis on the application to the patterns of motor learning. 1 lecture, 1 two-hour activity. Prerequisite: PE 334

PE 447 Folk and Square Dance Theory (2)

The advanced analysis of folk and square dance with an emphasis on the application to the patterns of motor

learning. 1 lecture, 1 two-hour activity. Prerequisite: PE 334

PE 448 Modern Dance Theory (2)

The advanced analysis of modern dance with an emphasis on the application to the patterns of motor learning. 1 lecture, 1 two-hour activity. Prerequisite: PE 334

PE 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.

PE 463 Undergraduate Seminar (2)

Discussion of new developments in recreation, health, and physical education. 2 lectures.

PE 650 Seminar in Physical and Health Education (1-3)

Special problems in selected areas of health education and physical education. 1 to 3 lecture-discussions. Prerequisite: Graduate standing. Maximum of nine units credit may be earned.

POLITICAL SCIENCE DEPARTMENT

Gerald Rigby, *Chairman*
George P. Hart
Ronald M. Peterson
Bruce E. Wilson

The Political Science department serves all segments of the college community. It provides courses in general education which aim to develop mature and informed citizens; it provides courses for those who wish to make their life work some activity in the public sector; it provides 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. Concentrations in Political Science and Public Administration may be elected in this major. The major prepares students for careers in which knowledge of politics and public affairs is required. Careers include school teaching, administrative 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 college in a rapidly growing population complex 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.

Curriculum in Political Science

Freshman	*F*	*W*	*S*
History of Civilization (HST 101, 102, 103)	4	4	4
Freshman Composition (ENG 104, 105, 106)	3	3	3
Health Education (PE 107)		2	
Physical Education (PE 141)	½	½	½
Descriptive Statistics (MAT 107)			3
†Mathematics	3		
Logic and Semantics (PHL 202)		3	
*Electives and courses to complete major	5	3	6
	15½	15½	16½

*To complete the major in Political Science, a student must complete a specialization in either Political Science or Public Administration. Courses are to be selected with approval of the adviser.
†To be selected from the General Education list.

Sophomore	*F*	*W*	*S*
United States History (HST 201, 202)	4	4	
American Government (PLS 221, 222)	4	4	
California State and Local Government (PLS 223)			4
Principles of Economics (EC 201, 202)	3	3	
Public Finance (EC 301)			4
General Psychology (PSY 202, 203)	3	3	
†Natural Sciences	3	3	6
Physical Education (PE 141)	½	½	½
*Electives and courses to complete major			1
	17½	17½	15½

Junior			
Public Speaking (SP 200)			3
Principles of Sociology (SOC 201, 202, 203) or Principles of Anthropology (ANT 201, 202, 203)	3	3	3
Constitutional Law (PLS 401)	4		
†Natural Sciences		3	
†Literature		3	
*Electives and courses to complete major	8	6	9
	15	15	15

Senior			
Senior Project (PLS 461, 462)	2	2	
Undergraduate Seminar (PLS 463)		2	
Sociology, Anthropology or Psychology (300–400 level)		4	4
†Literature	3		
*Electives and courses to complete major	10	6	10
	15	14	14

Political Science

PLS 101 Principles of Government: Political Institutions (4)

A comparative study of political and governmental institutions. The relevance of primary social groups—the family, social classes, occupational units, religious groups—to political behavior. 4 lecture-discussions.

PLS 102 Principles of Government: Political Ideologies (4)

Analysis of the relevance of ideologies and political myths to political institutions. The importance of basic concepts of legitimacy, obligation, right, the individual and the state to the study of government. 4 lecture-discussions. Prerequisite: PLS 101

PLS 203 Principles of Government: Political Inquiry (4)

Introduction to the principal methods and concepts used to analyze governmental institutions and political behavior. 4 lecture-discussions. Prerequisite: PLS 102

PLS 221, 222 American Government (4) (4)

Introduction to American political institutions and behavior. Emphasis on national government and federal

*To complete the major in Political Science, a student must complete a specialization in either Political Science or Public Administration. Courses are to be selected with approval of the adviser.

†To be selected from the General Education list.

system, distribution of powers and intergovernmental relations. 4 lectures. Meets state requirement in U.S. Constitution. Must be taken in sequence.

PLS 223 California State and Local Government (4)

The structure, function and problems of state, county, municipal, and district governments. 4 lecture-discussions. Prerequisite: PLS 222

PLS 304 Government and Politics (4)

Governmental and political institutions, political ideologies and myths, concepts of political rights and obligations, basic approaches to the study of governmental and political phenomena. 4 lecture-discussions.

PLS 314 Public Administration (4)

Structure and 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 lectures. Prerequisite: PLS 103 and 223 or AMC 302

PLS 315 Public 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 problems of making public policy responsive to democratic control. 4 lectures. Prerequisite: PLS 103 and 223 or AMC 302

PLS 316 Public Administration (4)

Characteristics of bureaucracies with special attention to the functioning of bureaucracy as a social and political institution. Concepts of administrative behavior in bureaucracies such as decision-making, leadership, and control. 4 lectures. Prerequisite: PLS 103 and 223 or AMC 302

PLS 321 Comparative State Governments (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 103 and 223 or AMC 302

PLS 322 Local and Metropolitan Governments (4)

Forms, structures, and functions of local and metropolitan government and politics. The modern urban problems and the role of local, state and national governments in meeting these problems. 4 lecture-discussions. Prerequisite: PLS 103 and 223 or AMC 302

PLS 324 Political Parties (4)

Nature and function of American political parties: party organization, political campaigns and elections. 4 lecture-discussions. Prerequisite: PLS 103 and 223 or AMC 302

PLS 325 Pressure Groups (4)

The nature and function of organized interest groups and their impact on government activity and programs. 4 lecture-discussions. Prerequisite: PLS 103 and 223 or AMC 302

PLS 341 Comparative Governments I (4)

Typical governments of industrial countries. Emphasis on governmental structures and functions, political processes and their relationship to current problems. 4 lecture-discussions. Prerequisite: PLS 103 and 223 or AMC 302

PLS 342 Comparative Governments II (4)

Selected non-industrialized countries committed to policies of industrialization. Emphasis of governmental structures and functions, political processes and their relationship to current problems. Special attention to importance of underdevelopment to mode of government. 4 lecture-discussions. Prerequisite: PLS 103 and 223 or AMC 302

PLS 401 Constitutional Law (4)

Analytical introduction to judicial processes, with emphasis on constitu-

tional law. Exposition of significant court decisions affecting civil rights, citizenship, federal system, police power, commerce and general welfare. 4 lecture-discussions. Prerequisite: PLS 221 and 222 and senior standing, or permission of instructor.

PLS 403 Political Science Methodology (4)

Concepts, approaches, and methods of research applicable to political phenomena. Designed to familiarize the student with the tools and potentialities of social research techniques and to assist him in the presentation, interpretation, and application of research studies. 4 lecture-discussions. Prerequisite: PLS 103 and 223 or AMC 302, and MAT 107

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. Attention to selected aspects of public revenues, expenditures, debt, and fund accounting. 4 lecture-discussions. Prerequisite: PLS 103, 223, 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; attention to recruiting, training, promotion, and control of government personnel. 4 lecture-discussions. Prerequisite: PLS 103, 223, 314

PLS 431, 432, 433 Political Thought (4) (4) (4)

Major political philosophies from the time of ancient Hellas to the present, an analysis of the transition from classical to modern theory. Investigation of specific concepts common to all political philosophy, e.g., the state, right, natural law, and legitimacy. 4 lectures.

PLS 452 International Organizations (4)

Description and analysis of administration, functioning, and organization of various transnational organizations, including nongovernmental. Discussion of U.S. participation. 4 lecture-discussions. Prerequisite: PLS 103 and 223 or AMC 302

PLS 453 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 103 and 223 or AMC 302 and permission of instructor.

PLS 454 Inter-American Relations (4)

Inter-American affairs. Political, economic, and social problems. Forces motivating cultural behavior, industrial development, trade techniques, agricultural methods. 4 lecture-discussions. Prerequisite: Junior standing or permission of instructor.

PLS 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.

PLS 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.

PLS 471, 472 Field Work in Government (3) (3)

Placement in governmental agencies for an introduction to practical application of techniques of administrative analysis and general academic training. Written report and evaluation of experience required. 1 lecture, 8 hours per week in agency assignment. Prerequisite: PLS 316

SOCIAL SCIENCES DEPARTMENT

Donald H. Pflueger, *Chairman*
Charles W. Ackley
Kenneth L. Beauchamp
Thomas C. Blackburn
Stanley Cohen
Gary A. Cretser
Ben S. Gantz
George B. Jenkins
Louis J. King
Marcia E. Lasswell
David G. Lord
William Martin
Forrest L. McElhoe
Joseph L. Philbrick
Richard C. Richards
Floyd Ross
Robert M. Schwieder
Donald Shupe
Gail G. Wickstrom

The Social Sciences department offers majors in Social Science, and Social Services.

Three options—Social Sciences, Economics, and Social Services—are available to students in the Social Science major. The choice of option will depend upon the student's professional objective.

A broad background of general education emphasizing the behavioral sciences is found in the Social Services curriculum. A two-year internship is required of students beginning their junior year. This field program is developed to provide the opportunity to observe and utilize the techniques learned in the classroom in a practical social laboratory. Students work directly under the supervision of social service professionals in the fields of education, juvenile and adult probation, parole and corrections, social welfare, and family and child services.

The department also coordinates the offerings in American Civilization, courses required of all students, and offers courses in anthropology, geography, library science, philosophy, psychology, and sociology. This broad spectrum of courses is important in the general education of all students, helping them to grasp the significance of the major problems of today's world.

Curriculum in Social Sciences

Freshman	*F*	*W*	*S*
Principles of Sociology (SOC 201, 202, 203) or Principles of Anthropology (ANT 201, 202, 203)	3	3	3
History of Civilization (HST 101, 102, 103)	4	4	4
Freshman Composition (ENG 104, 105, 106)	3	3	3
Physical Education (PE 141)	½	½	½
†Mathematics		3	
Health Education (PE 107)	2		
Electives and courses to complete major	4	3	6
	16½	16½	16½
Sophomore			
General Psychology I (PSY 202)	3		
Principles of Economics (EC 201, 202, 203)	3	3	3
American Government (PLS 221, 222)	4	4	
Physical Education (PE 141)	½	½	½
†Natural Sciences	3		3
United States History (HST 201, 202)	4	4	
Electives and courses to complete major		5	10
	17½	16½	16½
Junior			
†Natural Sciences	3	3	3
†Humanities	3	3	3
Introduction to Philosophy (PHL 201)	3		
Electives and courses to complete major	8	11	10
	17	17	16
Senior			
Senior Project (SSC 461, 462)	2	2	
Undergraduate Seminar (SSC 463)		2	
Social Psychology (PSY 401) or Contemporary Social Problems (SOC 301)			3
California State and Local Government (PLS 223)			4
Public Speaking (SP 200)		3	
Electives and courses to complete major	14	9	9
	16	16	16

Curricular Options

Economics

The Economics option offers a degree of specialization in economics slanted toward the social sciences.

Courses to complete major

Sophomore

EC 300—Development of Economic Doctrine (4)

MAT 107—Descriptive Statistics (3)

ACC 124—Principles of Accounting (4)

Junior

EC 311, 312—Price and Income Analysis (8)

EC 308—Money and Banking (4)

Senior

EC 403—Comparative Economic Systems (4)

EC 303-419—Economic Electives (12)

†To be selected from the General Education list.

Social Sciences

The Social Sciences option is interdisciplinary in nature and is recommended for those students preparing to qualify for elementary teaching as well as for those who seek a broad background in preparation for careers in business, industry, and government.

Courses to complete major

Sophomore

PSY 203, 204—General Psychology II, III ..... (6)
Indians of California (ANT 207) (4)

Junior

GEO 101, 102, 103—Principles of Geography ..... (12)
HST 342—History of California (4)
HST 324—Europe in the 20th Century ..... (4)

Senior

SOC 401—Urban Sociology ..... (3)
HST 420—History of the Soviet Area ..... (4)

Social Services

The Social Services option is tailored to meet the needs of those seeking careers in social work or who intend to do advanced work in the field of the behavioral sciences.

Courses to complete major

Sophomore

ENG 216—Report Writing ..... (3)

Junior

ANT 311—Culture and Personality ..... (3)
PSY 415—Abnormal Psychology ..... (3)
SOC 401—Urban Sociology ..... (3)
SSV 321, 322, 323—Social Welfare Practice ..... (9)

Senior

SSV 421, 422, 423—Advanced Social Welfare Practice ..... (9)
PSY 314—Human Relations ..... (3)
SOC 206—Family Relations ..... (3)
PSY 306—Adolescent Psychology ..... (3)

Curriculum in Social Services

Freshman	*F*	*W*	*S*
Freshman Composition (ENG 104, 105, 106)	3	3	3
Health Education (PE 107)	2		
Physical Education (PE 141)	½	½	½
History of Civilization (HST 101)	4		
United States History (HST 201, 202))		4	4
Principles of Sociology (SOC 201, 202, 203)	3	3	3
†Mathematics			3
†Natural Sciences		3	3
†Humanities	3		
Electives		4	
	15½	17½	16½

Sophomore			
Principles of Economics (EC 201, 202)	3	3	
Introduction to Philosophy (PHL 201)			3
Principles of Anthropology (ANT 201, 202, 203)	3	3	3
Introduction to Social Welfare (SSV 200)	3		
General Psychology (PSY 202)		3	
American Government (PLS 221, 222)		4	4
Physical Education (PE 141)	½	½	½
Contemporary Treatment of Law Violators (SSV 218)	3		
†Natural Sciences	3		3
†Humanities			3
Electives	1	4	1
	16½	17½	17½

†To be selected from the General Education list.

Junior	*F*	*W*	*S*
Public Speaking (SP 200)	3		
Case Recording Methods and Techniques (SSV 204)	2		
Adolescent Psychology (PSY 306)			3
Culture and Personality (ANT 311)	3		
Social Anthropology (ANT 312)			3
Economics of Social Welfare (EC 313)		4	
Human Relations I (PSY 314)		3	
†Natural Sciences			3
†Humanities		3	
Social Welfare Practice (SSV 321, 322, 323)	3	3	3
Electives	4	3	5
	15	16	17

Senior			
Senior Project (SSV 461, 462)	2	2	
Undergraduate Seminar (SSV 463)			2
Human Relations II (PSY 315)		3	
Social Psychology (PSY 401) or Contemporary Social Problems (SOC 301)		3	
Urban Sociology (SOC 401)	3		
Abnormal Psychology (PSY 415)	3		
Advanced Social Welfare Practice (SSV 421, 422, 423)	3	3	3
Electives	6	6	10
	17	17	15

† To be selected from the General Education list.

Description of Courses

American Civilization

AMC 301, 302, 303 American Civilization (3) (3) (3)

An analysis of American civilization with emphasis on the social, political, and economic ideas and practices which have moulded the unique American character; emphasis on American government, American ideals, and the United States and the contemporary world. Courses to be taken in sequence. 3 lectures.

Anthropology

ANT 201, 202, 203 Principles of Anthropology (3) (3) (3)

Physical, cultural and social anthropology; human evolution and heredity; racial classification; the nature of culture; cultural phenomena; comparative social organization; religion and value systems of non-literate and folk peoples; culture and psychological processes in the development of personality. 3 lectures.

ANT 207 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 202, 203

ANT 311 Culture and Personality (3)

Relations of variations in culture to personality development in different societies. Comparative study of the interrelationships of cultural milieu, social field, and individual psychological variability. Modern personality theories in cross-cultural perspective. 3 lectures. Prerequisite: ANT 203 and PSY 203 or permission of instructor.

ANT 312 Social Anthropology (3)

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. 3 lectures. Prerequisite: ANT 203

ANT 314 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 202, 203 and EC 201

ANT 315 Policital 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 202, 203

Geography

GEO 101, 102, 103 Principles of Geography (4) (4) (4)

Basic principles of physical, cultural and political geography. Significance of distribution patterns with reference to their effect on man's activities. 3 lectures. 1 two-hour activity.

GEO 312 Economic Geography and World Resources (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 throughout the world. 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 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 given to relationship of current California problems to their geographical causes. 4 lectures.

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 358 Geography of Sub-Sahara Africa (4)

Physical, cultural, and regional patterns of the nations south of the Sahara Desert in Africa. Emphasis on development patterns of the new countries in Africa. 4 lecture-discussions.

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.

LIB 331 Library Techniques for Teachers (3)

Current school library practices. The organization and the administration of school libraries; review of the sources of teacher's materials. 3 lectures.

Philosophy

PHL 201 Introduction of Philosophy (3)

A study of the purposes and meaning of philosophy for intelligent living. The study of philosophic methods and a study by philosophic method of issues traditional to philosophy and their relevance to contemporary living. A study of the methods, values and theories of ancient to modern philosophical systems through a problem approach. 3 lectures.

PHL 202 Logic and Semantics (3)

Inductive and deductive processes in reasoning and how semantic considerations affect general reasoning and communication. Emphasis on detection and avoidance of logical and semantic errors. 3 lectures.

PHL 204 Ethics (3)

The implications of ethics and ethical systems. The meaning of right and wrong. Sanctions and sources of morality. Inquiry into the principles of the morality of human actions. The ethical foundations of personal and social relations. 3 lectures.

PHL 211, 212, 213 History of Philosophy (3) (3) (3)

Examination of the great philosophical ideas of the world from ancient times to the present. 3 lectures.

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 (3)

Living religions of the world, beginning with primitive types and surveying Hinduism, Jainism, Buddhism, Confucianism, Taoism, Shintoism, Zoroastrianism, Islam, Judaism, and Christianity; men, movements and ideas, with particular reference to the ferment of the 20th century. 3 lectures.

PHL 310 Philosophy of Justice (4)

Dissent and private conscience in conflict with the claims of order and stability in a democratic society. Evaluation of the nature of liberty, law and justice, and the institutions developed to sustain them. 4 lecture-discussions. Prerequisite: PHL 201

Psychology

PSY 202 General Psychology I (3)

Basic concepts, methods, and vocabulary of psychology with emphasis upon human behavior as an object of scientific study. 3 lectures.

PSY 203 General Psychology II (3)

Critical consideration of the many methods used to analyze and guide behavior. Emphasis on the application of the basic principles to individual differences in social learning and thinking. 3 lectures.

PSY 204 General Psychology III (3)

The general problems, methodology, and principles of psychology, with emphasis upon sensory functions, perception, motivation, and social interaction;

elements of physiological psychology and statistical methods in psychological experimentation. 2 lectures, 1 two-hour activity. Prerequisite: PSY 202

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 305 Child Growth and Development (3)

Developmental aspects of the physical, social, emotional, and intellectual growth of the child from birth to adolescence. Focus on child as a person and emphasis on the awareness of self, at various ages, in relation to the world and environment. 3 lectures. Prerequisite: PSY 202

PSY 306 Adolescent Psychology (3)

Physical, social, emotional, and intellectual growth of the adolescent. Emphasis upon personality formation, social adjustment, and the problem of self-identity. 3 lectures. Prerequisite: PSY 202

PSY 312 Educational Psychology (3)

Psychological principles of the learning process and mental hygiene at the elementary and secondary levels. Emphasis upon learning and the motivation of the learner. 3 lectures. Prerequisite: PSY 202

PSY 314 Human Relations I (3)

The problems of human relations, specifically in group situations as observed on the job. 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. 2 lectures, 1 two-hour activity. Prequisite: PSY 202

PSY 315 Human Relations II (3)

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. 2 lectures, 1 two-hour activity. Prerequisite: PSY 202 and 314

PSY 321 The Psychology of Identity (4)

Psychological aspects of conflict, isolation, assimilation and assignation; the psychology of prejudices and discrimination; the psychological factors in minority group leadership, group membership identity and group membership consciousness. 4 lectures.

PSY 332 Industrial and Personnel Psychology (4)

A survey of applications of psychology to selection and motivation of employees; to work and efficiency; morale, fatigue and job safety. The course teaches the application of psychological principles to man as part of the man-machine system including multiple sensory input (sound-sight, etc.) for learning and motivation. 3 lectures, 1 two-hour activity.

PSY 401 Social Psychology (3)

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 controls, leadership. 3 lectures. Prerequisite: PSY 202 or permission of instructor.

PSY 415 Abnormal Psychology (3)

The causes, description, and treatment of the extremes of human behavior. Emphasis on an integrated analysis from a psycho-social viewpoint. 3 lectures. Prerequisite: PSY 204

Social Science

SSC 100 Contemporary Issues (2)

Development of insight into contemporary problems; integration of subject matter of traditional courses and the relevance of higher education to today's world. 2 two-hour activities. An experimental course limited to freshman students by invitation.

SSC 251, 252, 253 Laboratory in Group Activities (1) (1) (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 400 Special Problems for Advanced Undergraduates (1-2)

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

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. Project results are presented in a formal report. 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 650 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. 1-3 lectures. Prerequisite: Graduate standing. May be repeated for maximum of 9 units.

Social Services

SSV 200 Introduction to Social Welfare (3)

History and development of social welfare; development and philosophy of social welfare programs and social welfare trends, the Social Security program, and current programs of assistance to the disadvantaged. Prerequisite for all major courses in social welfare. 3 lectures.

SSV 204 Case Recording Methods and Techniques (2)

The observation, selection, evaluation and recordation of information necessary to effect a case history from which a diagnosis and plan of treatment within the structure of a social agency or program can be determined. Emphasis is on improving the capacity of observation and evaluation and presenting the results in a manner consistent with accepted rules of grammar and our position. 1 lecture, 1 two-hour activity.

SSV 218 Contemporary Treatment of Law Violators (3)

Current correctional practices in probation and parole; history and development of probation and parole; characteristics of offenders; evaluating an offender's needs and programming for treatment. 3 lectures.

SSV 321, 322, 323 Social Welfare Practice (3) (3) (3)

Principles and precepts of social welfare programs; public and private welfare agencies, group work agencies, schools, courts, hospitals, and correctional facilities; includes first-year internship program consisting of 8 hours weekly practical experience. 1 lecture, 8 hours field work. Prerequisite: SSV 200

SSV 421, 422, 423 Advanced Social Welfare Practice (3) (3) (3)

Contemporary practice of social case work method and its applications to present social welfare problems; includes second year of internship program consisting of 8 hours weekly practical experience. 1 lecture, 8 hours field work. Prerequisite: SSV 323 and permission of instructor.

SSV 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.

SSV 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.

Sociology

SOC 201, 202, 203 Principles of Sociology (3) (3) (3)

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. 3 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 (3)

Analysis of leading social problems facing American society today. Observations of selected social welfare institutions. 3 lectures. Prerequisite: Junior standing or permission of instructor.

SOC 302 Criminology (4)

Causal theories, nature, extent, control and prevention. Approximately 50 percent of course devoted to prevention and rehabilitation, both inside and outside penal institutions. 4 lecture-discussions.

SOC 320 Ethnic Relations in America (4)

Overview and interpretation of 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.

SOC 321 Family as a Social Institution (4)

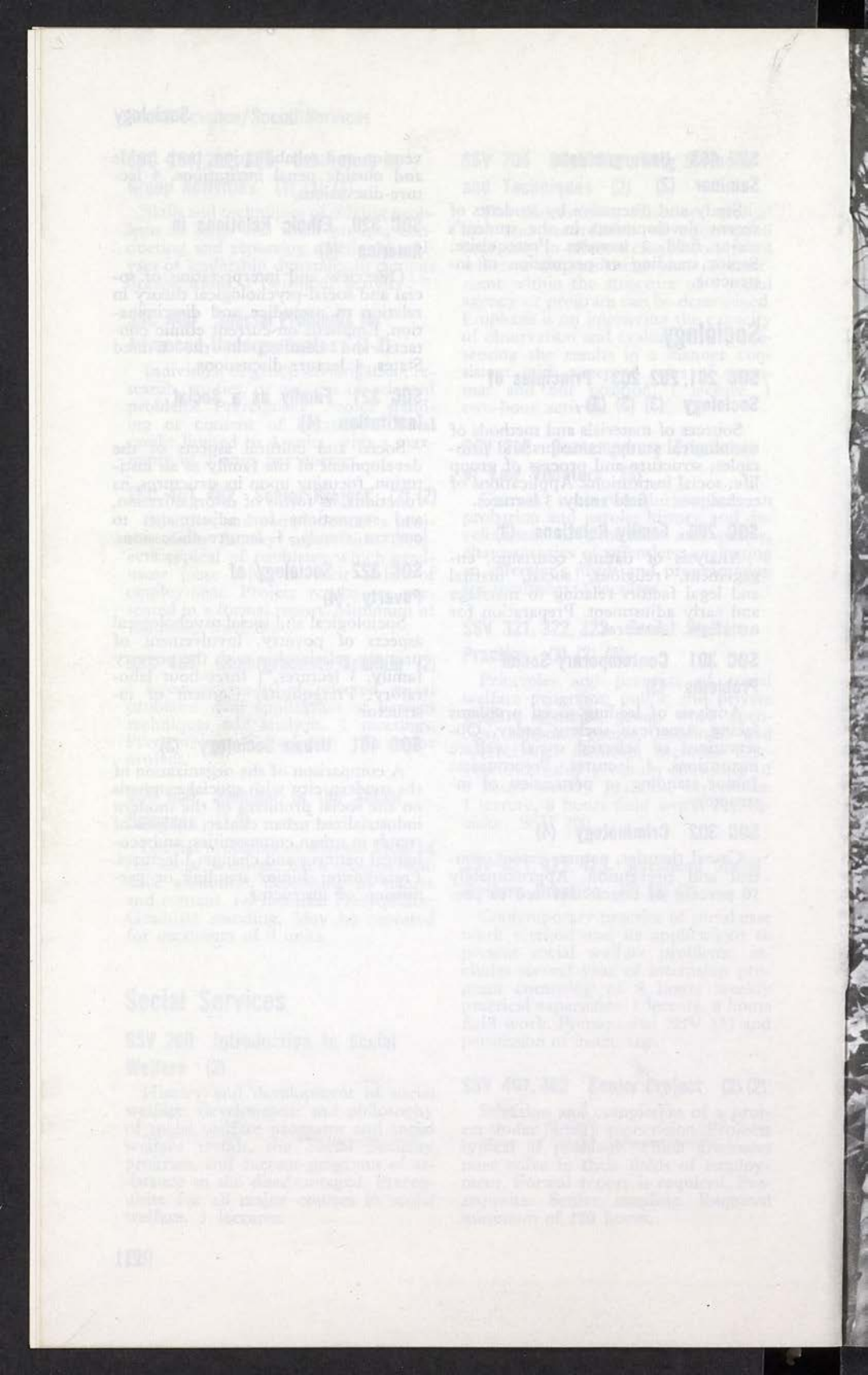
Social and cultural aspects of the development of the family as an institution, focusing upon its structures, its functions, its forms of disorganization, and suggestions for adjustments to current trends. 4 lecture-discussions.

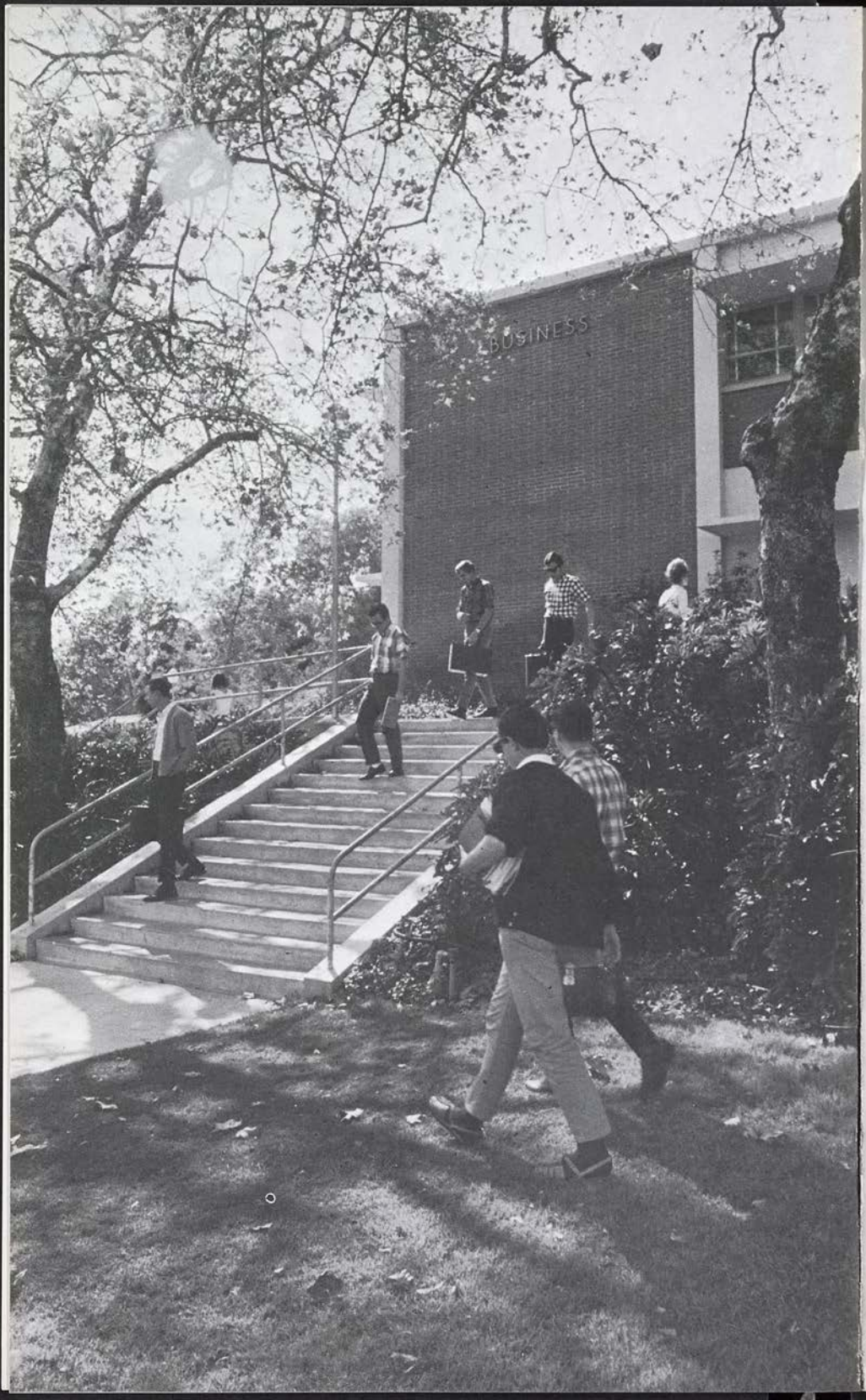
SOC 322 Sociology of Poverty (4)

Sociological and social psychological aspects of poverty. Involvement of primary relationship with the poverty family. 3 lectures, 1 three-hour laboratory. Prerequisite: Consent of instructor

SOC 401 Urban Sociology (3)

A comparison of the organization of the modern city with special emphasis on the social problems of the modern industrialized urban center; analysis of trends in urban communities; and ecological patterns and change. 3 lectures. Prerequisite: Junior standing or permission of instructor.




BUSINESS

SCHOOL OF BUSINESS ADMINISTRATION

ACCOUNTING . . . 218

BUSINESS MANAGEMENT . . . 222

MARKETING . . . 231

SCHOOL OF BUSINESS ADMINISTRATION

Louis Kaufman, *Dean*

The objective of the School of Business Administration is to provide an educational environment to prepare the undergraduate student for effective citizenship, as well as for a career in business. The programs of study aim to give the student an understanding of the social and economic environment and the 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 degree of Bachelor of Science in Business Administration may be earned by students enrolled in majors in Accounting; Business Management; Data Processing; Finance, Insurance and Real Estate; and Marketing. The Business Management major includes an option in Industrial Management and a concentration in Office Management.

The student selects his major on entering and immediately assumes responsibility for establishing his own educational objectives and working to accomplish them. By 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 salable 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 and seminar. Co-curricular opportunities related to his courses of study include the Cal Poly Accountants Club, the Marketing Club and the Society for the Advancement of Management Club.

Programs leading to secondary teaching credentials are offered by the School of Business Administration in Business Education and Business Management.

ACCOUNTING DEPARTMENT

Martin K. Barrett, *Chairman*
George E. Carlberg
John K. Cheever
Joseph C. Eischen
Gaylord Indvik
Andrew J. Johnson
Barry A. Knight
Frank Paul
Jewel M. Riddle

The Accounting department provides training 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.

Curriculum in Accounting

Freshman *	*F*	*W*	*S*
Freshman Composition (ENG 104, 105, 106)	3	3	3
Principles of Accounting (ACC 124, 125)	4	4	
Accounting Practice (ACC 145)		1	
Business Computations (BUS 151)		1	
Introduction to Data Processing (DP 211)	4		
Basic Mathematics (MAT 101) and College Algebra (MAT 105) or Introduction to Mathematical Analysis (MAT 108, 109)	3	3	
Descriptive Statistics (MAT 107)			3
Cost Accounting (ACC 211)			5
Health Education (PE 107)	2		
Physical Education (PE 141)	½	½	½
Public Speaking (SP 200)			3
†Natural Sciences		4	3
	16½	16½	17½

Sophomore			
Marketing Principles (MKT 305)	4		
Marketing Management (MKT 306)		4	
Intermediate Accounting (ACC 301, 302)	5	5	
Management Principles and Theory (BUS 307)			4
Principles of Economics (EC 201, 202, 203)	3	3	3
General Psychology (PSY 202)			3
Report Writing (ENG 216)			3
Physical Education (PE 141)	½	½	½
†Natural Sciences	3	3	3
	15½	15½	16½

* Unless already acceptable typists, majors will be required to take BUS 144.
† To be selected from the General Education list.

Junior	*F*	*W*	*S*
Business Law (BUS 301, 302)	3	3	
American Civilization (AMC 301, 302, 303)	3	3	3
Money and Banking (EC 308)			4
Fundamentals of Risk and Insurance (FIN 307)		4	
Budgetary Control (ACC 427)	3		
Business Forecasting (BUS 314)			4
†Literature, Philosophy, Art or Music	3	3	3
‡Directed Electives	4	4	4
	16	17	17

Senior			
Senior Project (ACC 461, 462)	2	2	
Undergraduate Seminar (ACC 463)			2
Business and Corporation Finance (FIN 304)			5
Federal Tax I (ACC 421)	3		
Auditing Principles, Practices and Procedures (ACC 325, 326)	3	3	
Management Policies and Systems (BUS 410)		4	
Electives	8	8	10
	16	17	17

Description of Courses

ACC 124, 125 Principles of Accounting (4) (4)

Principles and practices of fundamental double-entry accounting. Introductory survey of uses of modern accounting such as costs, budgeting, statement analysis. 3 lectures, 2 one-hour activity periods. ACC 124 is prerequisite to ACC 125; ACC 145 should be taken concurrently with ACC 125

ACC 145 Accounting Practice (1)

Practice, manual and EDP, in application of accounting principles to typical business situations. Concurrent: ACC 125

ACC 211 Cost Accounting (5)

Cost accounting cycle; cost elements of a product; job order, process and standard cost systems; overhead allocation cost considerations; joint products and by-products; cost behavior, cost-volume profit relationships; analysis of overhead variances. 5 lectures. Prerequisite: ACC 125

ACC 226 Budgeting Principles (3)

Principles and methods of preparing budgets, estimating income, and controlling expenditures of a manufacturing enterprise. Preparation of budgeted balance sheet and income statements. The duties of the sales, production, purchasing, and office managers in the planning and coordinating aspects of budgeting. 2 lectures, 1 two-hour activity period. Prerequisite: ACC 125, 145. (Not applicable for credit toward major in accounting.)

ACC 232 Income Taxes (3)

Federal and state income tax structure as related to individuals, including problems intended to provide an understanding of the principles. 3 lectures. (Not applicable for credit toward major in accounting.)

†To be selected from the General Education list.
‡Selected with the approval of the adviser.

ACC 301, 302 Intermediate Accounting (5) (5)

Introduction to advanced theory of accounts and its application. Standards of practice and recent opinions of the American Institute of Certified Public Accountants. 5 lectures. Prerequisite: ACC 125 and permission of the instructor.

ACC 306 Accounting Systems (2)

The installation and operation of accounting systems in business, with special attention to internal control. 2 lectures. Prerequisite: ACC 302, 311

ACC 311 Advanced Cost Accounting (4)

Profit planning; flexible budgets; management control systems; nonmanufacturing costs; relevant cost decisions; capital budgeting; nature of decision making; probabilities and the accountant. 4 lectures. Prerequisite: ACC 211

ACC 325, 326 Auditing Principles, Practices and Procedures (3) (3)

Theory of auditing and its objectives; procedures and techniques to carry out the objectives; principles of working paper development and preparation; types of opinions rendered by auditors and their responsibilities. 2 lectures, 1 two-hour activity period. Prerequisite: ACC 302

ACC 327 Internal and Operational Auditing (3)

Principles of internal control; examination and appraisal of controls; nature, principles and methods of operational auditing; techniques of verification, working papers, and other features of auditing applicable to the internal auditor's work. 2 lectures, 1 two-hour activity period. Prerequisite: ACC 302, 311, or consent of instructor.

ACC 400 Special Problems for Advanced Undergraduates (1-2)

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

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.

ACC 402 Advanced Accounting (4)

Governmental and institutional accounting and accounting for fiduciaries. 4 lectures. Prerequisite: ACC 302 or consent of instructor.

ACC 403 Advanced Accounting (4)

Consolidations and home office and branch accounting. 4 lectures. Prerequisite: ACC 302 or consent of instructor.

ACC 411, 412 Case Studies in Controllership (2) (2)

Analysis of accounting problems and business situations from the broad viewpoint of the controller. Studies of actual and simulated business case histories. 2 lectures. Prerequisite: Senior standing.

ACC 421 Federal Tax I (3)

Income, expenses, exclusions, deductions, and credits. Emphasis on individual returns. 2 lectures, 1 two-hour activity period. Prerequisite: ACC 301

ACC 422 Federal Tax II (3)

Continuation of ACC 421. Emphasis on estates, trusts, partnerships and corporations. 2 lectures, 1 two-hour activity period. Prerequisite: ACC 421

ACC 427 Budgetary Control (3)

Analysis of variances in budgetary control, including the break-even point, cost-volume relationships and the utilization of variable budgets. Current literature on budgetary control discussed. 3 lectures. Prerequisite: ACC 302, 311

ACC 441, 442 Internship in Accounting (1-3) (1-3)

On-the-job training with a business in some phase of accounting. The experience must be new to the student so that learning takes place. One unit of credit is granted for each 150 hours of training.

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.

ACC 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.

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 403 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 403 or consent of instructor.

BUSINESS MANAGEMENT DEPARTMENT

Richard H. Schoning, *Chairman*

Jack R. Dustman
Ronald W. Eaves
Robert J. Healey
Clarence H. Jackman
Richard T. Nelson
Theodore D. Piatt
Raymond C. Rauch
Alvin C. Ruppert
Richard Sabo
Katherine B. Seibert
Richard H. Smith
Stanley B. Smith
Robert V. Stumpf
Gerald E. Wagner
Paul F. Weisend
Mary E. Whitley
D. Wayne Williams
G. Dow Worley
William J. Zeidlik

Majors in Business Management; Data Processing; and Finance, Insurance, and Real Estate are offered by the Business Management department. The Business Management major offers an option in Industrial Management and a concentration in Office Management. By proper selection of electives and completion of a year of graduate study, the Office Management concentration meets the requirements for the Standard Teaching Credential—Secondary Specialization in business.

The department's programs prepare students for managerial and professional positions in business, government, and education. Specialized course work appropriate to the major field is designed to equip the student with first-job competence, shortening the apprenticeship period served by all managers. This specialization, however, avoids the teaching of skills and procedures vulnerable to rapid obsolescence by stressing the basic concepts, principles, and modes of approach required of a disciplined and analytic administrator.

Course offerings enable students to understand the basic principles of business and realize the significant interrelationships among the various segments of business and society. Students are prepared for a wide range of positions in industry, commerce, finance, insurance, real estate, data processing, secondary education, and public service such as management trainee, purchasing agent, department store buyer, credit manager, office manager, contract administrator, banking department manager, real estate manager, records supervisor, systems analyst, programmer, business teacher in secondary schools, executive secretary, or administrative assistant.

Curriculum in Business Management

Freshman *	*F*	*W*	*S*
Freshman Composition (ENG 104, 105)	3	3	
Business Communication (ENG 218)			3
Physical Education (PE 141)	½	½	½
Business and Its Environment (BUS 103)	4		
Office Management (BUS 127)			4
†Mathematics	3		
Descriptive Statistics (MAT 107)		3	
Principles of Accounting (ACC 124, 125)	4	4	
Principles of Economics (EC 201, 202, 203)	3	3	3
‡Electives and courses to complete major		3	6
	17½	16½	16½

Sophomore			
Business Law (BUS 301, 302)	3	3	
Introduction to Data Processing (DP 211)	4		
Systems Analysis (DP 222)			4
Public Speaking (SP 200)	3		
Physical Education (PE 141)	½	½	½
General Psychology (PSY 202)		3	
†Natural Sciences	4	4	4
‡Electives and courses to complete major	2	7	8
	16½	17½	16½

Junior			
Management Principles and Theory (BUS 307)	4		
Business and Corporation Finance (FIN 304)			5
Industrial Supervision (BUS 313)		4	
Business Forecasting (BUS 314)		4	
Marketing Principles (MKT 305)	4		
Marketing Management (MKT 306)		4	
Human Relations (PSY 314)	3		
‡Electives and courses to complete major	5	4	11
	16	16	16

Senior			
Senior Project (BUS 461, 462)	2	2	
Undergraduate Seminar (BUS 463)			2
Management Policies and Systems (BUS 410)		4	
American Civilization (AMC 301, 302, 303)	3	3	3
†Literature	3		
†Literature, Philosophy, Art or Music		3	3
†Natural Sciences	3		
‡Electives and courses to complete major	6	4	8
	17	16	16

*Unless already acceptable typists, students will be required to take BUS 144.
†To be selected from the General Education list.
‡Students concentrating in Office Management will select at least 29 units with the approval of the adviser.

Curricular Option and Concentration

Industrial Management

The option offers courses which provide a background in industrial operations and techniques for management occupations in industry.

Courses to complete major

Freshman

IE 111—Industrial Engineering (3)
IE 224—Work Analysis and Design (3)

Sophomore

IE 225—Work Analysis and Design (3)
IE 236—Production Planning and Control (4)

Junior

BUS 310—Managerial Accounting (4)
MKT 309—Marketing Logistics (4)
BUS 315—Quantitative Analysis in Business (4)

Senior

MKT 407—Industrial Marketing (4)
ABM 402—Personnel Management (3)

Office Management

This concentration provides skills and background needed by the executive office manager. By choice of additional courses the student may be prepared to seek qualification as a Certified Professional Secretary. By proper selection of electives, this concentration provides preparation for secondary teaching upon completion of a fifth year.

Curriculum in Data Processing

*Freshman**	*F*	*W*	*S*
Freshman Composition (ENG 104, 105)	3	3	
Business Communication (ENG 218)			3
Physical Education (PE 141)	½	½	½
Business and Its Environment (BUS 103)		4	
Office Management (BUS 127)	4		
Introduction to Mathematical Analysis (MAT 108, 109) or Analytic Geometry and Calculus (MAT 114, 115)	3	3	
Principles of Accounting (ACC 124, 125)	4	4	
Accounting Practice (ACC 145)		1	
†Natural Sciences			4
Electives and courses to complete major	2	1	9
	16½	16½	16½
Sophomore			
Introduction to Data Processing (DP 211)	4		
Computer Programming Principles (DP 221)		4	
Systems Analysis (DP 222)			4
Principles of Economics (EC 201, 202, 203)	3	3	3
Physical Education (PE 141)	½	½	½
Business Law (BUS 301)	3		
Marketing Principles (MKT 305)			4
General Psychology (PSY 202)	3		
Logic and Semantics (PHL 202)		3	
Public Speaking (SP 200)		3	
†Natural Sciences			4
Electives and courses to complete major	3	3	1
	16½	16½	16½

*Unless already acceptable typists, students will be required to take BUS 144.
†To be selected from the General Education list.

Junior

	F	W	S
Advanced Computer Programming (DP 322)		4	
Electronic Data Processing Systems (DP 323)			4
Descriptive Statistics (MAT 107)	3		
Business Forecasting (BUS 314)		4	
Quantitative Analysis in Business (BUS 315)			4
Marketing Management (MKT 306)	4		
American Civilization (AMC 301, 302, 303)	3	3	3
Managerial Accounting (BUS 310)	4		
Business and Corporation Finance (FIN 304)		5	
Management Principles and Theory (BUS 307)			4
Electives and courses to complete major	3	1	2
	17	17	17

Senior

	F	W	S
Senior Project (DP 461, 462)	2	2	
Undergraduate Seminar (DP 463)			2
Human Relations (PSY 314)	3		
Management Policies and Systems (BUS 410)	4		
Data Processing Management (DP 421)		4	
†Natural Sciences	4	3	
†Literature	3		3
Electives and courses to complete major	–	7	11
	16	16	16

Curricular Concentrations

Business Systems and Programming

This concentration provides the student with a specialization in the less quantitative orientation of the business Data Processing major. At least 18 units must be selected with approval of the adviser to complete the major in Data Processing.

Quantitative Business Analysis

This concentration provides the skills and background needed by the business computer programmer and systems analyst working in the complex area of industrial production management and control requiring a much more sophisticated knowledge of quantitative methods. At least 18 units must be selected with the approval of the adviser.

Curriculum in Finance, Insurance, and Real Estate

Freshman *

	F	W	S
Freshman Composition (ENG 104, 105)	3	3	
Business Communication (ENG 218)			3
Physical Education (PE 141)	½	½	½
Business and Its Environment (BUS 103)	4		
Office Management (BUS 127)	4		
Business Computations (BUS 151)	1		
†Mathematics		3	
Descriptive Statistics (MAT 107)			3
Principles of Accounting (ACC 124, 125)		4	4
Principles of Economics (EC 201, 202, 203)	3	3	3
†Natural Sciences		3	
‡Electives			4
	15½	16½	17½

*Unless already acceptable typists, students will be required to take BUS 144.
†To be selected from the General Education list.
‡At least 12 units of the electives must be selected with the approval of the adviser.

Sophomore	*F*	*W*	*S*
American Civilization (AMC 301, 302, 303)	3	3	3
Physical Education (PE 141)	½	½	½
Business Law (BUS 301, 302)	3	3	
Marketing Principles (MKT 305)			4
Introduction to Data Processing (DP 211)	4		
Public Speaking (SP 200)			3
General Psychology I (PSY 202)		3	
†Literature		3	
†Natural Sciences	4	4	4
‡Electives	2		2
	16½	16½	16½

Junior			
Management Principles and Theory (BUS 307)	4		
Managerial Accounting (BUS 310)		4	
Industrial Supervision (BUS 313)	4		
Business Forecasting (BUS 314)		4	
Business and Corporation Finance (FIN 304)	5		
Advanced Financial Management (FIN 305)		4	
Real Property Systems (FIN 306)			4
Fundamentals of Risk and Insurance (FIN 307)		4	
Investments (FIN 308)			4
Money and Banking (EC 308)			4
Quantitative Analysis in Business (BUS 315)			4
‡Electives	4	1	1
	17	17	17

Senior			
Senior Project (FIN 461, 462)	2	2	
Undergraduate Seminar (FIN 463)			2
Management of Financial Institutions (FIN 309)		4	
Marketing Management (MKT 306)	4		
Management Policies and Systems (BUS 410)			4
Human Relations (PSY 314)		3	
†Literature, Philosophy and Arts			6
‡Electives	10	7	4
	16	16	16

Description of Courses

Business Management

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 127 Office Management (4)

Basic office procedures and practices. Knowledge and techniques necessary to work in or manage a business office. Use of the latest types of mechanical equipment found in the business office. 3 lectures, 1 two-hour activity period.

†To be selected from the General Education list.
‡At least 12 units of the electives must be selected with the approval of the adviser.

BUS 144, 145 Typewriting (2) (2)

Fundamentals of the touch system. Training in preparing business forms and business letters and the development of professional competency in typewriting. 4 one-hour activity periods.

BUS 151 Business Computations (1)

Experience in the use and selection of adding and listing machines and rotary and printing calculators. Application of this experience to problems in interest, depreciation, sinking funds, annuities. 2 one-hour activity periods.

BUS 244, 245, 246 Shorthand (2) (2) (2)

Effective techniques for recording and transcribing personal dictation. 4 hours activity. Prerequisite: BUS 245, 244 or 60 wpm; BUS 246, 245 or 80 wpm.

BUS 301 Business Law (3)

The nature and sources of law. The law of contracts, including offer and acceptance, consideration, competent parties, illegality, fraud, mistake and duress, and performance and discharge. The law of sales including transfer of property between buyer and seller, warranties, remedies. Emphasis on California law. Casebook method. 3 lectures. Prerequisite: Junior standing or consent of instructor.

BUS 302 Business Law (3)

Law of negotiable instruments, partnerships, and corporations. Emphasis on California law. Casebook method. 3 lectures. Prerequisite: BUS 301 and ACC 125

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 Managerial Accounting (4)

Accounting as a managerial tool, budgets, cost analysis and interpretation. 4 lectures. Prerequisite: ACC 125

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 Forecasting (4)

Calculation and business applications of averages, measures of dispersion, skewness, and kurtosis. Probability, the binomial and normal distribution. Sampling and tests of significance. Construction and use of index numbers, correlation and regression analysis applied to business situations. 4 lectures. Prerequisite: MAT 105, 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 321, 322, 323 Executive Secretarial Practice (4) (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 400 Special Problems for Advanced Undergraduates (1-2)

Individual or group investigation, research, studies, or surveys of selected

problems. Prerequisite: Senior standing or consent of instructor. Total credit limited to 4 units, with a maximum of 2 units per quarter.

BUS 402 Inventory Control (3)

Management problems of production, maintaining proper control records, financing, and materials handling and storage. Analysis and discussion of typical situation-problems. 3 lectures.

BUS 403 Records Management (3)

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: BUS 307

BUS 441, 442 Internship in Business Management (1-3) (1-3)

On-the-job training in business management involving new, collegiate-level learning experiences, with one unit of credit for each 150 hours of training not to exceed 6 units. Experiences may be useful as a basis for senior projects. Prerequisite: Permission of the Coordinator of Business Internships.

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 650 Seminar in Business Education (3)

Identification and analysis of problems in the organization, administration, and teaching of business subjects in secondary schools. Current trends. Directed research. 3 lectures. May be repeated for maximum credit of 6 units.

Data Processing

DP 211 Introduction to Data Processing (4)

The nature and sources of information. Present techniques in information retrieval and utilization, with emphasis on trends affecting daily life and the environment in which we live. Analysis and discussion of typical situation-problems using the case study approach. 4 lectures.

DP 221 Computer Programming Principles (4)

Computer applications to solving problems using machine language and assembler language. Student projects in block diagramming, programming, and computer operation of problem solution. 4 lectures. Prerequisite: DP 211

DP 222 Systems Analysis (4)

Initiating, planning, executing, and implementing systems improvements in business. Analysis of business systems from a "total systems" concept using techniques such as flow charting, procedural analysis, and simplification studies. Analysis and discussion of typical situation-problems. 4 lectures. Prerequisite: DP 211

DP 321 COBOL Programming (4)

Structure of the Common Business Oriented Language (COBOL). Compiler operation. COBOL data and procedures divisions. Typical business data processing problems, programming in COBOL and discussion of alternate solutions. Field trips. 4 lectures. Prerequisite: DP 221

DP 322 Advanced Computer Programming (4)

Programming languages encountered in industry. Block diagramming, documentation, and programming problems in currently-used languages such as RPG, PL/1 and EASYCODER. 4 lectures. Prerequisite: DP 321 or MAT 119

DP 323 Electronic Data Processing System (4)

Study of complex computer systems using tapes, discs, and other mass storage devices. Characteristics of real time and large batch processing systems. Case studies and student projects. 4 lectures. Prerequisite: DP 221 and DP 222

DP 421 Data Processing Management (4)

Analysis of problems confronting data processing managers and development of decision-making techniques used to solve them. Critical Path Scheduling methods, equipment evaluation, feasibility studies and conversion problems. 4 lectures. Prerequisite: DP 322, 323

DP 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.

DP 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.

Finance, Insurance, and Real Estate

FIN 304 Business and Corporation Finance (5)

Analysis of business operations to determine type and amount of long term and short term financing. Comparison of alternative sources of financing. Analysis and evaluation of capital proposals. Empasis on numerical problems and case studies. 5 lectures and case problems. Prerequisite: ACC 125

FIN 305 Advanced Financial Management (4)

Theory and application of capital budgeting, treatment of uncertainty in financial decisions, and cost of capital theory. Case problems on financial decision making. 4 lectures and case problems. Prerequisite: FIN 304

FIN 306 Real Property Systems (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-discussion periods.

FIN 307 Fundamentals of Risk and Insurance (4)

Economic, 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.

FIN 308 Investments (4)

Mechanics of investment in insurance, real estate, industrials, railroads, public utilities, and financial institutions. Selection methods, fundamentals, and principles of investment analysis developed by project reports. 4 lectures.

FIN 309 Management of Financial Institutions (4)

A study of financial institutions as sources of funds; corporate supervision of funds; growth and development of insurance companies; consumer credit institutions, mortgage companies, inventory financing institutions. Analysis and discussion of typical situation-problems. 4 lectures. Prerequisite: EC 308

FIN 310 Urban Land Utilization and Development (4)

Planning, estimating and development of real property. Emphasis will be on light and residential construction operations and subdivisions. 4 lectures.

FIN 401 Security Analysis and Management (4)

Analysis and evaluation of corporate securities and their price fluctuation. Portfolio management of various trust funds, mutual funds, and pension retirement plans. 4 lectures. Prerequisite: FIN 308

FIN 402 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. Prerequisite: FIN 306

FIN 403 Real Property Evaluation (4)

Analysis of various approaches to or measures of value of real property. Emphasis on urban properties; of value theory concepts through use of specific problems. Application of real property evaluation through demonstration reports. 4 lectures. Prerequisite: FIN 306

FIN 411 Life and Casualty Insurance (4)

Personal and business applications of the various types of life and casualty insurance coverages. Emphasis on estate planning, risk analysis and survey techniques. 4 lectures. Prerequisite: FIN 307

FIN 412 Real Property 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. 4 lectures.

FIN 414 Social Insurance and Pension Plans (4)

Social aspects of insurance including the problems of old age, unemployment and disability will be investigated. Public and private solutions, including prevention and alleviation, will be explored. Emphasis will be on personal and business solutions relating to economic security. 4 lectures.

FIN 415 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 lectures. Prerequisite: FIN 307, 411

FIN 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.

FIN 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.

MARKETING DEPARTMENT

Richard H. Schoning, *Chairman*

William E. Fox
James R. Hill
Arthur Johnsen
Stanley B. Smith

The curriculum in Marketing is designed to train students for employment in the business field concerned with bringing to users the products of agriculture and industry. The student is prepared for positions as salesman, store operator, sales manager, advertising manager, advertising agency executive, and research director. Required courses cover subjects dealing directly with marketing, and also other topics involving the structure and organization of business as a whole. The program is designed to provide graduates with an adequate grasp of the overall problems of an organization, and ability to make their marketing activities an important part of the complete operation.

Courses and the curriculum are designed to provide the opportunity for actual work experience as well as theory.

Curriculum in Marketing

Freshman *	*F*	*W*	*S*
Freshman Composition (ENG 104, 105)	3	3	
Business Communications (ENG 218)			3
Physical Education (PE 141)	½	½	½
Principles of Accounting (ACC 124, 125)	4	4	
Principles of Economics (EC 201, 202)		3	3
College Algebra (MAT 105)		3	
Business and Its Environment (BUS 103)	4		
Office Management (BUS 127)			4
†Natural Sciences	4		3
Electives	1	3	3
	16½	16½	16½
Sophomore			
Consumer Behavior (MKT 200)	4		
Salesmanship (MKT 208)		4	
Marketing Principles (MKT 305)			4
Business Law (BUS 301)	3		
Managerial Accounting (BUS 310)	4		
Public Speaking (SP 200)		3	
General Psychology (PSY 202)	3		
Introduction to Data Processing (DP 211)		4	
Systems Analysis (DP 222)			4
†Literature			3
†Natural Sciences		4	4
Physical Education (PE 141)	½	½	½
Electives	2	1	1
	16½	16½	16½

*Unless already acceptable typists, students will be required to take BUS 144.
†To be selected from the General Education list.

Junior	*F*	*W*	*S*
Human Relations (PSY 314)	3		
Marketing Management (MKT 306)	4		
Advertising Principles (MKT 307)		4	
Retail Store Management (MKT 308)		4	
Marketing Logistics (MKT 309)		4	
Promotional Management (MKT 310)			4
Business and Corporation Finance (FIN 304)	5		
Management Principles and Theory (BUS 307)	4		
Descriptive Statistics (MAT 107)		3	
Business Forecasting (BUS 314)			4
Quantitative Analysis (BUS 315)			4
Electives		1	4
	16	16	16

Senior			
Senior Project (MKT 461, 462)	2	2	
Undergraduate Seminar (MKT 463)			2
Industrial Marketing (MKT 407)	4		
Marketing Research (MKT 408)		5	
International Marketing (MKT 414)			4
Management Policies and Systems (BUS 410)			4
American Civilization (AMC 301, 302, 303)	3	3	3
†Literature, Philosophy, Art or Music	3	3	
Electives	5	4	4
	17	17	17

Description of Courses

MKT 200 Consumer Behavior (4)

Analysis of behavior patterns of the consumer in the market place. 4 lectures.

MKT 208 Salesmanship (4)

Persuasive personal sales communications in behalf of products or services. Individual counseling on oral presentations. 4 lectures.

MKT 305 Marketing Principles (4)

Role of marketing in our society and economy. The business firm as a marketing system. Management of the firm's marketing effort. Determination of market objectives and competitive strategies applied to product, price, promotion and distribution variables. 4 lectures.

MKT 306 Marketing Management (4)

The role of marketing management in the integration of total activities as required to achieve business objectives. Emphasis on the problems, analytical tools, and approaches to decisions concerning the analysis, planning, and control of marketing efforts. 4 lectures. Prerequisite: MKT 305

MKT 307 Advertising Principles (4)

Technical, economic, and professional aspects of advertising. Campaign organization for effective advertising. Analysis and discussion of typical situation problems. 4 lectures. Prerequisite: 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

†To be selected from the General Education list.

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 of markets. 4 lectures. Prerequisite: MKT 306

MKT 310 Promotional Management (4)

Examination of managerial strategies in dealing with personal selling, advertising, and sales promotion. Emphasis on buyer motivation and behavior, strategy for human and financial resources, media strategy and reseller support. 4 lectures. Prerequisite: MKT 208, 307

MKT 400 Special Problems for Advanced Undergraduates (1-2)

Individual or group investigation, research, studies, or surveys of selected problems. Prerequisite: Senior standing or consent of instructor. 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 (5)

Determination of market data. Techniques of quantitative and qualitative market analysis. Individual counseling on marketing research field projects. Written reports and oral presentation and defense of field projects. 5 lectures. Prerequisite: MKT 306, BUS 314

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 441, 442 Internship in Marketing (1-3) (1-3)

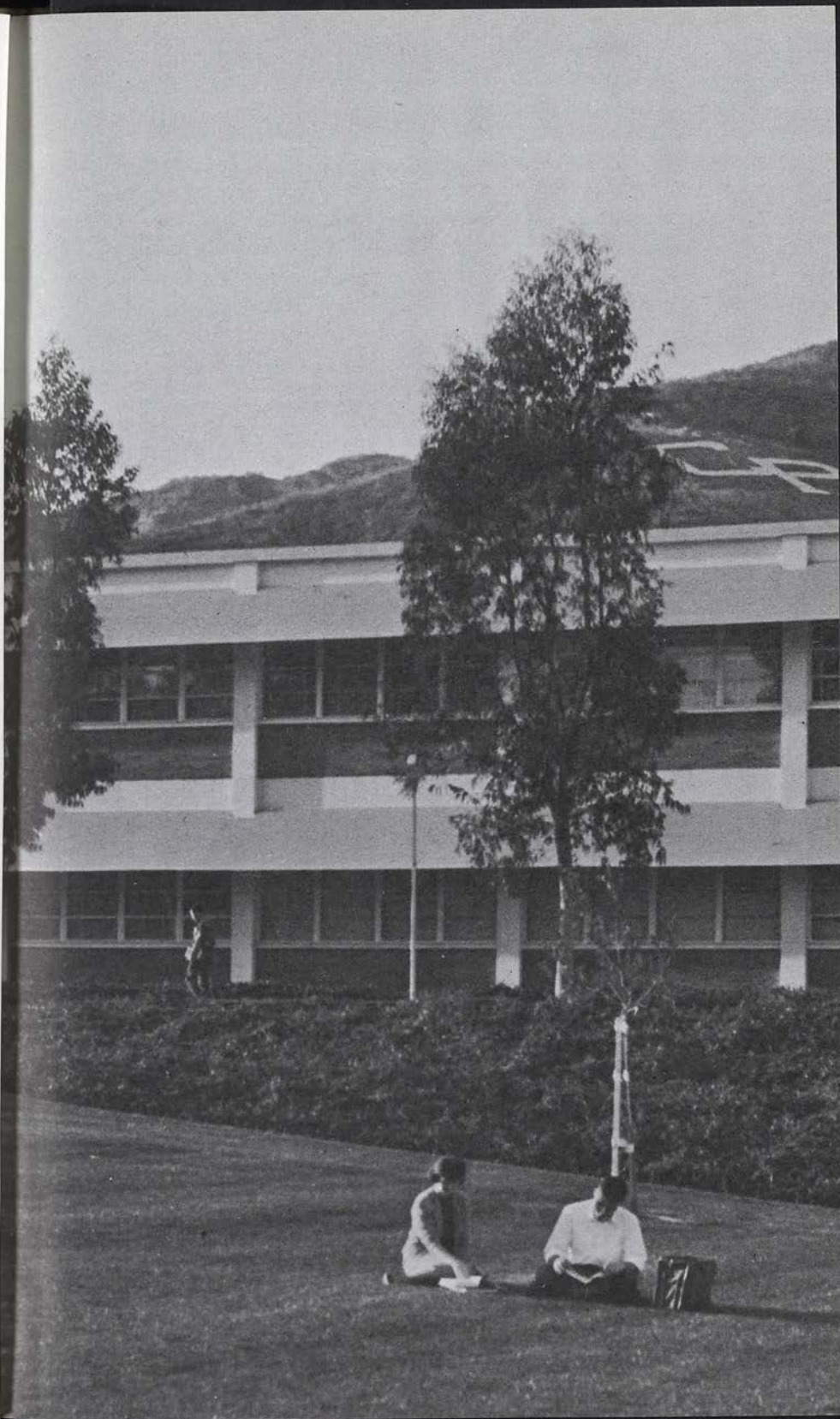
On-the-job training in marketing involving new, collegiate level learning experiences. One unit of credit for each 150 hours of training, not to exceed six units. Experience may be useful as a basis for senior project. Prerequisite: Permission of the Coordinator of Business Internships.

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. Required minimum of 120 hours.

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.



SCHOOL OF ENGINEERING

AEROSPACE ENGINEERING . . . 241

CHEMICAL ENGINEERING . . . 247

CIVIL ENGINEERING . . . 252

ELECTRICAL AND ELECTRONICS ENGINEERING . . . 259

INDUSTRIAL ENGINEERING . . . 266

MECHANICAL ENGINEERING . . . 272

SCHOOL OF ENGINEERING

Harold P. Skamser, *Dean*
Douglas C. Dowell, *Associate Dean*

Modern engineering is concerned with the economical utilization of the materials and power resources in the world by means of technology, providing society with an ever expanding wealth of useful products. The engineering profession demands a high degree of dedication to duty, but provides a commensurate amount of personal satisfaction and reward. Few professions require more diligent perseverance, more rigorous allotment of time and effort, or more clearly defined professional and personal integrity. Correspondingly, few professions offer more opportunities to be of real service to mankind, and to use one's education and experience to improve the general standard of living.

The School of Engineering prepares its students to meet the demands of the nation's constantly evolving and changing industries by stressing the application of fundamental concepts to the engineering techniques of the present and future. The school emphasizes laboratory and field work in addition to classroom study, obtaining a balance between basic principles and their practical applications to the real world. This "learn-by-doing" philosophy prepares the graduate to take his place as a worthwhile, producing member of the engineering profession.

School curricula lead to the Bachelor of Science degree in Aerospace, Chemical, Civil, Electrical and Electronics, Industrial, and Mechanical Engineering. In each curriculum, approximately equal amounts of basic mathematics and science, engineering core courses, and general education courses are required. The curricula are professionally oriented, fully recognizing the requirements of industry, business, and government. There is emphasis on manufacturing operations and laboratory work which develops an engineer capable of actually applying his basic knowledge to a practical engineering problem. Graduates work in positions involving design, development, applied research, test engineering, production and manufacturing, methods engineering, sales and field engineering, teaching, construction, consulting, and supervisory administration. A distinguishing feature of the Cal Poly graduate is his readiness to take his place in industry and begin producing for his employer early in his employment, and yet be well prepared for future growth

and development. Cal Poly graduates also have been accepted at leading graduate schools across the country.

Unlike the traditional engineering curricula which delay work in the major field until the junior and senior years, courses in the student's major begin in the freshman year and are taken concurrently with the science, mathematics, and general education courses. Thus, the Cal Poly student acquires skills of professional value in his chosen field as he progresses through his academic career providing the student with the advantage of early motivation, more complete orientation, greater understanding, and familiarity with the field of engineering.

A student learns at an early stage if the particular field he has chosen is one for which he is best suited. Courses common to all the majors enable a student to move from one engineering discipline to another with relative ease early in his academic career. In addition, it provides for employability during vacation periods.

There are cooperative work-study programs for senior students with leading local industries. Many major firms have made contributions of equipment, scholarships, awards, and other forms of aid. The college is a center for meetings of professional engineering societies, and maintains close liaison with the profession and industry.

Since a typical engineering education involves several years of college science and mathematics, the high school or junior college student contemplating the engineering profession should pursue a strong scientific program involving mathematics, physics, chemistry, and English; and if possible, mechanical drawing and related courses.

AEROSPACE ENGINEERING DEPARTMENT

Rodney D. Sutherland, *Chairman*

Donald C. Curran
George R. Graves
Horatio O. Morgan
Conrad F. Newberry
Albert D. Sanford
Bruce D. Shriver

The Aerospace Engineering curriculum consists of general education, science, mathematics, related engineering and major subjects. The major courses are organized on the basis of six fields of interest to the aerospace engineer: design, instrumentation, aerodynamics, propulsion, flight dynamics and flight structures.

Students learn theory and principles of problem-solving as applied to a variety of industrial and professional situations. These techniques cover a wide range of technology; mathematical analysis, manufacturing processes, computer methods and experimental analysis. Facilities available for experimental studies include two subsonic wind tunnels, a supersonic wind tunnel, flight environment simulation equipment, flight structures laboratory, and an aerospace construction laboratory.

Graduates are employed by aerospace vehicle and component manufacturers, airlines, government research laboratories and propulsion unit manufacturers in such fields as applied research, advanced engineering, product development, production, flight testing and field services.

The high school student planning a career in aerospace engineering should take a balanced program including mathematics, physical science, and mechanical drawing. The junior college student planning to transfer into this department should, insofar as possible, take courses which fulfill requirements of the aerospace curriculum.

The total curriculum provides an opportunity for the student to gain a knowledge of industrial practices as well as an excellent theoretical background.

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.

Curriculum in Aerospace Engineering

Freshman	*F*	*W*	*S*
Aerospace Engineering Fundamentals (ARO 124, 125, 126)	2	2	2
*Engineering Graphics (ME 120 or 121, 122)	2	2	
Descriptive Geometry (ME 125)			2
Technical Writing (ENG 219)			2
‡Analytic Geometry and Calculus (MAT 114, 115, 116)	3	3	3
General Physics (PHY 131, 132)		4	4
Freshman Composition (ENG 104, 105)	3	3	
Health Education (PE 107)	2		
Physical Education (PE 141)	½	½	½
Life Science (BIO 110)	3		
Principles of Economics (EC 201, 202)		3	3
Electives	3		
	18½	17½	16½

Sophomore			
American Civilization (AMC 301, 302, 303)	3	3	3
Aerodynamics Laboratory (ARO 247, 248)	2	2	
Aerospace Construction Laboratory (ARO 252)			2
Engineering Statics (ME 214)	3		
Engineering Kinematics (ME 215)		3	
Engineering Kinetics (ME 216)			3
Calculus and Differential Equations (MAT 214, 215, 216)	4	4	4
General Physics (PHY 133)	4		
General Chemistry (CHM 111, 112)		3	3
General Chemistry Laboratory (CHM 151, 152)		1	1
Physical Education (PE 141)	½	½	½
Manufacturing Processes (MPE 221)	2		
Weldment Engineering (WE 238)		2	
	18½	18½	16½

Junior			
Aerospace Structures (ARO 326)	4		
Aerospace Engineering Computer Applications (ARO 308)		3	
Energy, Mass and Momentum Transfer (ARO 304)		4	
Flight Vibrations (ARO 309)			3
Aerospace Structures (ARO 327, 328)		4	4
Experimental Analysis (ARO 347)			3
Gas Dynamics (ARO 311)		4	
Principles and Practices of Electrical Engineering (EE 231)	3		
Electronic Engineering (EE 322, 323)		3	3
Thermodynamics (ME 301)	3		
Mathematical Analysis of Engineering Problems (MAT 318)	3		
Material Science (WE 307)	3		
Aerodynamics (ARO 305)			4
	16	18	17

*ME 120 or ME 121 to be determined by the Mechanical Engineering department.

‡Students not prepared to take MAT 114 will take MAT 104 and/or MAT 105 as determined by the Mathematics department.

Senior	*F*	*W*	*S*
Senior Project (ARO 461, 462)	2	2	
Undergraduate Seminar (ARO 463)			2
Differential Equations (MAT 317)	3		
Propulsion Systems (ARO 402)	3		
Supersonic Aerodynamics (ARO 404)	3		
Aerospace Flight Stability (ARO 405)		3	
Advanced Aerospace Analysis (ARO 444, 445)	3	3	
Advanced Aerospace Design Project (ARO 446)			2
†Humanities		3	6
General Psychology I (PSY 202)			3
Aerospace Vehicle Performance (ARO 407)	3		
Modern Physics (PHY 401)		3	
Electives		4	5
	17	18	18

Description of Courses

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)

Physical concepts pertaining to space flight trajectories. Two-body problem. Ballistic and satellite trajectories. Basic theory of flight propulsion. Static testing of jet devices. 1 lecture, 1 three-hour laboratory. Prerequisite: ARO 125.

ARO 240 Additional Engineering Laboratory (1-2)

Elective project work. 1 or 2 three-hour laboratories. Prerequisite: Permission of instructor. Total credit limited to four units, with not more than two units in any one quarter.

ARO 247 Aerodynamics Laboratory (2)

Airfoil and wing geometry. Layout of airfoil sections. Aerodynamic coefficients. Airfoil pressure distributions. Wind tunnel model testing. 2 three-hour laboratories. Prerequisite: PHY 131

ARO 248 Aerodynamics Laboratory (2)

Pressure and skin friction drag. Drag polars. Finite wing effects. High lift devices. Propeller and helicopter rotor aerodynamics. Wind tunnel model testing. 2 three-hour laboratories. Prerequisite: ARO 247

ARO 252 Aerospace Construction Laboratory (2)

Fabrication of aerospace structures and components. Principles of light metal forming, joining and riveting. Hydraulic piping. Uses of plastics and reinforced fiberglass. Design and construction of a class project. 2 three-hour laboratories. Prerequisite: MPE 221, WE 238

†To be selected from the General Education list.

ARO 304 Energy, Mass and Momentum Transfer (4)

Equations of continuity, momentum and energy from a vector viewpoint. Transfer of momentum and energy in laminar and turbulent boundary layers. Energy transfer by conduction and radiation. 4 lectures. Concurrent: MAT 318

ARO 305 Aerodynamics (4)

Low speed aerodynamics; complex potential function; vorticity; circulation; finite span wing; vortex systems; high lift systems. 4 lectures. Prerequisite: ARO 304

ARO 308 Aerospace Engineering Computer Applications (3)

Use of computers in solving aerospace engineering problems. Emphasis on flow charting, programming, and numerical techniques. 3 lectures. Prerequisite: MAT 216

ARO 309 Flight Vibrations (3)

Single- and multi-degree of freedom bodies. Graphical methods of solution. The phase plane method for random forcing functions. Applications of series methods of solution. Introduction to aeroelasticity and flutter. 3 lectures. Prerequisite: MAT 216, ME 216

ARO 311 Gas Dynamics (4)

Thermodynamic processes. One-dimensional flow; isentropic, variable area duct, normal shock, constant area duct with friction, frictionless constant area duct with heat transfer. Two-dimensional flow. Operation of the supersonic wind tunnel; instrumentation; testing high speed models. 3 lectures, 1 three-hour laboratory. Prerequisite: ME 301

ARO 326 Aerospace Structures (4)

Stress-strain relationships. Shear and moment diagrams. Analysis of determinate structural elements. Introduction to thin skin structures. Experimental methods in stress analysis. 3 lectures, 1 three-hour laboratory. Prerequisite: ME 214, MAT 215

ARO 327 Aerospace Structures (4)

Analysis of aerospace vehicle structural components. Methods of virtual work. Combined stresses. Column analysis. Stress analysis of aerospace structural mechanisms. 3 lectures, 1 three-hour laboratory. Prerequisite: ARO 326, MAT 216

ARO 328 Aerospace Structures (4)

Virtual force and virtual displacement methods in structural analysis. Thin skin stress analysis. Beam column theory. Testing of typical aerospace vehicle structural components. 3 lectures, 1 three-hour laboratory. Prerequisite: ARO 327

ARO 347 Experimental Analysis (3)

Design of experiments based on fundamental laws of engineering. Error analysis; dimensional analysis; factorial test plans. Statistical data analysis. Instrumentation system design. 1 lecture, 2 three-hour laboratories. Prerequisite: MAT 216, ARO 304, 308, 311

ARO 400 Special Problems for Advanced Undergraduates (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 402 Propulsion Systems (3)

Fuel burning performance of aircraft and missile power plants. Thermodynamic analysis, and structural and mechanical requirements. Emphasis on turboprop, turbojet, ramjet and liquid and solid-fuel rocket engines. 3 lectures. Prerequisite: ARO 311

ARO 403 Rocket Propulsion (3)

Classification of propulsion systems. Definitions of rocketry terms. Rocket history. Nozzle theory and thermodynamic relations. Rocket propellant performance calculations. Heat transfer in rocket thrust chambers. Liquid propellant rocket systems. Solid propellant rocket fundamentals. Design and flight performance and flight testing. 3 lectures. Prerequisite: ARO 402

ARO 404 Supersonic Aerodynamics (3)

Effects of compressibility; two-dimensional and conical supersonic flow fields; similarity parameters; so-

lution of wave equations; shock-expansion theory. 3 lectures. Prerequisite: ARO 305

ARO 405 Aerospace Flight Stability (3)

Stability analysis of aerospace vehicles. Routh, Nyquist and root locus methods in stability. Perturbation and linearization techniques. Applications to aircraft, missiles and spacecraft. 3 lectures. Prerequisite: ARO 407, MAT 317

ARO 406 Astrodynamics (3)

Kepler's laws of motion and satellite orbits, orbital transfers. Space vehicle motion, despinning of satellites. Performance and optimization of single and multistage rockets. 3 lectures. Prerequisite: ARO 407

ARO 407 Aerospace Vehicle Performance (3)

Three dimensional rigid body motion methods of Newton and Lagrange. Euler Transformations. Performance analysis of aircraft, missiles and spacecraft. 3 lectures. Prerequisite: ARO 302, 309, MAT 318

ARO 408 Advanced Aircraft Structural Analysis (3)

Indeterminate structures, frame analysis, treatment of plates and shells, shear lag and deformation, effect of skin cutout, application of structural theory to the design of aircraft components. 3 lectures. Prerequisite: ARO 328

ARO 409 Aerodynamic Design of 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 project. 4 lectures. Prerequisite: ARO 301

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. Wing-body interference effects. 4 lectures. Prerequisite: ARO 404, 405

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 302, 309, 328, 401, MAT 317

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 multidisciplined 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. Prerequisite: EL 322, ARO 252. Concurrent: ARO 444, 457

ARO 463 Undergraduate Seminar (2)

Preparation, oral presentation, and discussion by students of technical papers on recent engineering developments. 2 lectures. Prerequisite: ARO 462

CHEMICAL ENGINEERING DEPARTMENT

Max Epps, *Chairman*
Robert G. Feeney
William M. Harris
Mel D. Compton
Daniel H. Fillhart
George D. Lanthorne
Donald L. Ritter

Chemical engineering is that branch of professional engineering which embraces the development and application of processes in which chemical and physical changes of material are involved. Chemical engineering includes the design, development, and production of many products such as fuels, plastics, paper, foods, and building materials.

The department program correlates science and its application to manufacturing processes, preparing students for professional positions or graduate work. The Chemical Engineering curriculum includes courses which prepare the student to plan, design, develop, construct, test, and operate process equipment and plants. Included are service and major courses and laboratories in materials, plastics, and metallurgy.

The Welding Engineering section of the department offers students an opportunity to gain both theoretical and practical knowledge of techniques and applications of the principal welding processes. The department's laboratories include facilities for twenty of the more common fusion, resistance, and braze welding processes. In addition nondestructive testing equipment includes devices for the study of X-ray, ultrasonic, magnetic particle, and penetrant methods.

Numerous opportunities for chemical engineers are found in practically every industry, including aerospace, electronics, housewares, toys, building materials, and governmental agencies such as air pollution control, military, and space exploration.

A high school or transfer student planning to pursue this curriculum should take a maximum of chemistry, physics, and mathematics courses.

Curriculum in Chemical Engineering

Freshman	*F*	*W*	*S*
Introduction to Chemical Engineering Design (CHE 123)			3
Chemical Engineering Fundamentals (CHE 131, 132)	3	3	
*Engineering Graphics (ME 120 or 121, 122)	2	2	
General Chemistry (CHM 111, 112)	3	3	
General Chemistry Laboratory (CHM 151, 152)	1	1	
Quantitative Analysis (CHM 221)			4
‡Analytic Geometry and Calculus (MAT 114, 115, 116)	3	3	3
Manufacturing Processes (MPE 228)		2	
Life Science (BIO 110)			3
Freshman Composition (ENG 104, 105)	3	3	
Technical Writing (ENG 219)			2
Health Education (PE 107)	2		
Physical Education (PE 141)	½	½	½
General Psychology (PSY 202)			3
	17½	17½	18½

Sophomore			
Stoichiometry (CHE 201)			3
Fundamentals of Plastics and Related Materials (CHE 133)	3		
Experimental Planning and Analysis (CHE 246)		3	
Engineering Statics and Dynamics (ME 211, 212)		3	3
Principles and Practices of Electrical Engineering (EE 231, 232)	3	3	
Organic Chemistry (CHM 201)	3		
Organic Chemistry Laboratory (CHM 251)	1		
General Physics (PHY 131, 132, 133)	4	4	4
Calculus and Differential Equations (MAT 214, 215, 216)	4	4	4
Physical Education (PE 141)	½	½	½
Structural Welding (WE 239)			2
	18½	17½	16½

Junior			
Chemical Engineering Thermodynamics (CHE 302, 303)		3	3
Applied Plastics Processes (CHE 332)	3		
Thermodynamics (ME 301)	3		
Fluid Mechanics (ME 311, 312)	3	3	
Heat Transfer (ME 313)			3
Metallurgy (WE 304)			2
Physical Chemistry (CHM 311, 312, 313)	4	4	4
Strength of Materials (ME 218, 219)		3	3
Principles of Economics (EC 201, 202)		3	3
Electives	4		
	17	16	18

Senior			
Senior Project (CHE 461, 462)	2	2	
Undergraduate Seminar (CHE 463)			2
Unit Operations (CHE 421, 422, 423)	3	3	3
Manufacturing Processes (MPE 438)		2	

*ME 120 or ME 121 to be determined by the Mechanical Engineering department.

‡Students not prepared to take MAT 114 will take MAT 104 and/or MAT 105 as determined by the Mathematics department.

	F	W	S
Electronic Engineering (EE 322, 323)		3	3
Metallurgy Laboratory (WE 343)		1	
American Civilization (AMC 301, 302, 303)	3	3	3
†Literature or Philosophy	3	3	3
§Chemistry Electives	3		
Electives	4		4
	18	17	18

Description of Courses

Chemical Engineering

CHE 123 Introduction to Chemical Engineering Design (3)

Reading and interpretation of chemical engineering drawings and specifications. Representation of molded parts, dies, piping, and equipment diagrams. 2 lectures, 1 three-hour laboratory. Prerequisite: ME 122

CHE 131, 132 Chemical Engineering Fundamentals (3) (3)

Introduction to the general field of chemical engineering. Elementary problems in material balance and related subjects. Laboratory work with basic devices and emphasis on report writing. 2 lectures, 1 three-hour laboratory.

CHE 133 Fundamentals of Plastics and Related Materials (3)

Composition, characteristics, and uses of commercially important synthetic materials including polymeric (plastic) materials. Economics of material selection. 3 lectures. Prerequisite: CHM 112

CHE 201 Stoichiometry (3)

Basic material and energy balances with emphasis on chemical engineering economics. Application of the digital computer to plant operation and to solving problems. 3 lectures. Prerequisite: CHM 221, CHE 132

CHE 240 Additional Engineering Laboratory (1-2)

Elective project work. 1 or 2 three-hour laboratories. Prerequisite: Permission of instructor. Total credit limited to four units, with not more than two units in any one quarter.

CHE 246 Experimental Planning and Analysis (3)

Analysis of various chemical engineering devices. Statistical methods in planning experiments and analyzing data. Investigation of such devices as pumps, refrigerators, heat exchangers, heating devices, distillation systems, and allied basic equipments. 2 lectures, 1 three-hour laboratory. Prerequisite: CHE 132

CHE 302, 303 Chemical Engineering Thermodynamics (3) (3)

Thermodynamic properties of various substances. Application of thermodynamics to process analysis, phase and chemical equilibria through the use of examples and problems. 3 lectures. Prerequisite: ME 301, CHM 221

CHE 332 Applied Plastics Processes (3)

Polymer structure and reactions, solutions of polymers and molecular weight, properties of plastics reactions in polymer formation. Emphasis on processes involved in the manufacture

†To be selected from the General Education list.
§To be selected with the approval of the student's adviser.

of commercially important materials. 2 lectures, 1 three-hour laboratory. Prerequisite: CHM 211, CHE 133

CHE 400 Special Problems for Advanced Undergraduates (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 421, 422, 423 Unit Operations (3) (3) (3)

Problems in typical design and operating situations for process equipment. Absorbers, dehumidifiers, fractionators, crystallizers, filters, evaporators, and extractors. 2 lectures, 1 three-hour laboratory. Prerequisite: CHE 201, 303, CHM 313, ME 313.

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

Selection and completion of a project under faculty supervision. Projects typical of problems in the Chemical Engineering field. Results to be presented in a formal report. Minimum requirement of 120 hours total time. Prerequisite: Senior standing.

CHE 463 Undergraduate Seminar (2)

General discussion of new developments, policies, practices and procedures. Each student responsible for preparation and presentation of a report on some development in his field. 2 lectures. Prerequisite: Senior standing.

Welding Engineering

WE 145 Production Welding Processes I (1)

Studies of the tungsten-inert-gas welding process, the resistance welding processes, brazing and braze welding. 1 three-hour laboratory.

WE 146 Production Welding Processes II (1)

Fundamentals of metallic arc welding including equipment, electrodes and basic procedures. Oxygen cutting. High speed consumable electrode processes. 1 three-hour laboratory. Prerequisite: WE 145

WE 223 Fusion Welding Applications (3)

Techniques of metal joining with the more common fusion welding processes. Selection of process, designation and selection of joint design, mechanical and visual evaluation of welding joints. 1 lecture, 2 three-hour laboratories. Prerequisite: WE 234 or 238 or 239 or 337

WE 234 Materials Joining (3)

Application and automation of welding processes in industry, related thermal effects and joint design. Welding of plastics. Adhesive bonding. Evaluation methods. Industrial safety related to subject areas. For Industrial Engineering majors. 2 lectures, 1 three-hour laboratory. Prerequisite: PHY 131. Concurrent: CHM 111

WE 238 Weldment Engineering (2)

Fundamentals of metal joining utilizing welding processes particularly applicable to the aerospace and electronics industries. Thermal effects of processes, effects of previous processing, evaluation, joint design, joint and process selection. For Aerospace and Electrical and Electronics Engineering majors. 1 lecture, 1 three-hour laboratory. Prerequisite: ME 122, PHY 131

WE 239 Structural Welding (2)

Engineering aspects of welding applied to structures. Common processes for joining, preparation and severing (fitting) methods. Joint design and strength determination. Thermal effects, effects of previous processing. Evaluation methods. For Civil Engineering majors. 1 lecture, 1 three-hour laboratory. Prerequisite: ME 122; Concurrent: ME 211

WE 240 Additional Welding Laboratory (1-2)

Additional experience with welding processes. 1 or 2 three-hour laboratories. Prerequisite: Previous WE courses. Total credit limited to 4

units, with not more than 2 units in any one quarter.

WE 251 Fundamentals of Art Welding (3)

Fundamentals of welding processes with 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.

WE 254 Welding Codes and Costs (2)

Codes and standards involved with welded fabrication. Costs of welding equipment, supplies, and materials. Relationships of fabrication costs to joint design, deposition rates, techniques, and processes. Basic cost estimating problems. 2 lectures. Prerequisite: WE 238 or 239

WE 304 Engineering Metallurgy (2)

Structure of metals. Constitutional diagrams. Relationship of properties and structure. Mechanical working. Thermal processing. Applications and designations of steel and light metals. 2 lectures. Prerequisite: CHM 112, PHY 131

WE 305 Engineering Metallurgy (3)

A continuation of WE 304. Emphasis on non-ferrous metal. Alloying elements in steel. Additional work on the relationship of properties and structure. 3 lectures. Prerequisite: WE 343

WE 306 Advanced Physical Metallurgy (3)

Powder metallurgy and castings materials, processes, design and applications. Tool steels. 3 lectures. Prerequisite: WE 304

WE 307 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

WE 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, WE 304

WE 343 Metallurgy Laboratory (1)

Basic principles of metallography. Thermal treatment of metals. Hardness testing. 1 three-hour laboratory. Prerequisite: WE 304

WE 421, 422 Weld Design (3) (2)

Welding processes, applications and limitations. Design of welded joints related to the welding processes, performance of welded joints under various load conditions with various metals and filler metals. Welding costs and tooling methods. WE 421: 3 lectures. WE 422: 2 three-hour laboratories. Prerequisite: ME 219, WE 239 or 337

WE 427 Nondestructive Testing (4)

Physical principles of the various methods of nondestructive testing. Correct application of the various methods. Techniques. Results to be expected. 2 lectures, 2 three-hour laboratories. Prerequisite: PHY 132, 133 or 204

WE 433 Metal Joining in the Process Industry (2)

Joining methods including metallic arc, tig, mig, and submerged arc welding processes; brazing and braze welding. Weld zone metallurgy, shrinkage and distortion. Corrosion topics. Evaluation methods. 1 lecture, 1 three-hour laboratory. Prerequisite: WE 343 or permission of instructor.

CIVIL ENGINEERING DEPARTMENT

John W. Comer, *Chairman*
Fenton Harding
Donald W. King
Ray Morales
Edward Nowatzki
Claude B. Ogle
Robert R. Schneider
Harrison P. Seuberling

The Civil Engineering program prepares graduates to enter the profession in design, construction, or maintenance capacities on such projects as freeways, highways, major buildings, dams, bridges, aqueducts, pipelines, airports, water supply, waste disposal, flood control, and urban development. The department offers a major in Civil Engineering with options in Civil Engineering and Water Resources Engineering.

Graduates are employed by governmental agencies at federal, state, and municipal levels and by contractors and private consulting firms. Other areas of employment are maintenance and sales engineering, teaching, research, materials testing, city planning, and administrative fields.

Many projects, including freeways, water supply and control facilities, waste disposal units, and new housing developments offer excellent opportunities for demonstration and practical applications of classroom and laboratory instruction.

Curriculum in Civil Engineering

Freshman	*F*	*W*	*S*
Civil Engineering (CE 122)	4		
Elementary Surveying (CE 134)		4	
Advanced Surveying (CE 135)			5
*Engineering Graphics (ME 120 or 121, 122)	2	2	
General Chemistry (CHM 111, 112)		3	3
General Chemistry Laboratory (CHM 151, 152)		1	1
‡Analytic Geometry and Calculus (MAT 114, 115)		3	3
General Physics (PHY 131)			4
Freshman Composition (ENG 104, 105)	3	3	
Health Education (PE 107)	2		
Physical Education (PE 141)	½	½	½
Electives and courses to complete major	5		2
	16½	16½	18½

*ME 120 or 121 to be determined by the Mechanical Engineering department.
‡Students not prepared to take MAT 114 will take MAT 104 and/or MAT 105 as determined by the Mathematics department.

Sophomore	*F*	*W*	*S*
Engineering Statics and Dynamics (ME 211, 212)	3		3
Strength of Materials (ME 218, 219)		3	4
Structural Welding (WE 239)	2		
General Physics (PHY 132, 133)	4	4	
Analytic Geometry and Calculus (MAT 116)	3		
Calculus and Differential Equations (MAT 214, 215)		4	4
Principles of Economics (EC 201, 202)		3	3
Technical Writing (ENG 219)	2		
Life Science (BIO 110)			3
Physical Education (PE 141)	½	½	½
Electives and courses to complete major	4	3	
	18½	17½	17½

Junior			
Economics of Engineering Decisions (CE 302)		3	
Structural Analysis (CE 304, 305)	3	3	
Engineering Soil Mechanics (CE 323)			3
Hydraulic Engineering (CE 332)		4	
Fluid Mechanics (ME 311)	3		
Calculus and Differential Equations (MAT 216)	4		
Engineering Geology (PSC 321)	4		
Statistical Methods in Engineering (MAT 309)		3	
Public Speaking (SP 200)			3
Water Supply Engineering (CE 431)			5
Electives and courses to complete major	3	3	7
	17	16	18

Senior			
Senior Project (CE 461, 462)	2	2	
Undergraduate Seminar (CE 463)			2
General Psychology (PSY 202)		3	
American Civilization (AMC 301, 302, 303)	3	3	3
Engineering Law, Contracts and Specifications (CE 403)			3
Water Quality Engineering (CE 432)	3		
†Humanities	3	3	3
Electives and courses to complete major	7	7	7
	18	18	18

Curricular Options

Civil Engineering

This option should be selected by students desiring to develop a background in the design and structural aspects of the profession.

Freshman

ME 125—Descriptive Geometry (2)

Sophomore

CE 221—Transportation Engineering (4)

CE 222—Highway Engineering Design (3)

Junior

CE 306—Structural Design: Steel (4)
ME 301—Thermodynamics (3)
EE 231, 232—Principles and Practices of Electrical Engineering (6)

Senior

CE 421—Structural Design: Reinforced Concrete (5)

†To be selected from the General Education list.

CE 433—Structural Design: Timber ..... (3)
Technical electives ..... (6)

Water Resources Engineering

This option provides the student with the opportunity to develop a background in the acquisition and uses of water.

Courses to Complete Major

Freshman

Technical electives ..... (2)

Sophomore

CE 251—Resource Interchange Systems ..... (4)

Junior

BIO 305—Ecology for Sanitary Engineers ..... (3)
PSC 303—Climatology ..... (3)
Technical electives ..... (3)

Senior

CE 454—Water Quality Management ..... (3)
CE 455—River and Coastal Engineering ..... (3)
CE 451—Engineering Hydrology (4)
BIO 434—Limnology ..... (3)
CHM 436—Nuclear Chemistry ... (4)
CE 434—Industrial and Radioactive Wastes ..... (3)
Technical electives ..... (1)

Description of Courses

CE 122 Civil Engineering (4)

Elementary digital computer programming for civil engineering problems. The technical, professional, and social responsibilities of the civil engineer. Engineering communications. 2 lectures, 2 three-hour laboratories.

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 221 Transportation Engineering (4)

Transportation systems planning; highway administration; economics, finance, planning, surveys, plans; construction and maintenance; mass transit; traffic surveys and routing studies, traffic operations and vehicular control, signs, signals and marking, terminal facilities, roadway design factors and drainage. 2 lectures, 2 three-hour laboratories. Prerequisite: CE 135

CE 222 Highway Engineering Design (3)

Geometric design of highways; highway substructure design; roadway structural section; flexible pavement design; rigid pavement design; highway surface treatments and stabilization. 2 lectures, 1 three-hour laboratory. Prerequisite: CE 221

CE 240 Additional Engineering Laboratory (1-2)

Total credit limited to 4 units, with not more than 2 units in any one quarter. 1 or 2 three-hour laboratories.

CE 251 Resource Interchange Systems (4)

Engineered systems for optimum beneficial use and management of water resources. Technical, aesthetic, and social aspects of water quality control. 3 lectures, 1 three-hour laboratory. Prerequisite: CE 122 or consent of instructor.

CE 270 Construction Internship (2)

Supervised on-the-job construction engineering training. Analytical reports of field work. Construction publication review. Prerequisite: Consent 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 I (3)

Determination of shears, moments, and deflections in statically determinate structures such as beams, trusses, bents, and arches involving both graphical and analytical methods of solution by means of structural mechanics. 3 lectures. Prerequisite: ME 219

CE 305 Structural Analysis II (3)

Determination of forces, moments, and deflections of statically indeterminate structures such as beams, bents, and gabled frames utilizing the methods of virtual work, slope deflection, and moment distribution. 3 lectures. Prerequisite: CE 304

CE 306 Structural Design—Steel (4)

Theory and practice in design, analysis, and detailing of structural steel members and their connections including beams, columns, trusses, and building frames in accordance with applicable material and building codes. Consideration of lateral load effects. Elements of plastic design. 3 lectures, 1 three-hour laboratory. Prerequisite: CE 305

CE 307 Elementary Structural Analysis (3)

Structural systems, including the determination of forces, stresses, and deflections in statically-determinate structures such as beams, trusses and bents; introduction to the analysis of statically-indeterminate building frames subjected to vertical and wind or seismic loadings. 3 one-hour lectures. Prerequisite: ME 202. Not open to majors in Civil Engineering.

CE 308 Elementary Structural Design (3)

Open only to non-civil engineering majors. Determination of sections for beams and columns in wood and steel design of truss members, design of bolted and welded connections. Effect of eccentric loading of columns. Introduction to plastic behavior. Lateral force design of diaphragm decks and shear panels. 2 lectures, 1 three-hour laboratory. Prerequisite: CE 307

CE 309 Contemporary Structural Systems (3)

Open only to non-civil engineering majors. Introduction to analysis and design of reinforced concrete beams, slabs, columns and foundations. Design of reinforced grooved masonry under vertical and lateral loadings. Discussion of design and construction of thin-shell, pre-stressed and post-tensioned concrete. Elements of space frames and other innovative structural systems. 2 lectures, 1 three-hour laboratory. Prerequisite: CE 308

CE 323 Engineering Soil Mechanics (3)

Structure, identification and classification of soil for engineering purposes. Determination of physical properties of soils by laboratory experiments including consolidation, shearing strength, permeability. Application to problems. 2 lectures, 1 three-hour laboratory. Prerequisite: PSC 321

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. Prerequisite: ME 311

CE 370 Construction Internship (2)

Supervised on-the-job construction engineering training. Analytical reports of field work. Construction publication review. Prerequisite: Consent of instructor.

CE 400 Special Problems for Advanced Undergraduates (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 421 Structural Design—Reinforced Concrete (5)

Analysis, design, and detailing of reinforced concrete structural elements including beams, columns, slabs, footings, and retaining walls. Elements of composite building design utilizing both working stress and ultimate strength design theories. Concrete usage as a construction material including its composition, proportioning and control, testing and strength. 3 lectures, 2 three-hour laboratories. Prerequisite: CE 306

*CE 423 Substructure Design (3)

Analysis and design of foundations and substructures. 2 lectures, 1 three-hour laboratory. Prerequisite: CE 421, 437

*CE 427 Photogrammetry (3)

Interpretation of aerial photographs. Stereoscopy. Application of aerial surveying to engineering problems, mapping. 2 lectures, 1 three-hour laboratory. Prerequisite: CE 135

CE 429 Traffic Engineering (3)

Driver and vehicle characteristics. Origin and destination studies. Volume, speed and accident studies. Traffic control devices. Channelization design. Traffic signal systems and design. Parking facilities design. Intersection design. Roadway lighting. Administration and financing of improvements. 2 lectures, 1 three-hour laboratory. Prerequisite: CE 222

CE 431 Water Supply Engineering (5)

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, 2 three-hour laboratories. Prerequisite: CE 332

CE 432 Water Quality Engineering (3)

Characteristics of waste waters; analysis and treatment of sewage and industrial wastes. Basic design of waste treatment plants and sewerage systems. 2 lectures, 1 three-hour laboratory. Prerequisite: CE 431

CE 433 Structural Design—Timber (3)

Analysis and design of timber structures, members, and connections in accordance with material and building code specifications. Consideration of lateral load effects upon design and detailing. 1 lecture, 2 three-hour laboratories. Prerequisite: CE 421

*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 435 Construction Costs and Estimates (3)

Construction costs and estimates of building and heavy construction. Estimating procedures: equipment, labor, material, and overhead costs. 2 lectures, 1 three-hour laboratory. Prerequisite: CE 222 and consent of instructor.

CE 436 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. Prerequisite: CE 222

*To be offered when course enrollment justifies.

CE 437 Foundation Soil Engineering (3)

Consolidation of soil and settlement of structures. Strength properties of soil, stability of slopes. 2 lectures, 1 three-hour laboratory. Prerequisite: CE 323

*CE 442 Masonry Design (3)

Design of brick and block structures. Emphasis on seismic analysis of these structures. 1 lecture, 2 three-hour laboratories. Prerequisite: CE 421

CE 443 Flexible Pavement Design Laboratory (3)

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. 1 lecture, 2 three-hour laboratories. Prerequisite: CE 222, 323 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 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 472 Construction Administration (4)

Construction management techniques; construction project administration and control; financing, bonding and insurance problems. 3 lectures, 1 three-hour laboratory. Prerequisite: CE 403, 436, IE 404

CE 473 Concrete Construction (3)

Concrete construction plant and equipment selection, form design and field operations, special techniques in forming and handling. 2 lectures, 1 three-hour laboratory. Prerequisite: CE 306

CE 474 Construction Safety (3)

Safety engineering in construction; cost of safety and accidents. Safety legislation, safety programs, accident prevention and public safety. 3 lectures. Prerequisite: Consent of instructor.

CE 515 Advanced Indeterminate Structures (4)

Advanced topics in analysis of multi-degree of freedom systems by slope deflection and super-position of distribution process. Elements of matrix application including flexibility and stiffness methods. Deflection of continuous trusses and framed structures. Stability analysis of beam-column

*To be offered when course enrollment justifies.

utilizing classical strain energy theorems. 4 lectures. Prerequisite: CE 305

CE 516 Advanced Structural Design—Steel (4)

Advanced topics in structural steel analysis and design including long span and tapered girders, orthotropic plates, spare frames. Column stability and post buckling states, secondary stresses. Design of lateral force resistant building frames. Plastic analysis and design of rigid frame structures. 3 lectures, 1 three-hour laboratory. Prerequisite: CE 306

CE 519 Dynamics of Structures (3)

Basic concepts in structural dynamics, in elastic response of structures to pulse loads and earthquakes, dynamic properties of structures, vibration of beams and other systems. Design approach to earthquake resistant structures. Basis for new earthquake factors in latest building codes. 3 lectures. Prerequisite: Consent of instructor.

CE 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. Pre-stressed concrete concepts; material and design methods. 3 lectures, 1 three-hour laboratory. Prerequisite: CE 421

CE 525 Foundation Engineering (3)

Advanced theories of soil bearing capacity and stress distribution of soils. Analysis and design of mat, pile and drilled caisson foundations involving advanced theories of foundation action. Design of foundations subjected to overturning forces and dynamic loads. Bridge piers and machinery foundations. 2 lectures, 1 three-hour laboratory. Prerequisite: CE 423

CE 663 Structural Engineering Seminar (2)

Discussion of new developments and procedures in structural analysis and design. Problems related to various phases of design. Presentation by student of new practices in structural field that are of particular interest to him. 2 three-hour laboratories.

ELECTRICAL AND ELECTRONICS ENGINEERING DEPARTMENT

Richard T. Black, *Chairman*
Robert A. Bruns
Henry M. Clanton
David L. Clark
Richard J. Hermsen
Alben C. Johnson
Howard K. Klebsch
A. Russell Knudsen
Verne L. LeCocq
Seung P. Li
Robert R. Marshall
Wilbur W. Maves
James A. McAllister
John C. McMillan
George A. Mellard
Daniel J. Nesin
Norman S. Nise
Earl E. Schoenwetter
Owen K. Skousen
Donald B. Smedley
Arthur W. Sutton, Jr.
William O. Thomas
Gustav N. Wassel
Harry K. Wolf
William T. Wootton

Choosing 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, electrical and electronic controls, computer design and application, ultrahigh frequency techniques, electrical and electronic metrology, and the generation, distribution and utilization of electrical power. Prior to entering the junior (third) year, the student will choose a concentration in either the field of Electrical Power Systems Engineering or Electronics Engineering to complete his major.

Graduates of this department are sought 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.

Curriculum in Electrical and Electronics Engineering

Freshman	*F*	*W*	*S*
Introduction to Electrical and Electronics Engineering (EE 107, 108, 109)	2	2	2
Introduction to Electrical and Electronics Engineering Laboratory (EE 147, 148, 149)	1	1	1
*Engineering Graphics (ME 120 or 121)			2
General Chemistry (CHM 111, 112)	3	3	
General Chemistry Laboratory (CHM 151, 152)	1	1	
Freshman Composition (ENG 104, 105, 106)	3	3	3
Life Science (BIO 110)	3		
Health Education (PE 107)			2
Physical Education (PE 141)	½	½	½
General Physics (PHY 131, 132)		4	4
Analytic Geometry (MAT 140)	4		
Calculus and Differential Equations (MAT 141, 142)		4	4
	17½	18½	18½

Sophomore			
Electronics (EE 201, 202)		3	3
Electronics Laboratory (EE 241, 242)		1	1
Fundamentals of Electrical Engineering (EE 211, 212, 213)	3	3	3
Electrical Engineering Laboratory (EE 252, 253)		1	1
Engineering Graphics for Electrical Engineers (EE 246)	2		
Engineering Statics and Dynamics (ME 211, 212)		3	3
General Physics (PHY 133)	4		
Physical Education (PE 141)	½	½	½
Calculus and Differential Equations (MAT 240, 241, 242)	4	4	4
Psychology (PSY 202)			3
Electives and courses to complete major	4	2	
	17½	17½	18½

Junior			
Networks (EE 301, 302)	3	3	
Analog Computers (EE 341)	1		
Networks Laboratory (EE 342)		1	
Electronic Circuits (EE 304, 305, 306)	3	3	3
Electronic Circuits Laboratory (EE 344, 346)	1		1
Advanced Mathematics (300–400 level)	3		
Engineering Materials (ME 314)			3
Principles of Economics (EC 201, 202)		3	3
Electronic Measurements (EE 324)	3		
Electromagnetic Fields (EE 402)			3
Manufacturing Processes (MPE 229)		2	
Weldment Engineering (WE 238)			2
Thermodynamics (ME 301)		3	
Electives and courses to complete major	4	3	3
	18	18	18

Senior			
Senior Project (EE 461, 462)		2	2
Undergraduate Seminar (EE 463)	2		
Control Systems Engineering (EE 413)	3		

*ME 120 or ME 121 to be determined by the Mechanical Engineering department.

	F	W	S
Control Systems Laboratory (EE 442)		1	
American Civilization (AMC 301, 302, 303)	3	3	3
†Humanities		3	
†Humanities	3		3
‡Basic Science elective			4
Electives and courses to complete major	4	8	4
	15	17	16

Curricular Concentrations

Electrical Power Systems

This concentration provides the knowledge and background needed by electrical engineers concerned with the design, production and utilization of electrical energy producing, transmitting, and distributing apparatus and electrical systems.

The student selecting this area of concentration will follow an alternate sequence of course work in electromechanics and energy conversion systems.

Electronics

This concentration provides the knowledge and background needed by electronic engineers in the broad areas of control systems, communications, computers, and circuit design. Some special emphasis is allowed by course work in microwave, electronic measurements, and solid state electronics.

The student selecting this area of concentration will follow a sequence of course work in network theory, electronic devices and circuit design theory, and the application of these to major areas of electronic engineering.

Description of Courses

EE 107, 108, 109 Introduction to Electrical and Electronics Engineering (2) (2) (2)

Introduction to the application of basic engineering fundamentals of electrical and electronics systems. Analytical, graphical, and computer techniques in the solution of typical problems. 2 lectures.

EE 147, 148, 149 Introduction to Electrical and Electronics Engineering Laboratory (1) (1) (1)

Electrical laboratory familiarization and basic experiments with electrical and electronic devices. Fundamentals of documenting laboratory work and technical report writing. 1 three-hour laboratory. Concurrent: EE 107, 108, 109

EE 201, 202 Electronics (3) (3)

Analysis of current flow in semiconductor and vacuum diodes. Characteristics of multi-element tubes, transistors, unipolar, multilayer, and special purpose semiconductor devices. Small-signal, low-frequency transistor analysis using impedence and hybrid parameters. 3 lectures. Prerequisite: MAT 240, CHM 111, PHY 133, EE 109, 149, or EE 210. Concurrent or prerequisite: MAT 116

EE 210 Introduction to Electrical and Electronics Engineering II (5)

Introduction to application of basic engineering fundamentals to electrical and electronics systems. Electrical laboratory familiarization and basic experiments with electrical and electronic devices. Analytical, graphical

†To be selected from the General Education list.
‡To be chosen from Life or Physical Sciences with approval of adviser.

and computer techniques in solution of typical problems. 3 lectures, 2 three-hour laboratories. Prerequisite: Consent of instructor.

EE 211, 212, 213 Fundamentals of Electrical Engineering (3) (3) (3)

Electrical circuits and parameters. Introduction to network theorems. Energy sources, magnetic circuits and amplifiers, transformers, alternating current circuits and parameters, complex algebra, single phase circuits, symbolic treatment, polyphase circuits, symmetrical components. Analysis of non-sinusoidal waves by Fourier series. 3 lectures. Prerequisite: MAT 142. Prerequisite or concurrent: PHY 133

EE 231, 232, 233 Principles and Practices of Electrical Engineering (3) (3) (3)

Electrical principles. Electric and magnetic circuits. Electrical machines. Machine controls and applications. Industrial wiring systems. Control and measurements including electronic devices. For non-electronic engineering majors. 2 lectures, 1 three-hour laboratory. Prerequisite: MAT 116, PHY 133

EE 240 Additional Engineering Laboratory (1-2)

Selected special assignments related to electrical and electronics design and construction of laboratory and demonstration apparatus.

Total credit limited to 4 units, with not more than 2 units in any one quarter. Prerequisite: Consent of the instructor.

EE 241, 242 Electronics Laboratory (1) (1)

Fundamental experiments concerned with the more common types of vacuum, gaseous, and semiconductor devices. 1 three-hour laboratory. Concurrent or prerequisite: EE 201, 202

EE 246 Engineering Graphics for Electrical Engineers (2)

Schematic drafting. Electronic and industrial symbols. Symmetry and balance. Schematic delineation, projection. Graphic integration. 1 lecture, 1 three-hour laboratory. Prerequisite: ME 120 or 121

EE 252, 253 Electrical Engineering Laboratory (1) (1)

Selected laboratory exercises in electrical engineering. 1 three-hour laboratory. Prerequisite or concurrent: EE 212, 213

EE 301, 302, 303 Networks (3) (3) (3)

Analysis and synthesis of network functions in the time domain and frequency domain. 3 lectures. Prerequisite or concurrent: MAT 242 or equivalent. Prerequisite: EE 202, 213, 242, 252

EE 304, 305, 306 Electronic Circuits (3) (3) (3)

Active devices as circuit elements. Amplification, feedback and stabilization. Oscillators and frequency stability. Wave shaping and pulse techniques. 3 lectures. Prerequisite: EE 213, 242, 252

EE 310 Environmental Test Engineering (2)

Study and operation of major environmental test equipment in the environmental lab (shock, vibration, acceleration, humidity, temperature, altitude, sound intensity). Test engineering instrumentation, calibration, maintenance. Test laboratory organization, scheduling and economics. Testing to military and industrial environment performance specifications. 1 lecture, 1 three-hour laboratory. Prerequisite: EE 202, 213, 242, 253 or equivalent and consent of instructor.

EE 311 Engineering Reports, Specifications, and Proposals (2)

Techniques of reading and writing technical specifications in electronics engineering. Avoiding technical, legal, and manufacturing pitfalls. Engineering reports: methods of clear exposition. Emphasizes concise presentation of plan and technical facts. Technical proposals: presentation techniques for soliciting funds and contracts. 2 lectures. Prerequisite: ENG 105, EE 246 or consent of instructor.

EE 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. 2 lectures, 1 three-hour laboratory. Prerequisite: EE 213, 253

EE 317 Electromechanics I (4)

Basic principles of electromechanical energy conversion, basic rotating machines, engineering considerations underlying machine ratings, applications and governing test codes and standards. General relationships with emphasis upon DC machines. For Power Systems Engineering students. 3 lectures, 1 three-hour laboratory. Prerequisite: EE 213, 253

EE 318 Electromechanics II (4)

Continuation of EE 317 with emphasis upon AC machine analysis, operation and applications. 3 lectures, 1 three-hour laboratory. Prerequisite: EE 317

EE 319 Electromechanics III (4)

Continuation of EE 317 and 318 with emphasis upon special purpose machines, new energy conversion devices, 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: EE 318

EE 322 Electronic Engineering (3)

Theory of operation and application of electronic devices. 2 lectures, 1 three-hour laboratory. Prerequisite: MAT 116, EE 231

EE 323 Electronic Engineering (3)

Introduction to the analysis of feedback control systems; introduction to digital and analog computer techniques. Emphasis on associated electronic circuits and components. 2 lectures, 1 three-hour laboratory. Prerequisite: MAT 216, EE 322

EE 324 Electronic Measurements (3)

Major types of instrumentation and techniques used in the measurement of electrical and non-electrical parameters. Applications to control, monitor, calibration, and pulse measurements. Transducers and data presentation methods. 2 lectures, 1 three-hour laboratory. Prerequisite: EE 203, EE 213 or equivalent.

EE 341 Analog Computers (1)

Application of analog computer to solutions of engineering problems with emphasis on network analysis and synthesis. 1 three-hour laboratory.

EE 342, 343 Networks Laboratory (1) (1)

Application of analog computers to solution of network analysis and synthesis problems. 1 three-hour laboratory. Prerequisite or concurrent: EE 301, 302, 303

EE 344, 345, 346 Electronic Circuits Laboratory (1) (1) (1)

Experimental determination of the important operating characteristics of audio and voltage amplifiers, tuned radio frequency power and voltage amplifiers. Standard performance testing. 1 three-hour laboratory. Prerequisite or concurrent: EE 304, 305, 306

EE 400 Special Problems for Advanced Undergraduates (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: EE 203, 243, consent of instructor.

EE 402 Electromagnetic Fields (3)

Static and quasi-static fields; laws of Coulomb, Gauss, Ohm, Faraday, Ampere; equations of electrostatic and magnetic fields, boundary value problems; introduction to time varying fields. Vector analysis used throughout. 3 lectures. Prerequisite: EE 303, MAT 216

EE 403 Microwave Engineering (3)

Microwave generation and energy propagation with emphasis on physical concepts and application to guided wages. 3 lectures. Prerequisite: EE 402

EE 404 Digital Circuits Design (3)

Generation and modification of pulse waveforms and design of logic, gating, multivibrator, and negative resistance switching circuits. Design and analysis of magnetic memory and switching elements. 3 lectures. Prerequisite: EE 306

EE 405 Communications Engineering (3)

Unified treatment of various types of transmission systems with emphasis on the role of system bandwidth and noise in limiting the transmission of information. Information theory as applied to contemporary communication techniques. 3 lectures. Prerequisite: EE 302, 306

EE 406 Electromagnetic Fields and Applications (3)

Continuation of EE 402, Electromagnetic Fields. Transmission line theory, basic to various modes of transmission, transmission line equations and solutions. Smith charts, Matching lines with losses, basic antenna theory and physical principles of antenna and line behavior. Elementary microwave theory. 3 lectures. Prequisite: EE 402, concurrent EE 446

EE 407 Advanced Circuit Design (4)

The practical design, testing, and evaluation of specialized circuits utilizing the latest and most advanced solid-state devices. 3 lectures, 1 three-hour laboratory. Prerequisite: EE 302, 306

EE 412 Solid State Electronics (4)

A unified treatment of the physical principles underlying electron devices, including the theory and application of solid state electronic devices, with considerable emphasis on recent developments in the field. 3 lectures, 1 three-hour laboratory. Prerequisite: MAT 242, EE 202, 302, 306

EE 413 Control Systems Engineering (3)

Analysis and design of feedback control systems. Root-locus and frequency response techniques. Systems performance criteria, methods of improving transient and steady response by use of compensating filters. 3 lectures. Prerequisite: EE 302, 342

EE 414 Control Systems Design (4)

Design of series and parallel equalization for DC control systems. Analysis and design of AC systems. Analysis and design of sampled data control systems including transform methods. Analysis of non-linear systems via phase plane and numerical methods. 3 lectures, 1 three-hour laboratory. Prerequisite: EE 413, 442

EE 415 Electronic Design (4)

Creative thinking and engineering analysis of electronic design and packaging problems. Basic mechanical, electronic, and fabrication problems; reliability, producibility, maintainability. Designing for extreme environments. 3 lectures, 1 three-hour laboratory. Prerequisite: EE 202, 246, 306, 324, consent of instructor.

EE 416 Electronic Instrument and Measurement Engineering (4)

Electrical measurement of electrical and non-electrical phenomena. Synthesis and analysis of measurement systems. Control system requirements. Transducers, signal conditioners, data transmission, data presentation. Transducer design and selection. Special applications in process control, engineering testing, aerospace, science. 3 lectures, 1 three-hour laboratory. Prerequisite: EE 302, 306, 324

EE 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, EE 313 or EE 233

EE 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: EE 421

EE 425 Advanced Digital Circuits Application and Design (4)

A systems approach to the design of combinational and sequential networks to perform specified computing functions. Hybrid computers and their applications. 3 lectures, 1 three-hour laboratory. Prerequisite: EE 404, 444

EE 442 Systems Laboratory (1)

Selected laboratory exercises based upon the course work of EE 413. 1 three-hour laboratory. Prerequisite: Senior standing, EE 313, 413

EE 443 Microwave Laboratory (1)

Laboratory exercises and applications of microwaves. 1 three-hour laboratory. Prerequisite: EE 343. Concurrent: EE 403

EE 444 Digital Circuits Laboratory (1)

Selected laboratory exercises from topics covered in EE 404. 1 three-hour laboratory. Prerequisite: EE 346. Concurrent: EE 404.

EE 445 Communications Laboratory (1)

Demonstrations of the individual aspects of communication techniques. 1 three-hour laboratory. Prerequisite: EE 342, 346. Concurrent: EE 405

EE 446 Electromagnetic Fields and Applications Laboratory (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: EE 402. Concurrent: EE 406

EE 451, 452, 453 Industrial Electronics (1) (1) (1)

Selected engineering activity with industry. Design, test, evaluation, and analysis responsibilities of the junior engineer. 1 three-hour laboratory. Prerequisite: Senior standing, consent of instructor.

EE 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: EE 463

EE 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.

INDUSTRIAL ENGINEERING DEPARTMENT

Joseph P. Wymer, *Chairman*
Bratcher L. Bright
Donald E. Brown
Daniel H. Fillhart
Quay D. Ives
Leonhard M. Myers
Russell A. Parish
Jack L. Pomeroy
Robert A. Quaney
Richard H. Schippers
J. Garrard Wright

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.

Courses in metal processes, which offer the student a foundation in the basic skills and an understanding of the capabilities and limitations of machine tools, are offered by the department. Laboratories in the department are equipped with a broad range of modern production processing equipment so that the student may gain a diversified knowledge of the advantages and limitations of the more commonly used manufacturing methods and techniques.

Instruction is realistic and characteristic of the requirements of industry. Many local industries have permitted students to work on projects in their plants.

Curriculum in Industrial Engineering

Freshman	*F*	*W*	*S*
Industrial Engineering (IE 111)	3		
Production Planning and Control (IE 236)		4	
Molding and Casting (IE 134)	2		
Industrial Costs and Controls (IE 239)			5
*Engineering Graphics (ME 120 or 121, 122, 123)	2	2	2
Manufacturing Processes (MPE 221, 222, 228)	2	2	2
‡Analytic Geometry and Calculus (MAT 114, 115)		3	3

*ME 120 or 121 to be determined by the Mechanical Engineering department.
‡Students not prepared to take MAT 114 will take MAT 104 and/or MAT 105 as determined by the Mathematics department.

	F	W	S
General Physics (PHY 131, 132)		4	4
Freshman Composition (ENG 104, 105)	3	3	
Life Science (BIO 110)	3		
Physical Education (PE 141)	½	½	½
Electives	2		
	17½	18½	16½

Sophomore

Industrial Incentives (IE 214)			3
Work Analysis and Design (IE 224, 225, 226)	3	3	3
Process Design (IE 228)		5	
Welding Fabrication and Design (WE 237)	3		
Analytic Geometry and Calculus (MAT 116)	3		
Calculus and Differential Equations (MAT 214, 215)		4	4
Statistical Methods in Engineering (MAT 309)			3
General Physics (PHY 133)	4		
General Chemistry (CHM 111, 112)	3	3	
General Chemistry Laboratory (CHM 151, 152)	1	1	
Technical Writing (ENG 219)		2	
General Psychology (PSY 202)			3
Physical Education (PE 141)	½	½	½
	17½	18½	16½

Junior

Production Engineering (IE 324, 325)	3	4	
Plant Layout and Material Handling (IE 331, 332)		3	3
Engineering Economy (IE 405)	3		
Industrial Computer Systems (IE 428)	4		
Industrial Systems Design (IE 429)			4
Electrical Engineering (EE 231, 232)	3	3	
Electronic Engineering (EE 322)			3
Engineering Statics and Dynamics (ME 211, 212)	3	3	
Strength of Materials (ME 218, 219)		3	4
Engineering Metallurgy (WE 304)	2		
Metallurgy Laboratory (WE 343)		1	
Electives			4
	18	17	18

Senior

Senior Project (IE 461, 462)	2	2	
Undergraduate Seminar (IE 463)			2
Quality Control by Statistical Methods (IE 415)	4		
Introduction to Operations Research (IE 416)			4
Reliability Concepts and Techniques (IE 419)		3	
American Civilization (AMC 301, 302, 303)	3	3	3
Principles of Economics (EC 201, 202)	3	3	
†Literature or Philosophy	3	3	3
§Technical Electives	3	2	
Electives		1	5
	18	17	17

†To be selected from the General Education list.
§To be selected with the approval of the student's adviser.

Description of Courses

Industrial Engineering

IE 111 Industrial Engineering (3)

Introduction to industrial engineering. Relationship of the industrial engineer to various divisions of business organizations, including manufacturing, sales and services. 3 lectures.

IE 134 Molding and Casting (2)

Shaping of metals while in the liquid state; common molding and casting techniques for both ferrous and nonferrous materials and alloys. 1 lecture, 1 three-hour laboratory.

IE 202 Production Processes (3)

Manufacturing processes such as foundry, forging, plastics, chemical milling, powder metallurgy, sponge and solid rubber; raw material processing such as steel, aluminum, glass, cloth and chemicals; finishing processes such as degreasing, painting, plating, and other surface treatments. For majors other than IE. 3 lectures. Prerequisite: MPE 221

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, 226 Work Analysis and Design (3) (3) (3)

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. 2 lectures, 1 three-hour laboratory.

IE 228 Process Design (5)

Design of manufacturing processes with particular emphasis on processes used in the electronics industry. Evaluation of alternate methods of processing depending upon delivery, volume, and quality specifications. Types of processes included are finishing including plating, printed circuit making, component preparation and installation, chassis construction, plastics and rubber processing, electroforming, and packaging. 3 lectures, 2 three-hour laboratories. Prerequisite: IE 134, MPE 222, WE 237

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 240 Additional Engineering Laboratory (1-2)

Total credit limited to 4 units, with not more than 2 units in any one quarter. 1 or 2 three-hour laboratories.

IE 324 Production Engineering I (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: ME 123, IE 236, IE 228

IE 325 Production Engineering II (4)

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, electromechanical tooling devices. Review of tool manufacturing techniques. 2 lectures, 2 three-hour laboratories. Prerequisite: IE 324

IE 326 Industrial Production (3)

The production of selected products through the operation and use of modern machine tools, plastic and metal forming machinery. The student will solve problems in estimation, scheduling, and production of the selected product on a simulated industrial production line, utilizing tooling typical of that designed and manufactured in Production Engineering II. 1 lecture, 2 three-hour laboratories. Prerequisite: IE 325

IE 331, 332 Plant Layout and Material Handling (3) (3)

Product development, production analysis, selection and utilization of plant equipment, material flow principles, material handling, plant layout. 2 lectures, 1 three-hour laboratory. Prerequisite: IE 228, 236

IE 400 Special Problems for Advanced Undergraduates (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 404 Industrial Organization (3)

Principles of industrial organization and control. Organizational relationships, departmentalization, centralization, decentralization, etc. Case histories utilized to illustrate the principle and theory. 3 lectures. Prerequisite: Senior standing.

IE 405 Engineering Economy (3)

Techniques for comparing the relative economies of engineering and manufacturing investments. Use of the scientific method and compound interest and depreciation formulas to compare alternatives before and after federal income taxes. Increment and sunk costs; retirement and replacement studies; sensitivity analysis; concepts of cash flow and capital rationing; 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: MAT 309

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.

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 428

IE 446 Die Casting (1)

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 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.

Metal Processes Engineering

MPE 142 Metal Processes (1)

An introduction to the metal processes involving the physics of metal cutting and the principles of chip removal. The student studies speeds, feeds, tolerances, and surface finish determinants as related to manually and numerically controlled machines. 1 three-hour laboratory.

MPE 143 Metal Processes (1)

Cutting tool materials and machinability of various metals and plastics. Machining experience on the lathe including taper turning, taper boring, internal thread cutting, and plain cylindrical grinding. Operations in relation to their adaptability to manually and numerically controlled equipment. 1 three-hour laboratory. Prerequisite: MPE 142

MPE 146 Metal Processes (1)

Advanced milling machine and surface grinder theory and practice; machine selection and operation analysis. Evaluation of materials, quantities, and economic factors. 1 three-hour laboratory.

MPE 221 Manufacturing Processes (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 lecture, 1 three-hour laboratory.

MPE 222 Manufacturing Processes (2)

Modern metal removal techniques including electrical discharge, abrasive, chemical, ultrasonic, electron beam, and numerical control processes. Laboratory experience includes both well established and recently developed methods of metal removal. 1 lecture, 1 three-hour labroatory. Prerequisite: MPE 221 and PHY 131 or concurrent

MPE 228 Manufacturing Processes (2)

The deformation and plastic flow of metal as influenced by mechanical and thermal processes. Emphasis is placed on development of engineering competency by involvement with design, materials, specifications, processes, operations, tools, dies, and specialized equipment. 1 lecture, 1 three-hour laboratory.

MPE 229 Manufacturing Processes (2)

Metal shaping and fabrication applied to the creative development of a new, marketable product which is

mass produced. Emphasis is placed upon development of engineering knowledge of dies, jigs, fixtures related to pressed metal stamping equipment. 1 lecture, 1 three-hour laboratory. Prerequisite: MPE 228

MPE 400 Special Problems for Advanced Undergraduates (1–2)

Individual or group investigation, research, and a depth study of a specific industrial process or operation. Total credit limited to 4 units, with a maximum of 2 units per quarter.

MPE 438 Manufacturing Processes (2)

Review of rheology of thermoplastic and thermosetting materials. Processing of plastics by injection, compression, transfer molding. Mixing, laminating, vacuum forming, machining, and handling characteristics of plastics. Included are field trips to plastic processors. 1 lecture, 1 three-hour laboratory. Prerequisite: MPE 228 and ME 313

MECHANICAL ENGINEERING DEPARTMENT

Kenneth J. Schneider, *Chairman*
Robert L. Beardmore
William R. de Boisblanc
Walter J. Ebersole
George F. Engelke
Edward D. Galbraith
James D. Goodin
Charles J. Kessler
Gary W. Koonce
E. Richard Mertz
Thomas S. Morris
Harvey A. Mylander
Ronald C. Paré
John W. Ridley
James P. Todd
Edwin H. Williams
Darryl C. Zell

Mechanical engineering deals with equipment, machines, and products which are characterized by their utilization of the strength and rigidity of structural materials, the useful properties of fluids, the conversion of energy from fuels to useful work, and the interrelation of wheels, gears, and levers.

Graduates in Mechanical Engineering obtain employment with manufacturers, contractors, public utilities, and government agencies, working in plant engineering, machine tool and pipe designing, engineering testing, sales engineering, air conditioning, refrigeration, construction supervision, and maintenance planning.

During the junior years students choose several areas of specialization such as advanced machine design, tool design, heat power, nuclear physics and nuclear engineering, and advanced mechanics. An elective sequence in electronics engineering is also available. 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, mechanical drawing, and shops. The junior college student planning to transfer into this department should, insofar as possible, take courses which fulfill the requirements of the curriculum in mechanical engineering.

Curriculum in Mechanical Engineering

Freshman	*F*	*W*	*S*
*Engineering Graphics (ME 120 or 121, 122)	2	2	
Mechanical Engineering (ME 131, 132, 133)	4	2	2
Descriptive Geometry (ME 125)			2

*ME 120 or ME 121 to be determined by the Mechanical Engineering Department.

	F	*W*	*S*
‡Analytic Geometry and Calculus (MAT 114, 115)		3	3
General Chemistry (CHM 111, 112)		3	3
General Chemistry Laboratory (CHM 151, 152)		1	1
General Physics (PHY 131)			4
Life Science (BIO 110)			3
Freshman Composition (ENG 104, 105)	3	3	
General Psychology (PSY 202)	3		
Health Education (PE 107)		2	
Physical Education (PE 141)	½	½	½
Electives	3		
	15½	16½	18½

Sophomore

Engineering Graphics (ME 123)			2
Engineering Statics (ME 214)	3		
Engineering Kinematics (ME 215)		3	
Engineering Kinetics (ME 216)			3
Strength of Materials (ME 218, 219)		3	4
Engineering Metallurgy (WE 304)	2		
Metallurgy Laboratory (WE 343)		1	
Analytic Geometry and Calculus (MAT 116)	3		
Calculus and Differential Equations (MAT 214, 215)		4	4
General Physics (PHY 132, 133)	4	4	
American Civilization (AMC 301, 302, 303)	3	3	3
Physical Education (PE 141)	½		
†Humanities			3
Electives	3		
	18½	18	19

Junior

Thermodynamics (ME 301, 302)	3	3	
Fluid Mechanics (ME 311, 312)		3	3
Heat Transfer (ME 313)			3
Machine Design (ME 324)			3
Principles and Practices of Electrical Engineering (EE 231, 232, 233)	3	3	3
Electronic Engineering (EE 322)			3
Manufacturing Processes (MPE 221, 222)	2	2	
Manufacturing Processes (MPE 228, 229)	2	2	
Welding Fabrication and Design (WE 337)	3		
Calculus and Differential Equations (MAT 216)	4		
Mathematics electives (300 series)			3
Physical Education (PE 141)	½	½	
†Humanities		3	
	17½	16½	18

Senior

Senior Project (ME 461, 462)		4	
Undergraduate Seminar (ME 463)	2		
Machine Design (ME 325)	3		
Mechanical Vibrations (ME 413)	4		
Advanced Engineering Measurements (ME 436)	3		
§Basic Science Elective	3		

†To be selected from the General Education list.

‡Students not prepared to take MAT 114 will take MAT 104 and/or 105 as determined by the Mathematics department.

§To be selected with the approval of the student's adviser.

	F	*W*	*S*
Engineering Economy (IE 405)			3
Principles of Economics (EC 201, 202)		3	3
†Humanities		3	
§Technical electives	3	6	6
Electives			6
	18	16	18

Description of Courses

Engineering

EGR 201 Engineering Technology (3)

History 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.

Mechanical Engineering

ME 120 Engineering Graphics (2)

Fundamentals of drafting methods. Use of equipment. Freehand lettering; geometric constructions; pictorial drawings. Multiplanar principal views; sectional views; auxiliary views. For students with little or no previous drafting experience. 2 three-hour laboratories.

ME 121 Engineering Graphics (2)

Freehand lettering, pictorial drawings. Drafting methods for geometric construction. Multiplanar projections. Auxiliary views, sectional views. Emphasis on industrial techniques and standards. 1 lecture, 1 three-hour laboratory. Prerequisite: 1 year of high school drafting recommended.

ME 122 Engineering Graphics (2)

Techniques of dimensioning working drawings for castings, forgings, machined, welded, sheet metal parts including tolerances, shop notes, screw threads. Relation between engineering drawings and shop processes. Intersection of surfaces. Development of surfaces. 1 lecture, 1 three-hour laboratory. Prerequisite: ME 120 or ME 121

ME 123 Engineering Graphics (2)

Fundamentals of product design including typical machine parts, fastening devices, shop notes, standard parts, assembly and detail drawings, parts lists. Fundamentals of production tool drawings. Elements of piping, structural and architectural drawing. 1 lecture, 1 three-hour laboratory. Prerequisite: ME 122

ME 125 Descriptive Geometry (2)

Solution of typical drafting room problems by graphical methods of multiview projection. Construction of fundamental views. Perpendicular, parallel and skew lines. Relationships of points, lines, and planes. Intersections of planes. Dihedral angles. 2 three-hour laboratories. Prerequisite: ME 120 or ME 121

ME 131 Mechanical Engineering (4)

Problem solving in mechanical engineering. Problems dealing with the basic concepts of dimension, time, temperature, pressure, motion and energy. Fundamentals of engineering experimentation and data presentation. 2 lectures, 2 three-hour laboratories.

ME 132 Mechanical Engineering (2)

Extension of problem solving. Problems involving basic computational methods including elementary concepts of digital computer programming. 1 lecture, 1 three-hour laboratory.

ME 133 Mechanical Engineering (2)

Introduction to machine design techniques and the design and selection of power transmission elements such as

†To be selected from the General Education list.
§To be selected with the approval of the student's adviser.

couplings; U-joints; roller and silent chains; V, flat, and gear belts; gears and gear transmissions; cams; friction drives. 1 lecture, 1 three-hour laboratory.

ME 201, 202 Statics and Strength of Materials (3) (3)

Equilibrium in two and three dimensional frames and trusses; cables; beams; shear and moment diagrams; analysis of axial, transverse and vending stresses in structural members including beams, columns and shafts; riveted and welded joints; introduction to repeated loading and fatigue. 3 lectures. Prerequisite: PHY 123, MAT 109

ME 211, 212 Engineering Statics and Dynamics (3) (3)

Equilibrium, trusses, friction and vector statics; relative velocity and acceleration, Newton's laws of motion, work and energy, impulse and momentum, impact and mechanical vibrations. For majors in EE, CHE, CE, IE, MAT and PSC. 3 lectures. Prerequisite: PHY 131, MAT 115 for ME 211, MAT 116 for ME 212

ME 213 Engineering Kinematics and Dynamics (3)

Kinematics of linear and angular motion, relative velocity and acceleration; force, mass and acceleration; work and energy. For students majoring in EE, CE, CHE, IE, MAT, and PSC transferring a formal course in statics from a junior college. 3 lectures. Prerequisite: MAT 116, at least 3 quarter units of statics.

ME 214 Engineering Statics (3)

Two- and three-dimensional equilibrium employing free-body diagrams; structures including two- and three-dimensional trusses and frames; principles of static friction involved with blocks, wedges and belts. 3 lectures. Prerequisite: PHY 131, MAT 115. Concurrent: MAT 116

ME 215 Engineering Kinematics (3)

Kinematics covering basic motion, centroids, relative linear velocity and acceleration with applications to planetary gearing. 3 lectures. Prerequisite: ME 214, MAT 116

ME 216 Engineering Kinetics (3)

Newton's laws of motion; force, mass, and acceleration; work and energy, conservation of energy; linear and angular impulse and momentum, conservation of momentum, impact and gyroscopic motion. 3 lectures. Prerequisite: ME 215, MAT 116

ME 218 Strength of Materials (3)

Properties of materials, stress-strain diagrams, mechanical hysteresis and creep; design loads, working stresses and factor of safety; deflections and stresses in structural and machine members. Use of Mohr's Circle for principal stresses; stress concentration. Combined axial and torsional loads with application to helical springs; load, shear, and moment diagrams for beams; riveted and welded joints. 3 lectures. Prerequisite: ME 214 or ME 211 and MAT 116

ME 219 Strength of Materials (4)

Deflection and stress in structural and machine members under combined axial, torsional, and flexural loading; deflection and slope of beams by various methods; deflection, slope, load, shear and moment curve transposition by multiple integration and differentiation; statically indeterminate members; columns, concentric and eccentric loading. 3 lectures, 1 three-hour laboratory. Prerequisite: ME 218

ME 240 Additional Engineering Laboratory (1-2)

Total credit limited to 4 units, with not more than 2 units in any one quarter. 1 or 2 three-hour laboratories.

ME 301 Thermodynamics (3)

The general energy equation, equations of state, First Law of Thermodynamics. Applications are considered and analyzed through the assignment of problems and exercises. 3 lectures. Prerequisite: PHY 132, MAT 116

ME 302 Thermodynamics (3)

Entropy and the Second Law, various thermodynamic cycles, and the relationships that obtain in the study of imperfect gases. Fundamentals of heat transfer applications are considered and analyzed through the assignment of problems and exercises. 3 lectures. Prerequisite: ME 301

ME 311 Fluid Mechanics (3)

Analysis and problems dealing with the various basic properties of fluids. These include: fluid statics, Bernoulli's Equation, the general energy equation of flow, impulse and momentum, and the flow of real fluids in closed conduits. 3 lectures. Prerequisite: ME 212 or ME 213 or ME 216. Concurrent: ME 301, MAT 215

ME 312 Fluid Mechanics (3)

Analysis and problems dealing with fluid measurement. Incompressible and compressible flow in orifices, nozzles, venturi meters. Compressible flow in conduits and about immersed objects. Dynamic similitude, dimensional analysis and fluid machines. 3 lectures. Prerequisite: ME 311

ME 313 Heat Transfer (3)

Basic principles of heat transfer and their application to the design of industrial equipment. Steady state and transient problems of conduction by analytical and numerical methods. Free and forced convection. Transfer of radiant energy. 3 lectures. Prerequisite: ME 301, 311, MAT 215

ME 314 Engineering Materials (3)

Structure, composition and physical properties of commercially useful materials. Selection of materials for specific applications. Heat treatment. Corrosion of metals and alloys; protective coatings. 3 lectures. Prerequisite: PHY 131

*ME 320 Creativity (3)

A survey of creativity. Learning the skill and technique of creative thought. Demonstration of creative solutions to problems. 2 lectures, 1 three-hour laboratory. Prerequisite: Junior standing.

ME 324 Machine Design (3)

Design and application of machine components such as shafts, brakes, clutches, gears and cams. Design factor selection and approach to design problems. Acceleration and loading of machine members. Designing with friction materials. 3 lectures. Prerequisite: ME 216, 219

ME 325 Machine Design (3)

Design and application of machine elements such as mechanisms, bearings, ways, sleeves, and bushings. Lubrication of machine elements, gaskets, seals, "O" rings. Fastening methods and devices. Design techniques and the design of a simple machine. 2 lectures, 1 three-hour laboratory. Prerequisite: ME 324, MPE 222, 229, WS 304

ME 326 Machine Design (3)

Design of machine frames and castings. Tolerances and surface roughness for machine elements and assemblies. Design of complete machines. Checking designs and redesigning machine failures. 1 lecture, 2 three-hour laboratories. Prerequisite: ME 325

ME 400 Special Problems for Advanced Undergraduates (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, 409 Nuclear Engineering (3) (3)

Engineering considerations in design, control, and operation of nuclear reactors; materials of construction; thermal, hydraulic and mechanical problems; instrumentation and control; isotope preparation; radiation hazards, shielding and disposal of radioactive waste; power from nuclear fuels. 3 lectures. Prerequisite: ME 313, WE 304, MAT 215

*ME 411 Heat Power (3)

Application of thermodynamics to actual power cycles. Turbine theory. Modern combustion gas and vapor power plants and auxiliaries. Economics of power generation. 3 lectures. Prerequisite: ME 302

*ME 412 Heat Power (3)

Theory and application of fuels, fuel systems, aspiration, combustion, detonation; mechanism, lubrication and performance of internal combustion engines. 3 lectures. Prerequisite: ME 302, 313

*To be offered when course enrollment justifies.

ME 413 Mechanical Vibrations (4)

Damped and forced vibrations, transient and steady state motions, vibration isolation, commercial vibration control and measuring hardware and electrical analogs of vibratory systems; balance and critical speeds of rotating machine members, flywheel and multicylinder engine balancing. Actual case studies of vibration isolation and machine balancing. 3 lectures, 1 three-hour laboratory. Prerequisite: ME 216, 219, MAT 216

***ME 414 Advanced Dynamics (3)**

Applications of Lagrange's equations and Hamilton's principle to systems having many degrees of freedom, gyrodynamics, trajectory studies of rigid and elastic bodies. 3 lectures. Prerequisite: ME 413, MAT 318

***ME 415 Advanced Dynamics (3)**

Analysis of transient response, beam vibration by Rayleigh's Method, method of influence, coefficients, iteration procedure, fundamentals of servomechanisms including theory of dynamic stability. 3 lectures. Prerequisite: ME 414

***ME 417 Environmental Engineering (3)**

Environmental requirements for human habitation, psychrometrics, building heating and cooling loads, air temperature and humidity control. 3 lectures. Prerequisite: ME 302, 313

***ME 418 Environmental Engineering (3)**

Air cleaning and distribution, radiant heating and cooling, design of the complete air conditioning system. 2 lectures, 1 three-hour laboratory. Prerequisite: ME 417

***ME 421 Mechanisms (4)**

Application of special mechanisms to practical problems in engineering. Geneva wheels, ratchets, couplings, universal joints, governors, escapements, straight line motion mechanisms. 4 lectures. Prerequisite: ME 216

***ME 431, 432 Tool Design (3) (3)**

Design of manufacturing tools such as jigs, fixtures, and dies. Materials, tolerance balancing, and toolroom methods as design factors. 2 lectures, 1 three-hour laboratory. Prerequisite: ME 325

ME 436 Advanced Engineering Measurements (3)

Application of sensing, modifying and signal read-out devices to problems of engineering measurement and control. System response and errors are studied for typical installations. 1 lecture, 2 three-hour laboratories. Prerequisite: ME 302, 312, 413, EE 322

***ME 438 Advanced Machine Design (3)**

Creativity and human engineering in machine design. Power source selection. Design of electrical, pneumatic, and hydraulic control systems for machines. Design of compression, extension, torsion, flat, wire form, and power springs. 2 lectures, 1 three-hour laboratory. Prerequisite: ME 325

***ME 439 Advanced Machine Design (3)**

Design and use of power screws, flexible shafts, flywheels, and high-speed machinery. Heat treatment required for machine functions. Dimensional control. Standard machine components, vari-speed drives or reducers, and feed mechanisms. Recent design developments. 2 lectures, 1 three-hour laboratory. Prerequisite: ME 438. Concurrent: ME 413

***ME 440 Analog Computation (4)**

Application of the electronic analog computer to the solution of typical problems in engineering. 3 lectures, 1 three-hour laboratory. Prerequisite: ME 216 or 212; MAT 215

***ME 441 Control Systems (4)**

Introduction to automatic control system analysis and design. Mechanical, electromechanical, hydraulic and pneumatic systems will be treated. For non-Electronics Engineering majors. 3

*To be offered when course enrollment justifies.

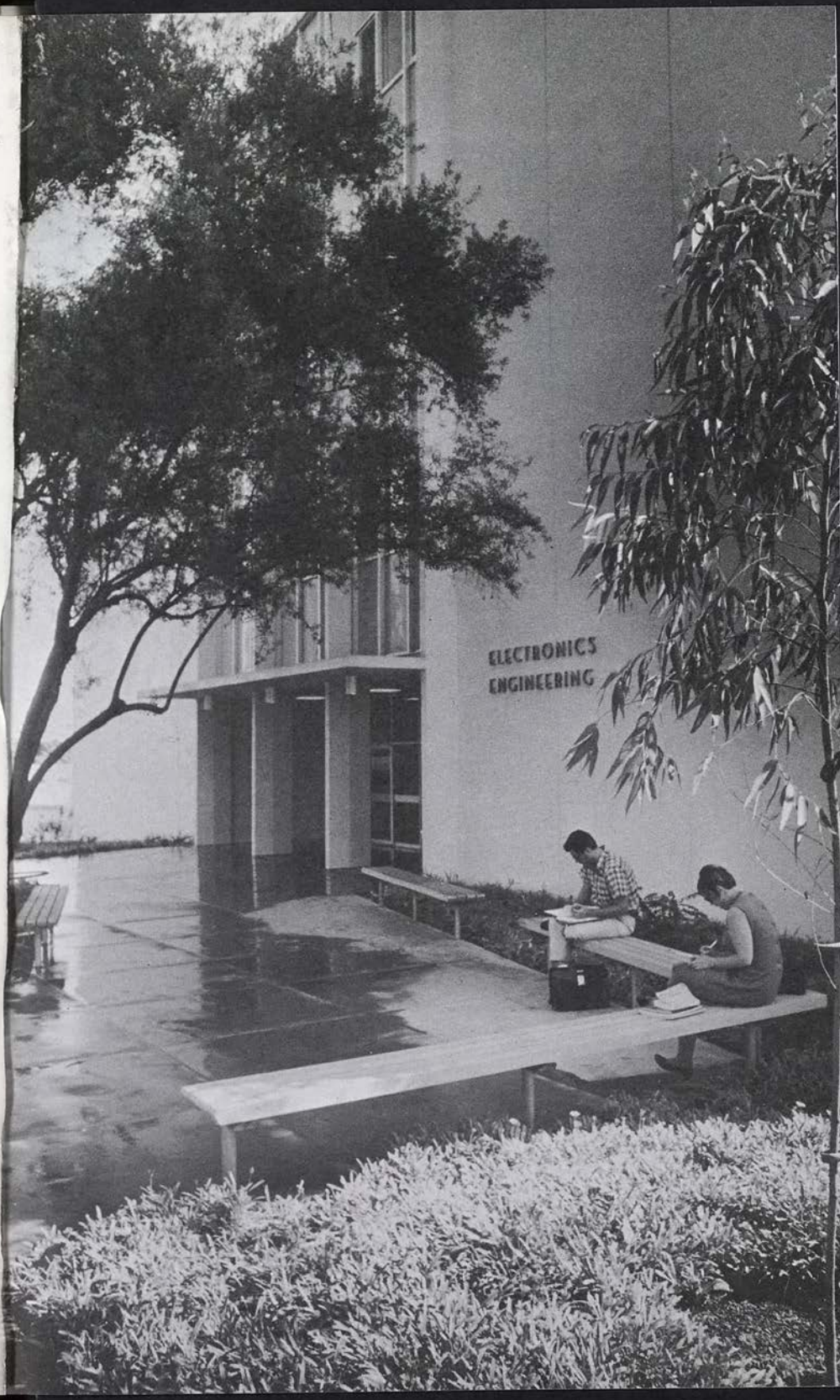
lectures, 1 three-hour laboratory. Prerequisite: MAT 215, EE 233, 322, ME 311, 413

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 325 and all required MPE courses.

ME 463 Undergraduate Seminar (2)

General discussion of new developments, policies, practices, and procedures in regular seminar. Each individual is responsible for the preparation and presentation of an engineering development in his chosen field. 2 lecture-problem sessions. Prerequisite: Senior standing.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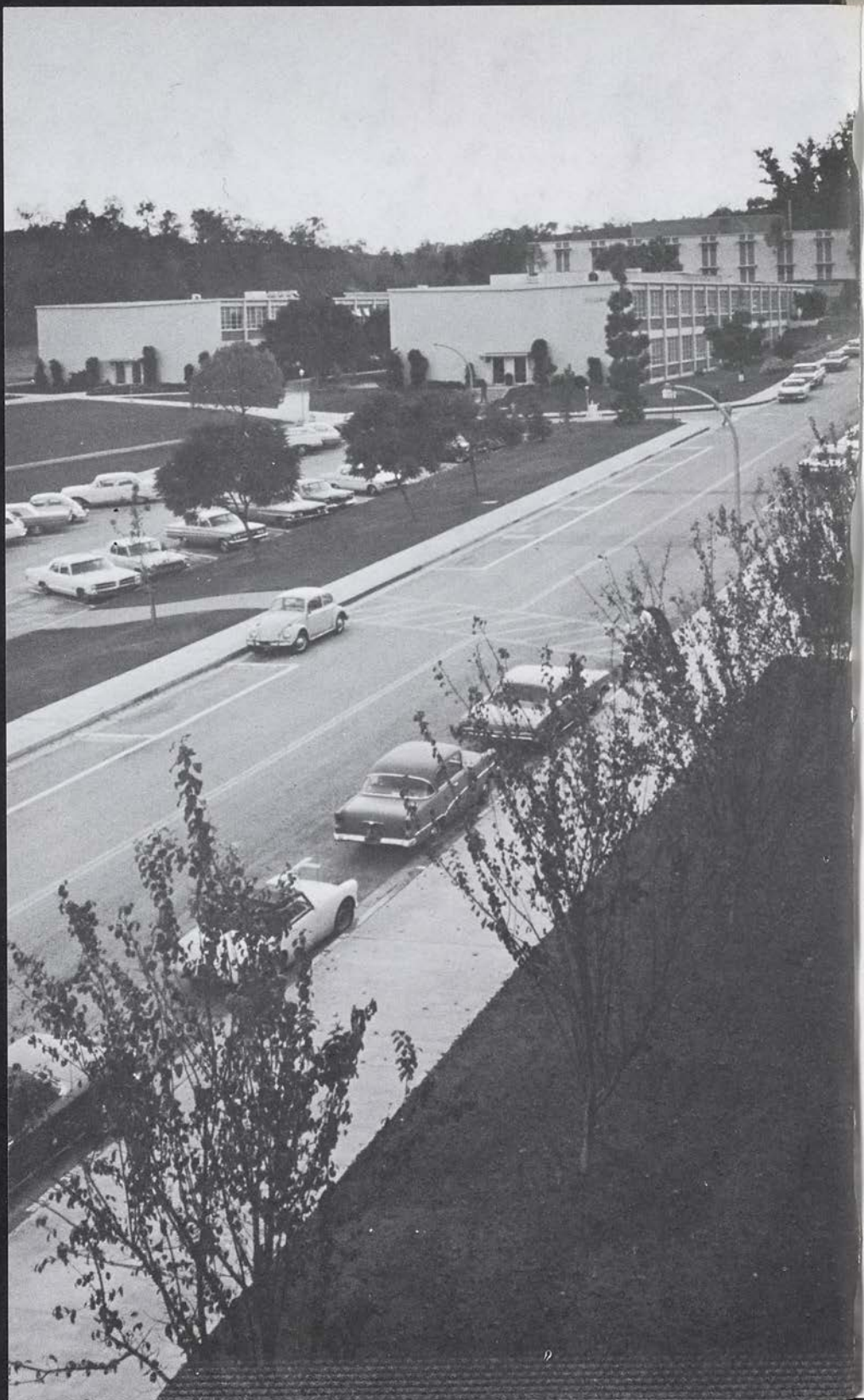

SCHOOL OF SCIENCE

BIOLOGICAL SCIENCES . . . 285

MATHEMATICS . . . 299

PHYSICAL SCIENCES . . . 304

THE SCHOOL OF SCIENCE

Vincent E. Parker, *Dean*

New frontiers in science and mathematics are among the great challenges and opportunities facing mankind. The faculty of the School of Science is dedicated to providing the finest education to students who elect to major in science or mathematics and to developing the creative type of scientist or mathematician so urgently needed for finding solutions to man's problems and for the development of a better society. The curricula combines 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 fields.

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 has never been so great. The School of Science also offers basic supporting courses for students enrolled in the professional and technological degree programs in other schools of the college.

Majors leading to the Bachelor of Science degree are offered in Biology, Botany, Chemistry, Mathematics, Microbiology, Physical Science, Physics and Zoology. Within the Biological Sciences major, students may pursue concentrations in Mycology-Plant Pathology, Physiology, Public Health-Medical Technology, and Systematic Entomology.

A Master of Science degree is offered in the Department of Biological Sciences and graduate courses are offered in Chemistry which will lead to the degree of Master of Science in Chemistry. Master of Science programs are being developed in Physics and Mathematics as well.

The Standard Teaching Credential program is offered for both the Elementary Specialization and the Secondary Specialization. A prospective elementary or secondary school teacher may elect an appropriate major or minor in biology, chemistry, mathematics, physical science, or physics.

An active co-curricular program includes Beta Beta Beta Biological honor society; Biovia, a club for Biological Sciences majors; a chapter of Kappa Mu Epsilon (mathematics); the Quantum Club, which is primarily for students majoring in the physical sciences; a SCUBA Club; and other organizations.

BIOLOGICAL SCIENCES DEPARTMENT

Jerome E. Dimitman, *Chairman*
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Lawrence M. Blakely
Howard S. Brown
Ronald S. Daniel
William D. Edmonds
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Bruce L. Firstman
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Brigitte H. Goehler
Vernon L. Gregory
Marion P. Harthill
John N. Howell
Lamar M. Knill
Dean C. Lindley
Harold L. Lint
Salvatore S. Margherita
George W. Martinek
Edward K. Mercer
Edward T. Roche
Fred Shafia
Glenn R. Stewart
Martin F. Stoner
Laszlo J. Szijj
Jia-Hsi Wu

The department offers four-year curricula in Biological Sciences with majors in Biology, Botany, Microbiology, and Zoology. Within these majors, students may choose concentrations in Mycology-Plant Pathology, Physiology, Public Health-Medical Technology, and Systematic Entomology. Each curriculum stresses a balance between the theoretical aspects of biology and actual experience in field and laboratory. Through this balance of experiences, the student gains a necessary understanding of the principles, socio-economic importance, and rapidly expanding scope and implications of modern biology.

A wide choice of elective courses offers ample latitude for specialization within the majors. Qualified students are provided with strong undergraduate preparation for graduate and professional schools. The department also offers courses designed to fulfill the general education requirements in life science.

Departmental facilities include laboratories, greenhouses and experimental field plots, a large animal colony, controlled environment units, and a radiation biology center. Unique and extensive wild areas are available on both the Kellogg and Voorhis campuses for ecological studies. The college's location facilitates field work in desert, mountain, and seashore areas, and stimulates cooperation with local academic and industrial institutions.

Master of Science in Biological Sciences

The purpose of the Master of Science degree in the Biological Sciences is to enhance the knowledge and competence of the candidate in his field of specialization as well as to develop his potential

for continuing self-directed study. 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 of the professional literature. Graduate study specializations may be elected in the disciplines of the Biological Sciences; for example, biology, botany, entomology, microbiology, physiology, and zoology.

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 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 college.

To be accepted as a classified graduate student and advanced to candidacy for a master's degree in this department, a student must apply to the departmental graduate committee through his graduate adviser.

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. No student is admitted to candidacy until he has received formal notification from the Director of Graduate Studies, which includes approval of his program.

Requirements for the Master of Science Degree

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 college or by the student's graduate committee must be met.
3. The student must complete his program based upon the curricular outline below.
4. An acceptable thesis must be completed and a final copy submitted for binding in accordance with college regulations.
5. A final oral examination must be successfully completed.

Curriculum

Required Courses	*Units*
Seminar in Biology (BIO 650)	3
Research in Biological Sciences (BIO 652)	6
Thesis (BIO 696)	3
	12
Courses in a Specialization	33–38
To be selected with consent of graduate adviser from 500 and 600-level courses and not to exceed 21 units of approved 400-level courses.	
Total	45–50

Curriculum in Biology

Freshman	*F*	*W*	*S*
Freshman Composition (ENG 104, 105, 106)	3	3	3
Health Education (PE 107)		2	
Physical Education (PE 141)	½	½	½
Basic Biology (BIO 115)	3		
Basic Biology Laboratory (BIO 145)	2		
General Zoology (ZOO 134, 135)		4	4
College Chemistry (CHM 104, 105) or General Chemistry (CHM 111, 112)	3	3	
College Chemistry Laboratory (CHM 141, 142) or General Chemistry Laboratory (CHM 151, 152)	1	1	
Organic Chemistry (CHM 211)			3
Mathematics (MAT 104, 105 or 108, 109)	3	3	
General Entomology (ENT 126)			4
Electives			3
	15½	16½	17½

Sophomore			
Physical Education (PE 141)	½	½	½
General Bacteriology (BAC 221)	4		
General Botany (BOT 124, 125)		5	5
Genetics (BIO 303)	3		
Principles of Evolution (BIO 213)		3	
College Physics (PHY 121, 122, 123)	4	4	4
Public Speaking (SP 200)			3
Electives	6	5	5
	17½	17½	17½

Junior			
American Civilization (AMC 301, 302, 303)	3	3	3
Principles of Ecology (BIO 325)			3
Principles of Taxonomy (BIO 306)		3	
†Biotechniques (BIO 341, 342)	2	2	
General Psychology (PSY 202)	3		
‡Literature	3		
‡Literature, Philosophy, Art or Music		3	3

†Plant Physiology (BOT 322), Animal Physiology (ZOO 324) or Cellular Physiology (BIO 435) may be substituted.
‡To be selected from the General Education list.

	F	W	S
§Approved electives	3	3	4
*Electives	3	3	3
	17	17	16

Senior

Senior Project (BIO 461, 462)	2	2	
Undergraduate Seminar (BIO 463)			2
†Social Sciences	3	3	
§Approved electives	6	6	7
*Electives	4	5	6
	15	16	15

Curriculum in Botany

Freshman

Freshman Composition (ENG 104, 105, 106)	3	3	3
Health Education (PE 107)		2	
Physical Education (PE 141)	½	½	½
Basic Biology (BIO 115)	3		
Basic Biology Laboratory (BIO 145)	2		
General Botany (BOT 124, 125)		5	5
College Chemistry (CHM 104, 105) or General Chemistry (CHM 111, 112)	3	3	
College Chemistry Laboratory (CHM 141, 142) or General Chemistry Laboratory (CHM 151, 152)	1	1	
Organic Chemistry (CHM 211)			3
Mathematics (MAT 104, 105 or 108, 109)	3	3	
General Entomology (ENT 126)			4
	15½	17½	15½

Sophomore

Physical Education (PE 141)	½	½	½
General Bacteriology (BAC 221)	4		
General Zoology (ZOO 134, 135)		4	4
Genetics (BIO 303)		3	
Principles of Evolution (BIO 213)			3
College Physics (PHY 121, 122, 123)	4	4	4
Public Speaking (SP 200)	3		
†Literature	3		
†Literature, Philosophy, Art or Music		3	3
Electives	3	3	3
	17½	17½	17½

Junior

American Civilization (AMC 301, 302, 303)	3	3	3
Principles of Ecology (BIO 325)	3		
Plant Anatomy (BOT 335)	4		
Plant Physiology (BOT 322)		4	
Principles of Taxonomy (BIO 306)			3
Taxonomy of Higher Plants (BOT 343)			2
General Psychology (PSY 202)		3	
§Approved electives	3	3	4
Electives	3	3	5
	16	16	17

*Eight units must be in 300–400 course level.

§Elective units to complete the major must be selected with the approval of the adviser.

†To be selected from the General Education list.

Senior	*F*	*W*	*S*
Senior Project (BOT 461, 462)	2	2	
Undergraduate Seminar (BOT 463)			2
†Social Sciences	3		3
Morphology of Non-vascular Plants (BOT 333) or Mycology (BOT 426)		4	
‡Approved electives	4	4	6
Electives	7	6	5
	16	16	16

Curriculum in Microbiology

Freshman			
Freshman Composition (ENG 104, 105, 106)	3	3	3
Health Education (PE 107)		2	
Physical Education (PE 141)	½	½	½
Basic Biology (BIO 115)	3		
Basic Biology Laboratory (BIO 145)	2		
General Botany (BOT 124, 125)		5	5
General Bacteriology (BAC 221)			4
College Chemistry (CHM 104, 105) or General Chemistry (CHM 111, 112)	3	3	
College Chemistry Laboratory (CHM 141, 142) or General Chemistry Laboratory (CHM 151, 152)	1	1	
Organic Chemistry (CHM 211)			3
Organic Chemistry Laboratory (CHM 251)			1
Mathematics (MAT 104, 105 or 108, 109)	3	3	
	15½	17½	16½

Sophomore			
Physical Education (PE 141)	½	½	½
General Zoology (ZOO 134, 135)	4	4	
General Entomology (ENT 126)			4
Genetics (BIO 303)		3	
Public Speaking (SP 200)	3		
College Physics (PHY 121, 122, 123)	4	4	4
†Literature	3		
†Literature, Philosophy, Art or Music		3	3
Electives	3	3	6
	17½	17½	17½

Junior			
American Civilization (AMC 301, 302, 303)	3	3	3
Biochemistry (CHM 327)		4	
General Psychology (PSY 202)	3		
‡Approved electives	4	3	8
*Electives	6	6	5
	16	16	16

Senior			
Senior Project (BAC 461, 462)	2	2	
Undergraduate Seminar (BAC 463)			2
†Social Sciences		3	3

†To be selected from the General Education list.
‡Elective units to complete the major must be selected with the approval of the adviser.
*Four units must be in 300–400 course level.

	F	W	S
Pathogenic Bacteriology (BAC 423)	4		
General Virology (BAC 431)		3	
Advanced Microbiology (BAC 432)			3
‡Approved electives	6	4	4
*Electives	4	4	4
	16	16	16

Curriculum in Zoology

Freshman

Freshman Composition (ENG 104, 105, 106)	3	3	3
Health Education (PE 107)		2	
Physical Education (PE 141)	½	½	½
Basic Biology (BIO 115)	3		
Basic Biology Laboratory (BIO 145)	2		
General Zoology (ZOO 134, 135)		4	4
College Chemistry (CHM 104, 105) or General Chemistry (CHM 111, 112)	3	3	
College Chemistry Laboratory (CHM 141, 142) or General Chemistry Laboratory (CHM 151, 152)	1	1	
Organic Chemistry (CHM 211)			3
Organic Chemistry Laboratory (CHM 251)			1
Mathematics (MAT 104, 105 or 108, 109)	3	3	
General Entomology (ENT 126)			4
Electives	2		
	17½	16½	15½

Sophomore

Physical Education (PE 141)	½	½	½
General Bacteriology (BAC 221)			4
General Botany (BOT 124, 125)	5	5	
Genetics (BIO 303)			3
Principles of Evolution (BIO 213)	3		
College Physics (PHY 121, 122, 123)	4	4	4
Public Speaking (SP 200)		3	
†Literature	3		
†Literature, Philosophy, Art or Music		3	3
Electives	2	2	3
	17½	17½	17½

Junior

American Civilization (AMC 301, 302, 303)	3	3	3
Principles of Ecology (BIO 325)		3	
Biochemistry (CHM 327)	4		
Comparative Anatomy of Vertebrates (ZOO 326)	4		
Animal Physiology (ZOO 324)		4	
Embryology (ZOO 323)			4
General Psychology (PSY 202)			3
‡Approved electives		3	3
Electives	5	3	3
	16	16	16

*Four units must be in 300–400 course level.
†To be selected from the General Education list.
‡Elective units to complete the major must be selected with the approval of the adviser.

Senior	*F*	*W*	*S*
Senior Project (ZOO 461, 462)	2	2	
Undergraduate Seminar (ZOO 463)			2
†Social Sciences	3	3	
‡Approved electives	7	4	7
Electives	4	7	7
	16	16	16

Description of Courses

Bacteriology

BAC 190 Elements of Microbiology (3)

Basic elements of microbiology and applications to daily life. 3 lectures.

BAC 221 General Bacteriology (4)

Morphology, classification, physiology, and cultivation of bacteria; relation of bacteria to health of man, animals, and plants. 2 lectures, 2 three-hour laboratories. Prerequisite: BIO 110 or 115; CHM 111, 151 or CHM 104, 141

BAC 332 Soil Microbiology (4)

Methods of studying soil microflora-plant rhizosphere relationships; methods of sampling and isolating microorganisms from soil; assay of antibiotics from antagonistic soil micro-organisms. 2 lectures, 2 three-hour laboratories. Prerequisite: BAC 221, CHM 211, 251

BAC 333 Sanitary Microbiology (3)

Sanitary and industrial application of microbiology stressing food, dairy, water, air, and sewage; practical aspects of environmental sanitation emphasized. 2 lectures, 1 three-hour laboratory. Prerequisite: BAC 221

BAC 423 Pathogenic Bacteriology (4)

Characteristics of disease-producing bacteria, their means of transmission, disease development, and laboratory methods of diagnosis. 2 lectures, 2 three-hour laboratories. Prerequisite: BAC 221

BAC 424 Food Microbiology (4)

The microbiology of foodstuffs as related to storage, transit, and animal and human nutrition. 2 lectures, 2 three-hour laboratories. Prerequisite: BAC 221

BAC 431 General Virology (3)

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. 2 lectures, 1 three-hour laboratory. Prerequisite: BAC 221 and CHM 211, 251

BAC 432 Advanced Microbiology (3)

Physiological characteristics of micro-organisms with emphasis upon morphology, growth, nutrition, and metabolism of the cell. 2 lectures, 1 three-hour laboratory. Prerequisite: BAC 221 and CHM 211, 251

BAC 433 Serology (4)

Theory and practice of serological methods involving antigen-antibody reactions. 2 lectures, 2 three-hour laboratories. Prerequisite: BAC 221

BAC 443 Immunology (4)

Principles of immunology involving a study of the mechanisms of resistance to infection and the procedures involved in evaluating the immune response. 2 lectures, 2 three-hour laboratories. Prerequisite: BAC 221

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

Selection and completion of a project under faculty supervision. Projects

†To be selected from the General Education list.
‡Elective units to complete the major must be selected with the approval of the adviser.

typical of problems which graduates must solve in their fields. Results presented in a formal report. Minimum of 120 hours total time.

BAC 463 Undergraduate Seminar (2)

Study and discussion of recent developments in microbiology and critical examination of senior theses. 2 lectures. Prerequisite: BAC 462

Biology

BIO 110 Life Science (3)

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.

BIO 115 Basic Biology (3)

Introduction to living things; basic structure and function of plants and animals and their relationship to the physical world. 3 lectures.

BIO 145 Basic Biology Laboratory (2)

Laboratory techniques in the study of cells, plant and animal structure and functions. 2 three-hour laboratories. Prerequisite: To be taken concurrently with or after BIO 115

BIO 200 History of Biology (3)

Chronological résumé of events, inventions, discoveries, and workers contributing to growth of biological sciences. 3 lectures.

BIO 201 Conservation of Natural Resources (3)

Fundamental concepts, historical development, problems and practices concerning conservation of natural resources in the United States. 3 lectures.

BIO 213 Principles of Evolution (3)

Introduction to plant and animal evolution. 3 lectures.

BIO 225 Microtechnique (3)

Methods of preparing plant and animal tissues for microscopic study. 1 lecture, 2 three-hour laboratories. Prerequisite: BIO 145

BIO 228 Natural History of Plants (4)

Characteristics, classification and natural history of the major groups of plants; basic principles of ecology; conservation ethics. Identification of common native plants with emphasis on trees and shrubs; field study of natural plant communities and life zones. 3 lectures, 1 three-hour laboratory. Prerequisite: BIO 110 or 115 or consent of instructor.

BIO 229 Natural History of Animals (4)

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. Prerequisite: BIO 110 or 115 or consent of instructor.

BIO 303 Genetics (3)

Principles of heredity and variation. 3 lectures. Prerequisite: BIO 110 or 115

BIO 305 Ecology for Sanitary Engineers (3)

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

BIO 306 Principles of Taxonomy (3)

Major principles of taxonomy, classification, biosystematics, and nomenclature as applied to plants and animals. 3 lectures. Prerequisite: BIO 110 or BIO 115

BIO 311 Biometrics (3)

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 204 or equivalent

BIO 325 Principles of Ecology (3)

Response of plants and animals to their environment. 2 lectures, 1 three-hour laboratory. Prerequisite: BOT 124 or ZOO 134

BIO 331, 332, 333 Marine Biology (3) (3) (3)

Marine plants and animals. Sampling, identification, data analysis. Physical and biological factors controlling populations and distribution. Characterization of the marine environment. 2 lectures, 1 three-hour laboratory. Prerequisite: BOT 125, ZOO 135, junior standing.

BIO 335 Fresh Water Biology (4)

Ecology, taxonomy, morphology 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. 2 lectures, 2 three-hour laboratories. Prerequisite: BOT 125, ZOO 134, 135

BIO 341 Biotechniques (2)

Botanical techniques; collecting, preservation, preparation of botanical specimens. 2 three-hour laboratories. Prerequisite: BOT 124

BIO 342 Biotechniques (2)

Zoological techniques; collecting, preservation, preparation of zoological specimens. 2 three-hour laboratories. Prerequisite: ZOO 134

BIO 352 Genetics Laboratory (2)

Laboratory techniques in genetics. 2 three-hour laboratories. Taken concurrently with or after BIO 303

BIO 400 Special Problems for Advanced Undergraduates (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: Senior standing or consent of instructor.

BIO 410 Biophysics (3)

Concepts and mechanisms involved in the interpretation of biological systems. A description of living processes in physical terms. 3 lectures. Prerequisite: PHY 133 or permission of instructor.

BIO 418 Population Ecology (3)

Factors affecting the abundance and distribution of animal populations in their natural environment. 2 lectures, 1 three-hour laboratory. Prerequisite: BIO 311 and 325

BIO 421 Advanced Genetics (3)

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

BIO 423 General Cytology (4)

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 134, BIO 303

BIO 431 Radiation Biology (4)

Introduction to radioisotope techniques, radiometric analyses, radiation safety and health physics as applied to life sciences and public health. 2 lectures, 2 three-hour laboratories. Prerequisite: BIO 145, CHM 111, 151

BIO 432 Isotope Tracers (3)

Use of radio isotopes with special emphasis on agricultural applications. Plant and soil science techniques and methods utilizing radiometric analyses. 1 lecture, 2 three-hour laboratories. Prerequisite: BIO 431 or CHM 336

BIO 434 Limnology (3)

Evaluation of physical and biological parameters affecting bodies of water as part of the total environment of river basin systems. 3 lectures. Prerequisite: CE 431

BIO 435 Cellular Physiology (4)

Physical mechanisms at the cellular level. 2 lectures, 2 three-hour laboratories. Prerequisite: CHM 327

BIO 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. Results pre-

sented in a formal report. Minimum of 120 hours total time.

BIO 463 Undergraduate Seminar (2)

Study and discussion of recent developments in biology. 2 lectures. Prerequisite: BIO 462

BIO 510 Cytogenetics (3)

Nuclear and cytoplasmic structures and phenomena as related to inheritance. 2 lectures, 1 three-hour laboratory. Prerequisites: BIO 303, 423

BIO 515 Physiology of Parasitism (3)

Physiology and biochemistry of host-parasite interactions; infection phenomena; host or parasite-specific toxins; resistance mechanisms; symptomatology; phenomena of obligate parasitism. 3 lectures. Prerequisite: CHM 327, BIO 435 and graduate standing

BIO 520 Endocrinology (4)

Study of the endocrine glands and their role in growth, development, metabolic regulation, and reproduction in animals. 3 lectures, 1 three-hour laboratory. Prerequisite: CHM 327, ZOO 324, and/or consent of instructor

BIO 522 Bacterial Physiology (4)

Physiological characteristics of bacteria with emphasis upon growth, biosynthetic capabilities and regulation of enzyme formation and function. 2 lectures, 2 three-hour laboratories. Prerequisite: BAC 432 and CHM 327

BIO 523 Microbial Genetics (4)

Principles of heredity in micro-organisms, with emphasis on bacterial and fungal systems. 3 lectures, 1 three-hour laboratory. Prerequisite: BAC 432 or consent of instructor

BIO 524 Insect Physiology (4)

Functions of insect organs and organ systems. 3 lectures, 1 three-hour laboratory. Prerequisite: CHM 327, ENT 423

BIO 526 Comparative Physiology (4)

Mechanisms of basic functions in the important animal phyla. 3 lectures, 1 three-hour laboratory. Prerequisite: ZOO 324, 326

BIO 530 Mechanisms of Speciation (3)

Principles and concepts of evolutionary mechanisms in plants and animals. 3 lectures. Prerequisite: BIO 213, 303, 325, or graduate standing or senior standing with consent of instructor.

BIO 534 Plant Growth and Development (4)

Hormonal and environmental control of plant morphogenesis. 2 lectures, 2 three-hour laboratories. Prerequisite: CHM 211, BOT 322

BIO 535 Advanced Cell Biology (4)

A molecular, ultrastructural and functional approach to cell biology. 4 lectures. Prerequisite: BIO 435, CHM 327 or consent of instructor

BIO 538 Physiology of Plant Disease (4)

Physiological bases of infectious and noninfectious plant diseases, including aspects of disease development and host-parasite interaction. 2 lectures, 2 three-hour laboratories. Prerequisite: BOT 322, CHM 327, and PTH 223

BIO 541 Biogeography (3)

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. 3 lectures. Prerequisite: BIO 213 and BIO 325 or graduate standing or senior standing with consent of instructor.

BIO 650 Seminar in Biology (1-3)

Arrangements to be made with faculty. Topics in disciplines of biology offered according to interests and needs of students. Each seminar to have a sub-title identifying the discipline. Prerequisite: Graduate standing. 1-3 units in one quarter, maximum of 9 units.

BIO 652 Research in Biological Sciences (2)

Current research methods in the biological sciences. 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. 2 three-hour laboratories. Prerequisite: Graduate standing.

BIO 661 Experimental Biology (3)

Lecture series concerning recent research in selected fields of biology; each series to have a subtitle identifying the field. 3 lectures. Total credit limited to 6 units. Prerequisite: Graduate standing

BIO 680 Advanced Topics in Biology (2)

Discussion of advanced topics in biology. Topics selected to correspond to the changes in the field or needs of advanced students. Total credit limited to 6 units with a maximum of 2 units per quarter. 2 lecture-discussions. Prerequisite: Graduate standing or senior standing with consent of instructor.

BIO 696 Thesis (3)

Compilation, evaluation, interpretation, and report of research for thesis. Completion of approved, bound thesis. Prerequisite: BIO 652

Botany

BOT 116 Plant Environments (3)

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.

BOT 120 Agricultural Botany (4)

Principles of structure, function, and classification of seed plants and fungi with special application to agriculture. 3 lectures, 1 three-hour laboratory. Prerequisite: BIO 145

BOT 124 General Botany (5)

Structure and function of plants. 3 lectures, 2 three-hour laboratories. Prerequisite: BIO 145

BOT 125 General Botany (5)

Comparative morphology and phyllogenetic relationships of plant groups from bacteria to angiosperms. 3 lectures, 2 three-hour laboratories. Prerequisite: BIO 145

BOT 249 Taxonomy of Grasses (2)

Structure and variation in grasses. Use of a key in identification. Recognition of tribes of the grass family. Use of vegetative characters in identification of common hay and pasture grasses. 2 three-hour laboratories. Prerequisite: BIO 145

BOT 307 Economic Botany (3)

Sources and uses of plant products utilized by man. 3 lectures.

BOT 322 Plant Physiology (4)

Functions of plants; water relations, metabolism and plant growth. 2 lectures, 2 three-hour laboratories. Prerequisite: BOT 120 or 124

BOT 333 Morphology of Non-vascular Plants (4)

Comparative structure, life history and relationships of algae, mosses, liverworts and lichens. 2 lectures, 2 three-hour laboratories. Prerequisite: BOT 125

BOT 334 Morphology of Vascular Plants (4)

Evolution of the plant kingdom as illustrated by comparative morphology of major plant groups. 2 lectures, 2 three-hour laboratories. Prerequisite: BOT 125

BOT 335 Plant Anatomy (4)

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

BOT 343 Taxonomy of Higher Plants (2)

General principles of classification of plants; procedures for identification of unknown plants; preparation and

use of specimens. 2 three-hour laboratories. Prerequisite: BOT 120 or 124; concurrent BIO 306

BOT 421 Plant Ecology (4)

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

BOT 422 Advanced Plant Physiology (4)

Selected major aspects of plant water relations, metabolism and growth treated in depth. Emphasis on experimental investigations. Student initiative in experimental and library research will be encouraged. 2 lectures, 2 three-hour laboratories. Prerequisite: BOT 322

BOT 423 Mineral Nutrition of Plants (3)

Present day concepts of inorganic nutrition in plants, effects of hydrogen ion, deficiency and excess diseases, nitrogen metabolism, photosynthesis; relationship of plant nutrition to animal nutrition. 3 lectures. Prerequisite: BOT 322

BOT 426 Mycology (4)

Morphological, cultural, and pathological characteristics of fungi. 2 lectures, 2 three-hour laboratories. Prerequisite: BOT 125 or consent of instructor.

BOT 427 Medical Mycology (4)

Characteristics, habits and laboratory identification of fungi inciting human and animal diseases. 2 lectures, 2 three-hour laboratories. Prerequisite: BAC 221

BOT 436 Advanced Plant Taxonomy (4)

Phylogeny of the vascular plants; recognition of the major orders and families. 2 lectures, 2 three-hour laboratories. Prerequisite: BOT 343

BOT 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. Results presented in a formal report. Minimum of 120 hours total time.

BOT 463 Undergraduate Seminar (2)

Study and discussion of recent developments in botany and critical examination of senior theses. 2 lectures. Prerequisite: BOT 462

Entomology

ENT 126 General Entomology (4)

Basic principles of insect structure, function, development, behavior, classification, and control, with a survey of the principal orders. 2 lectures, 2 three-hour laboratories.

ENT 226 Families of Insects (3)

Recognition of major, common, and important families of insects and their habits. 1 lecture, 2 three-hour laboratories. Prerequisite: ENT 126

ENT 312 Insect Ecology (3)

Principles of ecology as they apply to insects and other invertebrates. 3 lectures. Prerequisite: ENT 126

ENT 331 Insect Taxonomy (3)

Classification of insects; taxonomic categories and procedures; nomenclature and literature. 1 lecture, 2 three-hour laboratories. Prerequisite: ENT 126

ENT 334 Morphology of Immature Insects (3)

Classification of immature insects; taxonomic categories; methods of preparation for preservation and study. 1 lecture, 2 three-hour laboratories. Prerequisite: ENT 126

ENT 423 Structure and Function in Insects (4)

Comparative anatomy and physiology of insects. 2 lectures, 2 three-hour laboratories. Prerequisite: ENT 126

ENT 431 Insect Pathology (3)

Infectious and non-infectious diseases of insects involving the principles of insect microbiology and pathology.

2 lectures, 1 three-hour laboratory. Prerequisite: ENT 126, BAC 221

Microbiology

MIC 422 Clinical Microscopy (4)

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. Prerequisite: CHM 328, ZOO 235

MIC 444 Hematology (4)

Microscopic and chemical examination of the blood. Designed primarily for those students interested in the field of medical technology. 3 lectures, 1 three-hour laboratory. Prerequisite: Permission of the instructor. Recommended: ZOO 134

MIC 445 Blood Bank (4)

Theory and practice involved in blood banking including donors, collection, groupings, processing, storage, and records. 2 lectures, 2 three-hour laboratories. Prerequisite: BAC 433, 443

Plant Pathology

PTH 223 General Plant Pathology (4)

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

PTH 335 Fungi Attacking Wood Products (3)

Recognition and identification of fungi found in timber products. Types of damage, means of prevention, and control measures. 2 lectures, 1 three-hour laboratory.

PTH 423 Plant Nematology (3)

Classification of nematodes associated with economic plants; basic morphology, biology and control of important plant nematodes. 2 lectures, 1 three-hour laboratory. Prerequisite: PTH 223, ZOO 135

PTH 424 Advanced Plant Pathology (4)

Methods and materials used in the diagnosis of plant diseases; special reference to techniques for differentiation of plant disease problems. 2 lectures, 2 three-hour laboratories. Prerequisite: PTH 223

Zoology

ZOO 134 General Zoology (4)

Structure and function of vertebrate organ systems, with emphasis on man and domestic animals; study of interrelationships within the Phylum Chordata. 2 lectures, 2 three-hour laboratories. Prerequisite: BIO 145

ZOO 135 General Zoology (4)

Invertebrate animals from Protozoa to Chordates. Study of the variety and distribution of invertebrate life, with emphasis on those forms of economic and medical importance. 2 lectures, 2 three-hour laboratories. Prerequisite: BIO 145

ZOO 234 Human Anatomy (4)

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, 145

ZOO 235 Human Physiology (4)

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, 145

ZOO 236 Invertebrate Zoology (4)

A systematic and comparative survey of all invertebrate groups, including the minor phyla, with emphasis on morphology and phylogeny. (Insects and parasites are omitted.) 2 lectures, 2 three-hour laboratories and field work.

ZOO 323 Embryology (4)

Embryonic development of the vertebrate body. 2 lectures, 2 three-

hour laboratories. Prerequisite: ZOO 134

ZOO 324 Animal Physiology (4)

Introduction to functions of vertebrate and invertebrate organ systems. 2 lectures, 2 three-hour laboratories. Prerequisite: ZOO 134, 135

ZOO 326 Comparative Anatomy of Vertebrates (4)

Comparative structure of vertebrate organ systems. 2 lectures, 2 three-hour laboratories. Prerequisite: ZOO 134

ZOO 329 Ornithology (3)

Identification, structure, physiology, ecology, behavior and economic importance of birds, especially of Pacific Coast region. 2 lectures, 1 three-hour laboratory or field exercises and field project. Prerequisite: ZOO 134

ZOO 341 Mammalogy (3)

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 134 or equivalent.

ZOO 417 Helminthology (3)

An intensified study of helminths living in and on other organisms. Their life cycles, natural history, physiology and anatomy, taxonomy and latest methods of control of harmful species. 2 lectures, 1 three-hour laboratory. Prerequisite: ZOO 135

ZOO 419 Animal Behavior (3)

Biological, physiological, genetic and anatomical principles of animal behavior. Ethology and experimental psychology involving wild and laboratory animals. 2 lectures, 1 three-hour laboratory. Prerequisite: ZOO 134 or consent of instructor.

ZOO 422 Histology (4)

Microscopic study of vertebrate tissues: organology and correlation of form with function. 2 lectures, 2 three-hour laboratories. Prerequisite: ZOO 134

ZOO 425 Parasitology (4)

Study of the protozoan and helminth parasites of man and lower animals. Life histories, control, epidemiology and economic importance. 2 lectures, 2 three-hour laboratories. Prerequisite: ZOO 135

ZOO 429 Herpetology (3)

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 134 or equivalent.

ZOO 435 Arthropod Vectors (3)

Role of insects, mites, ticks and other arthropods in causation and transmission of human diseases. Classification, structure, and life histories of arthropods and parasites. 2 lectures, 1 three-hour laboratory. Prerequisite: ENT 126 or ZOO 425

ZOO 442 Acarology (3)

Identification, biology, ecology and importance of injurious and beneficial mites and ticks; methods of preparation for study. 1 lecture, 2 three-hour laboratories. Prerequisite: ZOO 135

ZOO 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. Results presented in a formal report. Minimum of 120 hours total time.

ZOO 463 Undergraduate Seminar (2)

Study and discussion of recent developments in zoology and critical examination of senior theses. 2 lectures. Prerequisite: ZOO 462

MATHEMATICS DEPARTMENT

Harold F. Simmons, *Chairman*

Laure I. Abu-Haydar
Cameron C. Bogue
George C. Carlstedt
George W. Carson
Yu Chang
Theodore J. Cullen
Thomas J. Flynn
Carlos Ford-Livene
Samuel Gendelman
Simon Green
Emil R. Herzog
David A. Horwitz
Alice A. Huffman
Larry D. Irwin
Martha Janson
Joseph Kachun
Thomas M. King
Albert Konigsberg
Gail S. Konkle
Kenneth B. Kriege
Kei A. Lee
Kenneth A. MacDonald
Lydia P. Moore
William C. Paugstat
Alvin C. Sugar
Eldon J. Vought
Harry A. Wilson

The major in Mathematics has three objectives: to prepare secondary school teachers, to prepare mathematicians for industrial and governmental employment, and to prepare students for graduate programs in mathematics.

The major program requires extensive work in applied mathematics and skills courses to produce mathematicians who are capable of using their knowledge in a wide variety of applications. A high school student planning a major in Mathematics should take eight semesters of mathematics, two of physics, and two of chemistry.

Curriculum in Mathematics

Freshman	*F*	*W*	*S*
Freshman Composition (ENG 104, 105, 106)	3	3	3
Physical Education (PE 141)	½	½	½
Analytic Geometry (MAT 140)	4		
General Physics (PHY 131)			4
Calculus and Differential Equations (MAT 141, 142)		4	4
General Chemistry (CHM 111, 112)	3	3	
General Chemistry Laboratory (CHM 151, 152)	1	1	
Fortran and Elementary Numerical Methods (MAT 119)		3	
Mathematical Logic (MAT 117)	3		
Introduction to Probability (MAT 123)			3
Health Education (PE 107)	2		
Electives		2	2
	16½	16½	16½

Sophomore			
†Biological Science			3
General Psychology (PSY 202)			3
Physical Education (PE 141)	½	½	½
Physics (PHY 132; 133, or 204)	4	4	

†To be selected from the General Education list.

	F	W	S
Principles of Economics (EC 201, 202)	3	3	
Calculus and Differential Equations (MAT 240, 241, 242)	4	4	4
Higher Algebra (MAT 201)	3		
Linear Algebra (MAT 208, 209)		3	3
Electives	2	2	3
	16½	16½	16½

Junior

American Civilization (AMC 301, 302, 303)	3	3	3
Intermediate Analysis (MAT 314, 315)	3	3	
Introduction to Complex Variables (MAT 316)			3
†Literature	3		
†Literature, Philosophy, Art or Music		3	3
Mathematics electives	3	3	3
Electives	5	5	5
	17	17	17

Senior

Senior Project (MAT 461, 462)	2	2	
Undergraduate Seminar (MAT 463)			2
Mathematics electives	3	3	3
Electives	11	11	11
	16	16	16

Description of Courses

MAT 1 Preparatory Mathematics (3)

Fundamentals of arithmetic, denominate numbers, introduction to algebra, percentage, exponents, simultaneous linear equations. 3 lectures.

MAT 101 Basic Mathematics I (3)

Graphs, charts, ratio, proportion, variation, basic algebraic operations, linear and quadratic equations, logarithms. 3 lectures. Prerequisite: high school algebra and geometry or MAT 1

MAT 102 Basic Mathematics II (3)

Elements of trigonometry, analytic geometry, statistics. 3 lectures. Prerequisite: MAT 101

MAT 103 Business Mathematics (3)

Simple interest, discounts, compound interest, annuities, sinking funds, amortization, insurance, stocks and bonds. 3 lectures. Prerequisite: MAT 101

MAT 104 Trigonometry (3)

The circular functions, general reduction formulas, inverse functions, graphs, exponential and logarithmic functions, Law of Sines, Law of Cosines, identities and complex numbers. 3 lectures. Prerequisite: One year of high school geometry and second year of high school algebra with grades of "C" or better.

MAT 105 College Algebra (3)

Real numbers, inequalities, absolute value, coordinate systems, functions, progressions, linear and quadratic systems, polynomials and mathematical induction. 3 lectures. Prerequisite: Second year high school algebra with grade of "C" or better, or MAT 104.

MAT 107 Descriptive Statistics (3)

Graphical representation of statistical data; calculation and uses of various averages, measures of variability, elementary probability and the normal

†To be selected from the General Education list.

probability curve, simple linear correlation. Not open to students with credit for MAT 309 or MAT 311. 3 lectures.

MAT 108, 109 Introduction to Mathematical Analysis (3) (3)

Introductory mathematical analysis for agriculture, economics, business management, biological and social science majors. Selected topics from the calculus including differentiation and integration of elementary functions, maxima and minima of functions of several variables including the use of Lagrange multipliers. 3 lectures. Prerequisite: Second year high school algebra with grade of "B" or better

MAT 114, 115, 116 Analytic Geometry and Calculus (3) (3) (3)

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 117 Mathematical Logic (3)

Symbolic methods in propositional logic, inference in logic and mathematics, predicates and sets, set algebra, Boolean diagram techniques in logic and mathematics. 3 lectures. Prerequisite: MAT 140 concurrently or consent of instructor.

MAT 119 Fortran and Elementary Numerical Methods (3)

Fortran programming for the digital computer. Execution of elementary numerical algorithms; interpolation, integration, solution of linear systems. 3 lectures. Corequisite: MAT 115 or 141

MAT 123 Introduction to Probability (3)

Probability in theory and practice; permutations, combinations, equiprobable outcomes, finite sample spaces. 2 lectures, 1 two-hour activity, Prerequisite: MAT 115 or 141 or concurrent MAT 204.

MAT 140 Analytic Geometry (4)

Standard topics from plane analytic geometry, with emphasis on vector methods; polar coordinates and parametric equations; extension of vector methods to 3-space. 4 lectures. Prerequisite: MAT 104 and 105 or equivalent.

MAT 141, 142 Calculus and Differential Equations (4) (4)

Functions and limits; differentiation and integration of functions of one variable, including mean-value theorems; applications to geometry and physics. 4 lectures. Prerequisite: MAT 140 or equivalent.

MAT 201 Higher Algebra (3)

A transition between the problem-solving college algebra course and the postulational approach of modern algebra: real and complex numbers, polynomials, rational functions, numerical identities and inequalities, theory of equations. 3 lectures. Prerequisite: MAT 141

MAT 204 Introduction to Mathematical Analysis (3)

Introductory mathematical analysis for agriculture, economics, business management, biological and social science majors. Introduction to differential and difference equations. Elementary properties of vectors and matrices with applications to the solution of linear systems, linear programming, etc. 3 lectures. Prerequisite: MAT 109

MAT 205, 206, 207 Basic Concepts of Elementary Mathematics (3) (3) (3)

For prospective elementary teachers. Development of systems of numeration, fundamental operations, logical basis of the number system including elementary concepts in set theory. Selected topics in algebra and geometry. 3 lectures. Prerequisite: High school algebra and geometry.

MAT 208, 209 Linear Algebra (3) (3)

Introduction to vector spaces, systems of linear equations, matrix algebra. Algebra and geometry of linear transformations, quadratic forms, the eigenvalue problem. 3 lectures. Prerequisite: MAT 214 or 240

MAT 214, 215, 216 Calculus and Differential Equations (4) (4) (4)

Vector analysis applied to three dimensional analytic geometry. Theory and technique of multivariable calculus, power series, and differential equations (with emphasis on the linear case). 4 lectures. Prerequisite: MAT 116

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 301, 302, 303 Differential Equations (3) (3) (3)

Solution of partial differential equations with applications to wave motion, heat transfer, fluid flow. Ordinary linear equations with variable coefficients and systems of linear equations. Stability and qualitative behavior of solutions. 3 lectures. Prerequisite: MAT 208 and 242 or 317 or PHY 322

MAT 305 Applied Boolean Algebra (3)

Boolean algebra and its application to switching and logic circuits. Map methods for representation and minimization of Boolean functions. Boolean matrices and applications. 3 lectures. Prerequisite: Junior standing in mathematics or consent of instructor.

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 means; comparison of two or more variances; correlation; design of engineering experiments. Not open to Mathematics majors. 3 lectures. Prerequisite: MAT 214

MAT 311, 312 Mathematical Statistics (3) (3)

Discrete and continuous probability distributions, moments, moment generating functions, transformations of random variables, limiting distributions, sampling distributions, point and interval estimation, tests of hypotheses. 3 lectures. Prerequisite: MAT 123 and 204 or 216 or 242

MAT 314, 315 Intermediate Analysis (3) (3)

Analysis of functions of a single real variable via the number system, limits, sequences, continuity, differentiation, infinite series, integration. Rigorous treatment of ideas, techniques, theorems, proofs. 3 lectures. Prerequisite: MAT 241 or 215 and consent of instructor.

MAT 316 Introduction to Complex Variables (3)

Algebra and geometry of complex numbers. Cauchy-Riemann conditions and analyticity. Elementary functions and their mappings. 3 lectures. Prerequisite: MAT 314 or consent of instructor.

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 lectures. 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

MAT 401, 402, 403 Numerical Analysis (3) (3) (3)

Derivation, error analysis, and computational application of algorithms for the solution of non-linear equations, interpolation and approximation, integration, matrix inversion, numerical solution of differential equations. 3 lectures. Prerequisite: MAT 315, 316, or consent of instructor.

MAT 404, 405 Vector Analysis (3) (3)

Vector algebra and applications. The del operator, gradient, divergence, curl. Integration and the theorems of Stokes and Green. Applications to engineering, mathematics, and physics. 3 lectures. Prerequisite: MAT 216 or 242

MAT 406 History of Mathematics (3)

Development of mathematics over four millenniums. Recommended for students preparing to teach mathematics. 3 lectures. Prerequisite: MAT 241 or consent of instrucor.

MAT 408, 409 Functions of a Complex Variable (3) (3)

Contour integration and the Cauchy Integral Formula. Taylor and Laurent series. The residue theorem. Conformal mapping with applications. 3 lectures. Prerequisite: MAT 316

MAT 412, 413 Advanced Calculus (3) (3)

Continuation and expansion of MAT 314, 315. Primary emphasis on the differential and integral calculus of functions and transformations in several real variables. 3 lectures. Prerequisite: MAT 315, 316

MAT 415 Geometry I (3)

Selected topics from Euclidean and non-Euclidean geometries with emphasis on the role of axioms in a synthetic development. 3 lectures. Prerequisite: MAT 208

MAT 416 Geometry II (3)

Selected topics from projective geometry with emphasis on the analytic treatment of the projective plane. 3 lectures. Prerequisite: MAT 209

MAT 417, 418 Modern Algebra (3) (3)

Introduction to semigroups, groups, rings and ideals, integral domains, fields. Mappings of algebraic structures with emphasis on morphisms. 3 lectures. Prerequisite: MAT 209

MAT 421 Design of Experiments (3)

Methods of constructing and analyzing designs for experimental investigation. Latin-square, split-plot, simple and partially confounded factorial designs, incomplete block designs, treatment of missing data and techniques of experimentation. 2 lectures, 1 activity period. Prerequisite: MAT 312

MAT 422 Design of Surveys (3)

Statistical design and analysis of survey investigation. Mathematical development of sampling systems; simple random, stratified, multistage and multiphase sampling designs; estimation; determination of sample size. 2 lectures, 1 activity period. Prerequisite: MAT 312

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: MAT 462

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. Prerequisite: Senior standing or consent of instructor

MAT 650 Seminar in Mathematics (1-3)

Topics in advanced mathematics chosen according to the interests and needs of the students enrolled. Each seminar will have a sub-title according to the nature of the content. 1, 2, or 3 lectures. Prerequisite: Instructor's approval and graduate standing. May be repeated for a maximum of 6 units.

PHYSICAL SCIENCES DEPARTMENT

Earl L. Pye, *Chairman*

Keith H. Brown
Myron S. Dendurent
Vasu Dev
Robert D. Eagleton
Horace G. Ferris
John G. Frayne
Irwin Geller
Lawrence J. Herber
Walter H. Hesse
Paul C. Hiemenz
Shiu Kwong Ho
Edward M. Kelly
Bernard O. Lane
Esther B. Leffler
John Macropol
Ruth McKown
Gabriel T. Moran
Barton Palatnick
Elmer H. Rice
Ernest J. Simpson
Donald D. Smith
Franklin R. Turner
Johannes Tuul
Arnulf Vollmar
Frank C. Whitmore
Dorothy V. Winslow

Majors in Chemistry, Physics and Physical Science are offered by the department. Each of the three curricula provides a solid background for graduate studies, and courses in the department are suitable for pre-medicine, pre-dentistry, or pre-veterinary medicine students.

The major in Chemistry prepares students for careers in private industry and government, as well as for graduate study. It satisfies the requirements for the Standard Teaching Credential through fifth-year courses in chemistry offered as part of the credential program. Through choice of electives, it is possible for students to specialize in areas of analytical, inorganic, organic or physical chemistry. The chemistry program is accredited by the American Chemical Society and chemistry majors are certified as having met the A.C.S. standards.

The major in Physics prepares students for careers as physicists with industry, government, and university laboratories. 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.

The major in Physical Science is designed for students who desire a broad knowledge of the physical sciences but do not intend to pursue careers as physicists or chemists. A graduate in this curriculum is suited for sales or managerial positions in companies which service industries that employ physicists, chemists, geologists, mathematicians, and biologists. The major is recognized as a course of study which leads to the Standard Teaching Credential-Elementary Specialization.

It is recommended that the high school student planning to major in the Physical Sciences department take three semesters of algebra, one of trigonometry, two of geometry, two of physics, and two of chemistry in high school.

Curriculum in Chemistry

Freshman	*F*	*W*	*S*
General Chemistry (CHM 111, 112)	3	3	
General Chemistry Laboratory (CHM 151, 152)	1	1	
Chemical Principles (CHM 113)			3
Ionic Equilibria (CHM 153)			1
General Physics (PHY 131, 132)		4	4
Analytic Geometry and Calculus (MAT 114, 115, 116)	3	3	3
Freshman Composition (ENG 104, 105, 106)	3	3	3
Physical Education (PE 141)	½	½	½
Health Education (PE 107)			2
†Life Science (BIO 110)	3		
Electives	3	2	
	16½	16½	16½

Sophomore			
Quantitative Analysis (CHM 221)	4		
Organic Chemistry (CHM 211, 212, 213)	3	3	3
Organic Chemistry Laboratory (CHM 251, 252, 253)	1	2	2
General Physics (PHY 133 or 204)	4		
†Literature, Philosophy, Art, or Music		3	3
Calculus and Differential Equations (MAT 214, 215)	4	4	
Principles of Economics (EC 201, 202)		3	3
Physical Education (PE 141)	½	½	½
Electives		2	6
	16½	17½	17½

Junior			
Physical Chemistry (CHM 311, 312, 313)	4	3	3
Physical Chemistry Laboratory (CHM 352, 353)		2	2
Advanced Analytical Chemistry (CHM 332)		4	
Instrumental Analysis (CHM 333)			4
American Civilization (AMC 301, 302, 303)	3	3	3
Elementary German (GER 101, 102, 103)	4	4	4
†Literature	3		
‡Electives	3		
	17	16	16

†To be selected from the General Education list.
‡MAT 216 is recommended for students who plan to do graduate work in Chemistry.

Senior	*F*	*W*	*S*
Senior Project (CHM 461, 462)	2	2	
Undergraduate Seminar (CHM 463)			2
Public Speaking (SP 200)	3		
Inorganic Chemistry (CHM 401, 402)	3	3	
General Psychology I (PSY 202)		3	
Modern Physics (PHY 401, 402)	3		3
*Advanced Chemistry Electives		3	3
Electives	5	5	8
	16	16	16

Curriculum in Physical Science

Freshman			
Freshman Composition (ENG 104, 105, 106)	3	3	3
General Chemistry (CHM 111, 112)	3	3	
General Chemistry Laboratory (CHM 151, 152)	1	1	
College Physics (PHY 121, 122)		4	4
Physical Education (PE 141)	½	½	½
Basic Biology (BIO 115)	3		
Basic Biology Laboratory (BIO 145)	2		
Analytic Geometry and Calculus (MAT 114, 115, 116)	3	3	3
Physical Geology (PSC 221)			4
Health Education (PE 107)			2
Electives		2	
	15½	16½	16½

Sophomore			
Physical Education (PE 141)	½	½	½
Principles of Economics (EC 201, 202)	3	3	
General Psychology I (PSY 202)		3	
College Physics (PHY 123)	4		
†Literature			3
Public Speaking (SP 200)		3	
Historical Geology (PSC 222)		3	
Mineralogy (PSC 223)			3
Basic Soil Science (SS 231)	4		
Foreign Language	4	4	4
General Botany (BOT 125)			5
Electives	2		2
	17½	16½	17½

Junior			
†Literature, Philosophy, Art or Music	3	4	
American Civilization (AMC 301, 302, 303)	3	3	3
Astronomy (PSC 215)		3	
Organic Chemistry (CHM 211)	3		
Organic Chemistry Laboratory (CHM 251)	1		
General Zoology (ZOO 134)			4
Geomorphology (PSC 323)			3
Foreign Language	3	3	3
Quantitative Analysis (CHM 221)		4	
‡Electives	3		3
	16	17	16

*Select from CHM 405, 409, 411, 415, 422, 423, 436, 442.
‡Eleven units of electives must be taken in science or mathematics.
†To be selected from the General Education list.

Senior

	F	W	S
Senior Project (CHM or PHY 461, 462)	2	2	
Undergraduate Seminar (CHM or PHY 463)			2
Invertebrate Paleontology (PSC 423)			3
Soil Conservation (SS 333)			4
Principles of Anthropology (ANT 201, 202, 203)	3	3	3
Regional World Geography (GEO 301)	3		
Instrumental Analysis (CHM 333)	4		
Biochemistry (CHM 327)		4	
*Electives	5	7	4
	17	16	16

Curriculum in Physics

Freshman

Freshman Composition (ENG 104, 105, 106)	3	3	3
General Chemistry (CHM 111, 112)	3	3	
General Chemistry Laboratory (CHM 151, 152)	1	1	
General Physics (PHY 131, 132)		4	4
Physical Education (PE 141)	½	½	½
Health Education (PE 107)			2
Life Science (BIO 110)	3		
Analytic Geometry and Calculus (MAT 114, 115, 116)	3	3	3
Electives	3	2	4
	16½	16½	16½

Sophomore

Physical Education (PE 141)	½	½	½
Principles of Economics (EC 201, 202)	3	3	
Calculus and Differential Equations (MAT 214, 215, 216)	4	4	4
General Psychology (PSY 202)		3	
General Physics (PHY 133)	4		
†Literature			3
Public Speaking (SP 200)		3	
Elementary Atomic Physics (PHY 212)		3	
Thermal Physics (PHY 233)			3
Electives	5		6
	16½	16½	16½

Junior

†Literature, Philosophy, Art or Music	3	4	
American Civilization (AMC 301, 302, 303)	3	3	3
†Biological Science			3
Differential Equations (MAT 301)			3
Optics (PHY 302, 303)		3	3
Physics of Electric and Magnetic Phenomena (PHY 313, 314, 315)	3	3	3
Mechanics (PHY 321, 322)	3	3	
Electives	5	1	2
	17	17	17

†To be selected from the General Education list.
*Eleven units of electives must be taken in science or mathematics.

Senior	*F*	*W*	*S*
Senior Project (PHY 461, 462)	2	2	
Undergraduate Seminar (PHY 463)			2
Physical Chemistry (CHM 311)	4		
Modern Physics (PHY 401, 402)	3	3	
Advanced Nuclear Physics (PHY 403)			3
Advanced Physics Laboratory (PHY 430)	3		
‡Advanced electives	3	9	9
Electives		2	3
	15	16	17

Description of Courses

Chemistry

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)

Stoichiometry and chemical calculations. Principles of atomic structure, periodicity and bonding. General chemistry for those who do not require calculus in their major. 3 lecture-discussions. Concurrent: CHM 141. 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)

Physical states of matter. Solutions and colligative properties. Equilibrium. Physical and chemical properties of some common elements. 3 lecture-discussions. Concurrent: CHM 142. Prerequisite: CHM 104

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 and MAT 114 or higher.

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, MAT 114. Concurrent: CHM 152

CHM 113 Chemical Principles (3)

Electrochemistry, nuclear chemistry, metals, alloys, macromolecules, and special topics. 3 lecture-discussions. Prerequisite: CHM 105 or 112. Concurrent: CHM 153

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. Concurrent: CHM 105

CHM 151 General Chemistry Laboratory (1)

Analysis of problems dealing with physical-chemical measurements. Experiments to illustrate scientific methods of observation, development of laboratory techniques, use of analyti-

‡Select from CHM 312, 313, 352, 353; PHY 406, 407, 408, 409, 412, 413, 420.

cal balance. 1 three-hour laboratory. Concurrent: CHM 111

CHM 152 General Chemistry Laboratory (1)

Experiments in thermochemistry, redox systems and gas laws, colligative properties, reaction rates, equilibria, pH. 1 three-hour laboratory. Concurrent: CHM 112

CHM 153 Ionic Equilibria (1)

Applications of ionic equilibria. Problems in acids, bases, solubility product, and qualitative analysis. 1 three-hour laboratory. Prerequisite: CHM 105, 142 or CHM 112, 152. Concurrent: CHM 113

CHM 201 Elements of Organic Chemistry (3)

The fundamental concepts of organic chemistry with emphasis on practical applications. For students who are required to take one quarter of organic chemistry. Not open for credit to chemistry majors. 3 lectures. Prerequisite: CHM 105 or 112. Concurrent: CHM 251 for students planning to take CHM 327

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

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 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: CHM 201 or 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. Prerequisite: CHM 105 or 112

CHM 311 Physical Chemistry (4)

Properties of gases, kinetic molecular theory and thermodynamics. 4 lecture-problems. Prerequisite: MAT 215, CHM 112, one year of college physics.

CHM 312 Physical Chemistry (3)

Atomic and molecular structure; chemical kinetics. 3 lectures. Prerequisite: CHM 311

CHM 313 Physical Chemistry (3)

Phase equilibria, solutions, transport phenomena, and surface and colloid chemistry. 3 lectures. Prerequisite: CHM 312

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 201 or 211, 251

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 332 Advanced Analytical Chemistry (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 333 Instrumental Analysis (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 and 311

CHM 352 Physical Chemistry Laboratory (2)

Physicochemical 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 Advanced Undergraduates (1-2)

Individual or group investigation, research, studies, or surveys of selected problems. Prerequisite: Senior standing or consent of instructor. 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. Prerequisite: CHM 401

CHM 405 Physical Organic Chemistry (3)

The application of physiochemical principles to organic chemistry with emphasis on the kinetic approach to the postulation of reaction mechanisms. 3 lectures. Prerequisite: 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 313

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 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 422 Organic Synthesis (4)

Examples from recent chemical journals of the modern methods of organic synthesis in preparations involving multistep synthesis, with emphasis on mechanism and stereochemistry. 2 lectures, 2 three-hour laboratories. Prerequisite: CHM 253, 313

CHM 423 Inorganic Synthesis (4)

Systematic study of the preparation, properties, analysis, and reactions of inorganic compounds emphasizing the application of thermodynamics and physicochemical techniques. 2 lecture-problems, 2 three-hour laboratories. Prerequisite: CHM 402

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 116, 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 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 521, 522 Theoretical Chemistry (3) (3)

Quantum chemistry; applications of quantum mechanics to problems of atomic and molecular structure. Molecular orbital and valence bond theories; their applications and extensions. Electronic states and transitions. Organic and inorganic molecular structures and reaction mechanisms. 3 lectures. Prerequisite: Graduate standing. Concurrent: CHM 651, 652

CHM 650 Seminar in Chemistry (1-3)

Special problems in selected areas of chemistry. 1 to 3 lectures. Prerequisite: Graduate standing. Maximum of six units may be earned.

CHM 651, 652 Independent Study in Theoretical Chemistry (1) (1)

Reading and reports on papers in the literature; solving of assigned problems. Minimum of 60 hours total time. Prerequisite: Graduate standing. Concurrent: CHM 521, 522

CHM 696 Research and Thesis (1-9)

A study of experimental research methods, the design and execution of experiments in the field of chemistry, and the analysis and correlation of experimental data. Results of the study are written as a formal thesis. This course may be repeated for a total of 9 units. Prerequisite: Graduate standing.

Physical Science

PSC 101 Fundamentals of Earth Science (4)

Geologic features and processes. Solar phenomena and concepts. The scientific method of investigating the earth and neighboring planets for a better understanding of man's physical environment. PSC 101 is not open to students who have credit for PSC 215, 221 or 321. 3 lectures, 1 recitation.

PSC 215 Astronomy (3)

Astronomical properties of the solar system. Instruments, methods, and principles of astronomical investigation. Theories as to the origin, state, and future of the universe. A consideration of man's place in the cosmos. 3 lectures.

PSC 221 Physical Geology (4)

Fundamental geologic processes. General surface features of the earth. Rocks and minerals. 3 lectures, 1 three-hour laboratory. Not open for credit to students who have completed PSC 101.

PSC 222 Historical Geology (3)

A description of the evolution of landscapes beginning with the origin of the earth. Includes discussions of conditions and changes occurring during successive geologic ages. 2 lectures, 1 three-hour laboratory.

PSC 223 Mineralogy (3)

Identification and occurrence of common rocks and minerals. Includes elementary crystallography, physical and chemical examinations of minerals and descriptive mineralogy. 2 lectures, 1 three-hour laboratory. Prerequisite: PSC 101 or 221

PSC 303 Climatology (3)

Introduction to the weather-producing processes of the atmosphere. Subject matter includes the earth's heat budget, thermodynamics of the atmosphere, cloud and precipiation mechanisms and the cause of atmospheric circulation. 3 lectures. Prerequisite: PHY 133

PSC 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. Not open to students who have credit for PCS 221. For junior engineering majors.

PSC 323 Geomorphology (3)

Various landforms and interpretation of forces resulting in these landforms. 2 lectures, 1 three-hour laboratory. Prerequisite: PSC 101 or 221

PSC 423 Invertebrate Paleontology (3)

Morphology and evolution of fossil invertebrates. Includes discussions of ancient environments and changes in life forms with time. 2 lectures, 1 three-hour laboratory. Prerequisite: PSC 222 or ZOO 236

Physics

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 College Physics (4)

Principles of mechanics and heat. Statics, uniform motion, accelerated motion. Newton's second law, work and energy, impulse and momentum, rotational motion, fundamentals of heat, properties of gases, heat flow. 3 lectures, 1 three-hour laboratory. For non-engineering students. Prerequisite: MAT 101

PHY 122 College Physics (4)

Sound and light. Simple harmonic motion. Wave motion, Doppler effect, acoustical phenomena, geometrical and physical optics, elements of spectroscopy. 3 lectures, 1 three-hour labora-

tory. For non-engineering students. Prerequisite: PHY 121

PHY 123 College Physics (4)

Electrostatics, magnetostatics, current electricity, potential, dielectrics, capacitance, Ohm's Law, electromagnetics. 3 lectures, 1 three-hour laboratory. For non-engineering students. Prerequisite: PHY 122

PHY 131 General Physics (4)

Fundamental principles of mechanics. Vectors, statics, uniform motion, accelerated motion, work and energy, rotational motion, elasticity, impact, and harmonic motion. 3 lectures, 1 three-hour laboratory. Prerequisite: MAT 114 or higher.

PHY 132 General Physics (4)

Fundamental principles of hydraulics, heat, sound, and light. Fluids at rest and in motion, temperature, expansion, quantity of heat, heat transfer, thermodynamics, thermal properties of matter, wave motion, vibrating bodies, acoustical phenomena, nature and propagation of light, geometric optics. 3 lectures, 1 three-hour laboratory. Prerequisite: PHY 131

PHY 133 General Physics (4)

Fundamental principles of magnetostatics, electrostatics, and current electricity. Coulomb's law, electric field, potential, properties of dielectrics, capacitance, Ohm's law, magnetism and magnetic fields, measuring instruments, magnetic field of a moving charge, induced emf, ac circuits. 3 lectures, 1 three-hour laboratory. Prerequisite: PHY 131

PHY 204 Physics of Electricity and Magnetism (4)

Coulomb's law, the electrostatic field, potential, properties of dielectrics, capacitance and capacitors, the magnetostatic field, the magnetic field of a current, induced electromotive force, inductance, magnetic properties of matter. 4 lectures. Prerequisite: PHY 131 and MAT 116

PHY 212 Elementary Atomic Physics (3)

Theory of special relativity, radiation, wave mechanics and atomic structure. 3 lectures.

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 212

PHY 233 Thermal Physics (3)

Fundamental principles of thermodynamics applied to simple thermodynamic systems. Introduction to kinetic theory of gases. 3 lectures. Prerequisite: PHY 132 and MAT 214

PHY 302 Optics (3)

Geometrical optics: Reflection and refraction, lenses and mirrors. Magnifiers, telescopes and other simple optical systems. Physical optics: Electromagnetic spectrum, Fourier analysis, coherence. 2 lectures, 1 three-hour laboratory. Prerequisite: PHY 133 or 204, PHY 212 and MAT 214

PHY 303 Optics (3)

Physical Optics: Interference and diffraction, polarization, double refraction, dispersion and scattering. Electromagnetic nature of light. Quantum Optics: Photoelectric effect, Bragg diffraction, Compton scattering, Mössbauer effect. Doppler effect and red shift, elementary radiation theory and the laser. 2 lectures, 1 three-hour laboratory. Prerequisite: PHY 302

PHY 313, 314, 315 Physics of Electric and Magnetic Phenomena (3) (3) (3)

Principles of electric and magnetic phenomena of fundamental importance in practical application. Static electric and magnetic fields, dielectric and magnetic materials, magnetic effects of currents, Maxwell's Field Equations, boundary value problems employing the field equations. 3 lec-

tures. Prerequisite: PHY 133 or 204, and MAT 216

PHY 321, 322 Mechanics (3) (3)

Vector algebra, kinematical descriptions of motion employing various coordinate systems, fundamental principles of Newtonian mechanics, conservative forces, simple harmonic motion, central-force motion, the two-body problem, center of mass coordinates, statics and dynamics of rigid bodies, accelerated coordinate systems, introduction to the mechanics of continuous media and use of normal coordinates. 3 lectures. Prerequisite: PHY 131 and MAT 216

PHY 400 Special Problems for Advanced Undergraduates (1-2)

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

PHY 401 Modern Physics (3)

Atomic theory of matter, fundamental atomic particles. Thermal radiation and quantum theory, atomic and nuclear structure, electromagnetic radiation effects. 3 lectures. Prerequisite: PHY 133 or 204 and MAT 215

PHY 402 Modern Physics (3)

Special theory of relativity, X-ray phenomena, wave-particle duality, quanta and atoms, wave mechanics, applications of quantum mechanics. 3 lectures. Prerequisite: PHY 401

PHY 403 Advanced Nuclear Physics (3)

Natural and induced radioactivity, induced nuclear disintegration and nuclear reactions, interaction with matter of charged particles and gamma rays. Neutron physics, nuclear fusion, nuclear fission, nuclear reactions and related applications. Hyperfine structure. Nuclear models. Nuclear resonance and the Mössbauer effect. 3 lectures. Prerequisite: PHY 402

PHY 406 Solid State Physics (3)

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). 3 lectures. Prerequisite: PHY 133 or 204 and MAT 216

PHY 407 Statistical Physics (3)

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. 3 lectures. Prerequisite: PHY 212, 233 and MAT 216

PHY 408, 409 Quantum Mechanics (3) (3)

Experimental foundations of quantum theory. De Broglie waves, Bohr-Sommerfeld quantization rule, the uncertainty principle, the correspondence principle. The Schroedinger wave equation and its interpretation. Application of wave mechanics to simple one-dimensional systems. Interpretation of atomic and molecular structure. Heisenberg matrix theory and the quantum mechanical treatment of angular momentum. Time-independent perturbation theory. Introduction to time-dependent perturbation theory. 3 lectures. Prerequisite: PHY 401 and MAT 301

PHY 412, 413 Mathematical Methods of Physics (3) (3)

Solutions of problems in physics by mathematical methods. Analysis of phenomena involving motion of particles and rigid bodies using such techniques as vector calculus, differential equations, calculus of variations, complex variables, Lagrange's and Hamilton's equations. 3 lectures. Prerequisite: PHY 133 or 204 and MAT 301

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. Prerequisite: PHY 132 and MAT 216

PHY 430 Advanced Physics Laboratory (3)

Selected topics in advanced experimental physics. 3 three-hour laboratories. Prerequisite: Consent of department. To be scheduled only 1 unit at a time.

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

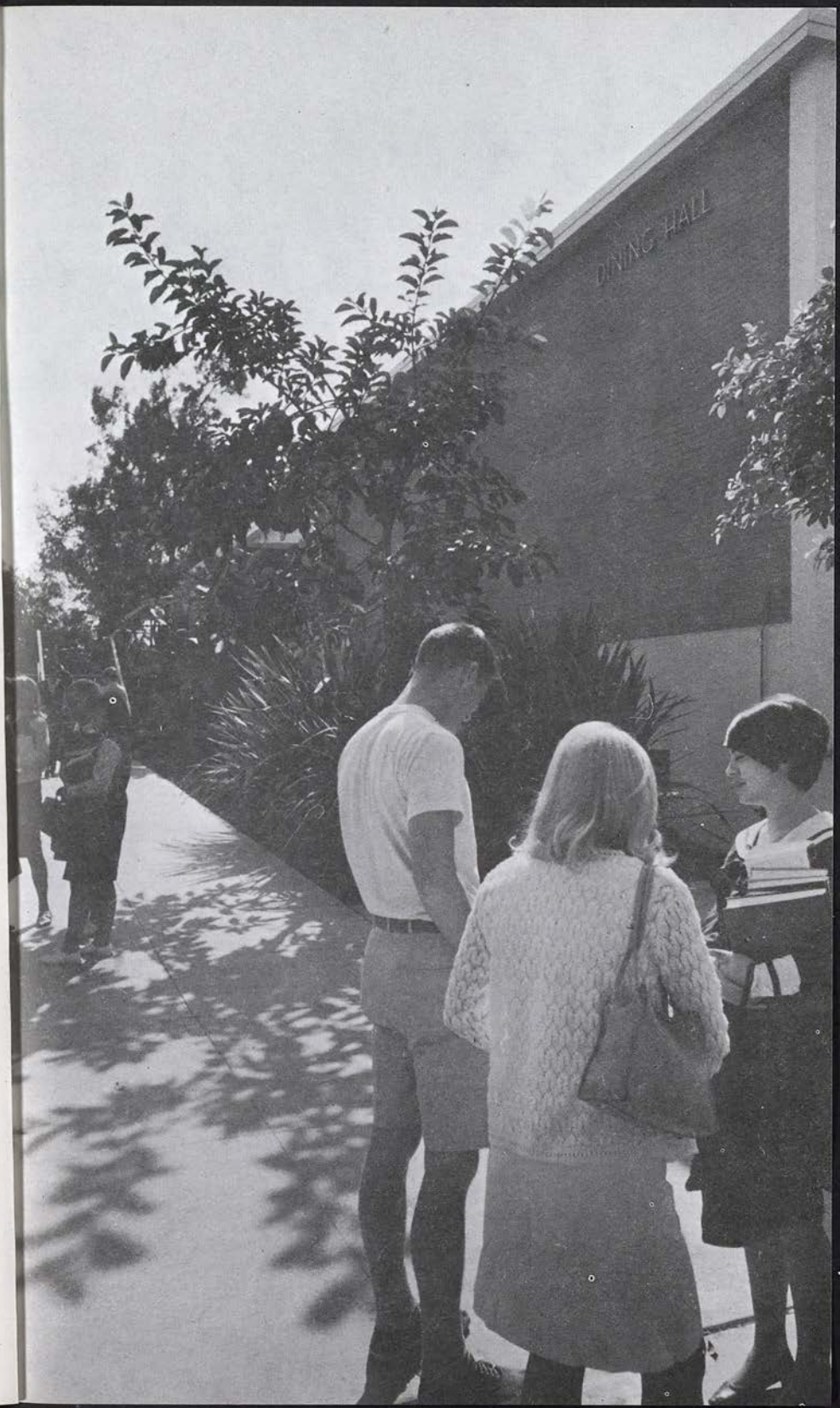
Selection and completion of a project under faculty supervision. Projects typical of problems which graduates must solve in their fields of employment. Project results presented in a formal report. Minimum of 120 hours total time.

PHY 463 Undergraduate Seminar (2)

Study of current developments in physics and discussion of periodicals of an appropriate level. 2 lecture-discussions.

PHY 650 Seminar in Physics (1-3)

Special problems in selected areas of physics. 1 to 3 lectures. Prerequisite: graduate standing. Maximum of six units may be earned.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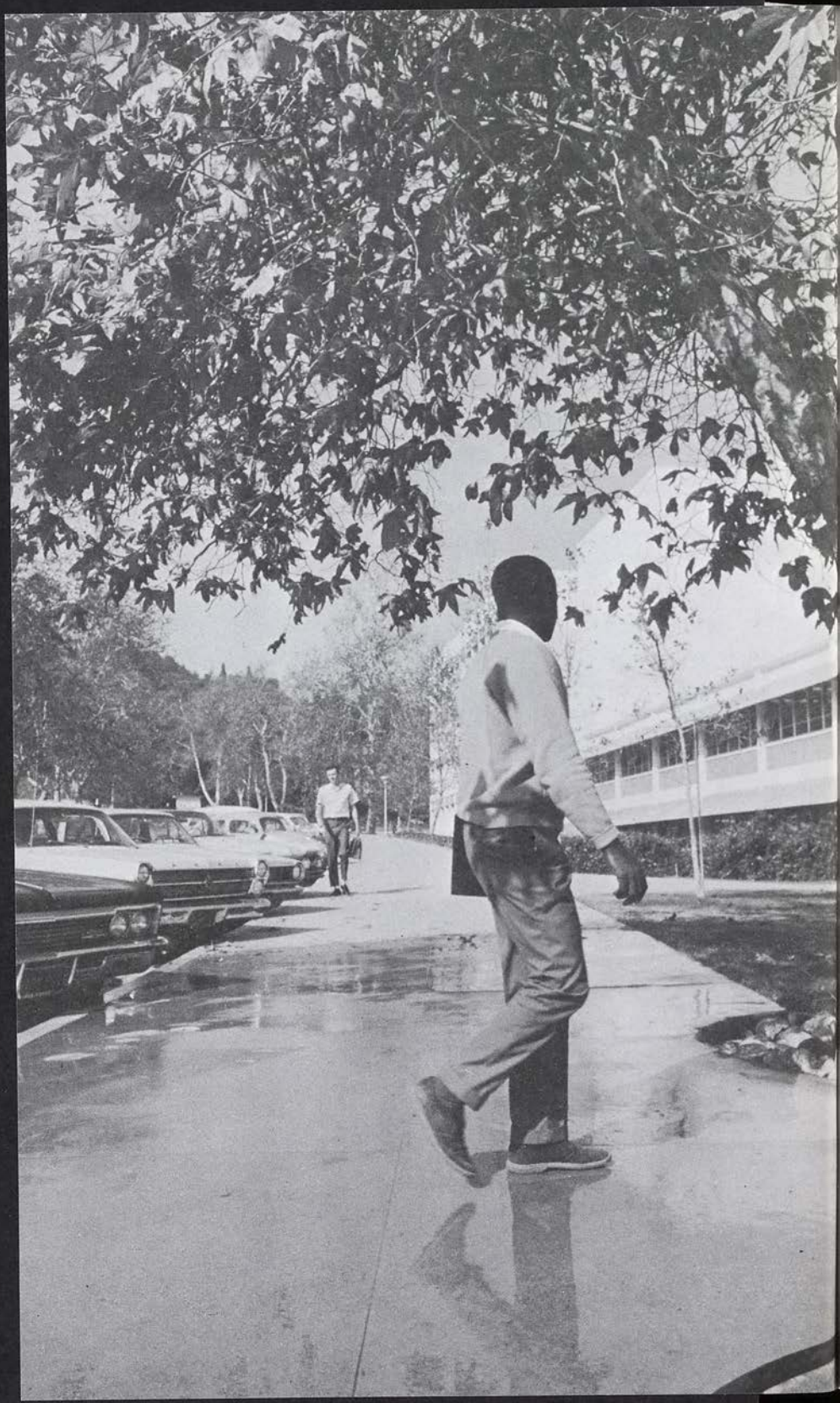

DIRECTORIES

FACULTY . . . 321

FACULTY OVERSEAS ASSIGNMENTS . . . 363

INDEX . . . 365

FACULTY

KRAMER, ROBERT C. (1965)
President

B.S., Purdue University, 1947; M.S., Michigan State University, 1948; Ph.D., 1952; post-doctoral graduate study, Harvard University; honorary doctorate, Purdue University, 1968.

Experience: Vice President, Cal Poly, Pomona; professor, director, Agricultural Marketing and Utilization Center, Michigan State University; assistant director, Michigan Cooperative Extension Service; consultant, O.E.C.D., Paris, France.

ABU-HAYDAR, LAURE I. (1960)
Associate Professor
Mathematics

B.A., American University, Beirut, Lebanon, 1949; Mathématiques Generales, University of Lyon, 1951; M.A., University of Southern California, 1956.

Experience: Teacher, College of Ahhah, Beirut; lecturer, University of Southern California.

ACKLEY, CHARLES W. (1966)
Associate Professor
Social Sciences

B.A., Seattle Pacific College, 1936; S.T.B., New York Theological Seminary, 1940; S.T.M., Harvard Divinity School, 1953; Ph.D., Claremont Graduate School, 1968.

Experience: Merchant Marine; Methodist minister; chaplain, U.S. Navy (Ret.); lecturer, Chaffey College.

ADAIR, VIRGINIA H. (1957)
Associate Professor
Language Arts

A.B., Mount Holyoke College, 1933; M.A., Radcliffe College, 1936.

Experience: Librarian and bibliotherapist; instructor, College of William and Mary, Pomona College, La Verne College.

AL-SABEA, TAHA H. (1968)
Assistant Professor
Economics

B.A., Baghdad University, 1960; M.A., Montana State University, 1963; Ph.D., University of Southern California, 1968.

Experience: Assistant professor, Humboldt State College; senior economist, Ministry of Petroleum, Baghdad, Iraq.

AMES, RALPH W. (1961)
Associate Professor
Biological Sciences

B.S., University of Wyoming, 1941; M.S., 1942; Ph.D., University of Illinois, 1950.

Experience: Plant pathologist, professor and department chairman, Utah State University; plant pathologist, University of Massachusetts, Los Angeles State and County Arboretum, and J. Harold Mitchell Company.

ANDERSON, KENNETH H. (1963)
Director of Undergraduate Studies

B.S., Brigham Young University, 1953; M.S., 1955; Ph.D., University of Southern California, 1963.

Experience: Assistant professor, South Dakota School of Mines and Technology, Bakersfield College, California State College at Los Angeles; Coordinator of academic development, Cal, Poly, Pomona.

ANOOSHIAN, V. BARNEY (1958)
Professor
Physical Education

A.B., San Jose State College, 1947; M.A., Claremont Graduate School, 1960.

Experience: High school teacher and coach.

APPEL, EDWARD C., JR. (1946)
Professor
Plant and Soil Science
B.S., Oregon State University, 1940.
Experience: Agricultural inspector and deputy agricultural commissioner, Department of Agriculture, San Bernardino County; U.S. Navy; California Department of Agriculture.

ARMSTRONG, WILLIAM W., JR. (1960)
Audio Visual Coordinator
B.S., California State Polytechnic College, 1958; M. S. University of California, Riverside, 1964.
Experience: Horticulturist, U.S. Department of Agriculture, Indio.

ASCHENBRENNER, ALBERT J. (1947)
Dean, School of Arts
A.B., Whitman College, 1940; M.S., University of Southern California, 1947; Ed.D., 1961.
Experience: Instructor, English and social sciences; registrar and admissions officer, associate dean, counseling and testing, California State Polytechnic College, Kellogg-Voorhis.

BARRETT, MARTIN K. (1955)
Associate Professor
Chairman, Accounting Department
B.S., University of Pittsburgh, 1937; M.A., Ohio State University, 1939.
Experience: Certified public accountant; assistant professor, Ohio State University, Redlands University; staff, Arthur Anderson & Company; private accounting practice.

BATCHELLER, OLIVER A. (1946)
Professor
Chairman, Ornamental Horticulture Department
B.S., Oregon State University, 1936.
Experience: Assistant county agent and horticulturist, Lane County, Oregon; nursery manager, California Nursery Company; horticultural consultant; U.S. Army.

BEARDMORE, ROBERT L. (1958)
Professor
Mechanical Engineering
B.S.M.E., University of Illinois, 1951; M.S.M.E., 1962. Candidate for Engineer's degree, Stanford University.
Experience: Industrial engineer, mechanical engineer, design engineer, registered professional engineer, California.

BEAUCHAMP, KENNETH L. (1965)
Assistant Professor
Social Sciences
A.B., Whitman College, 1962; M.A., Claremont Graduate School, 1965; Ph.D., 1968.
Experience: Research scientist, Aeroneutronics; instructor, Peninsula College.

BELCHER, MELVIN B. (1958)
Coordinator of Academic Articulation
B.S.E.E., University of California, Berkeley, 1951.
Experience: Engineering assignments in test, design, application and sales, General Electric Co.; technical education advisor, USAID; instructor, Pasadena City College.

BELL, JAMES (1968)
Associate Professor
Physical Education
A.B., Lincoln University, 1952; M.A., Columbia University, 1953; Ed.D., 1960.
Experience: Department chairman, Virginia State College; assistant professor and coach, Southern University; high school teacher and coach; group social worker, recreation worker and supervisor.

BELLMAN, SAMUEL I. (1957)
Professor
Language Arts
B.A., University of Texas, 1947; M.A., Wayne University, 1951; Ph.D., Ohio State University, 1955.
Experience: Newspaper columnist; instructor, Fresno State College, University of California Extension, Los Angeles and Riverside; visiting professor, University of Southern California.

BERNE, JOHN R. (1960)
Foreign Student Advisor
B.S., University of Southern California, 1958.
Experience: Housing coordinator, California State Polytechnic College; counselor of men's organizations.

BESS, DAVID E. (1967)
Assistant Professor
Environmental Design
A.B., Stanford University, 1959; M.C.P., University of California, Berkeley, 1957.
Experience: City and regional planner.

BETHE, DONALD R. (1968)
Assistant Professor
Physical Education
B.A., San Fernando Valley State College, 1963; M.S., Syracuse University, 1964; Ph.D., Ohio State University, 1968.
Experience: Elementary teacher; instructor, Syracuse University, Cuyahoga Community College, Ohio State University.

BLACK, RICHARD T. (1960)
Professor
Chairman, Electrical and Electronics Engineering Department
B.S.E.E., U. S. Naval Academy, 1933; certificates, Harvard Graduate School of Engineering and Massachusetts Institute of Technology.
Experience: Air War College; commander, air proving ground electronics unit; group commander, Strategic Air Command; chairman, European Radio Frequency Agency (NATO).

BLACKBURN, THOMAS C. (1965)
Assistant Professor
Social Sciences
B.A., University of Hawaii, 1959; admitted to candidacy, Ph. D., University of California, Los Angeles.
Experience: Teaching assistant, Santa Monica City College, University of California, Los Angeles.

BLAKELY, LAWRENCE M. (1963)
Associate Professor
Biological Sciences
B.A., University of Montana, 1956; M.A., 1958; Ph.D., Cornell University, 1963.
Experience: Research associate and instructor, Cornell University, visiting assistant professor, University of Montana.

BLINKHERN, LOUISE (1955)
Librarian III
Catalog Librarian
B.A., University of California, Los Angeles, 1929; Certificate in Librarianship, University of California, Berkeley, 1931.
Experience: City librarian, San Marino Public Library; cataloger and audio-visual assistant, Arcadia Unified School District.

BLUMNER, SIDNEY M. (1967)
Assistant Professor
Economics
B.A., University of California, Los Angeles, 1960; M.A., 1961; Ph.D., University of Arizona, 1968.
Experience: Instructor, University of Arizona; assistant professor, Chico State College; public utilities consultant.

BOBB, SYDNEY RALPH (1958)
Professor
Language Arts
A.B., University of Chicago, 1939; M.A., 1948; Ph.D., Stanford University, 1954.
Instructor, Washington State College, California State Polytechnic College, San Luis Obispo.

BOGUE, CAMERON C. (1955)
Professor
Mathematics
B.A., University of Redlands, 1943; M.A., University of Michigan, 1947.
Experience: Life insurance company, actuarial department; mathematical statistician, Naval Ordnance Laboratory.

BOLAND, GERTRUDE C. (1957)
Professor
Economics
A.B., Mt. Saint Mary's College, 1936; B.S., Georgetown University, 1948; M.A., Catholic University of America, 1950; Ph.D., Claremont University College, 1961.

Experience: Statistician and group leader, Aerojet General Corp.; instructor, Manhattanville College, New York; teacher, Los Angeles City Schools.

BONDE, ROBERT G. (1966)
Executive Dean

B.A., San Jose State College, 1955; M.A., 1956; Ed.D., Colorado State College, 1964.

Experience: Assistant professor, Humboldt State College; associate professor, California State College at Long Beach; facilities planner, Chancellor's Office, California State Colleges.

BRAY, ROBERT T. (1965)
Assistant Professor
Economics

B.S., Pennsylvania State University, 1957; M.A., Uinversity of California, Los Angeles, 1960; admitted to candidacy, Ph.D.

Experience: Teaching assistant, Pennsylvania State University, University of California, Los Angeles; research economist, Real Estate Research Program, Institute of Government and Public Affairs, University of California, Los Angeles.

BRIGHT, BRATCHER L. (1964)
Assistant Professor
Industrial Engineering

B.S., Buffalo State University, 1960; M.A., Colorado State University, 1961.

Experience: Teacher, mechanic, experimental and tool room machinist, tool and die maker.

BROWN, CECIL B. (1968)
Professor
Communication Arts

B.S.B.A., Western Reserve, Ohio State University, 1929; L.L.D. (Honorary), Union College.

Experience: Newspaper reporter; foreign correspondent, Europe, Far East, U.S.A.; news commentator, CBS, Mutual, NBC, Educational Television, U.S.A., Europe, Far East; lecturer, San Fernando Valley State College.

BROWN, DONALD E. (1958)
Associate Professor
Industrial Engineering

B.V.E., California State College at Los Angeles, 1963.

Experience: Tool and manufacturing engineer, Aerojet General; senior manufacturing engineer, Boeing Company.

BROWN, HOWARD S. (1948)
Professor
Biological Sciences

B.A., University of California, Los Angeles, 1943; M.A., 1949; Ph.D., Claremont Graduate School, 1960.

Experience: Visiting professor, Chung Chi College, Hong Kong.

BROWN, KEITH H. (1968)
Assistant Professor
Physical Sciences

B.A., Brigham Young University, 1964; M.S., University of Illinois, 1965; admitted to candidacy, Ph.D., Brigham Young University.

BROWNE, PHILIP (1963)
Associate Professor
Chairman, Music Department

B.A., Arizona State University, 1956; M.M., Eastman School of Music, 1959; composition studies with Bernard Rogers, Wayne Barlow, Darius Milhaud, and Roy Harris.

Experience: School music teacher; published composer and author; member of A.S.C.A.P.; musician, Phoenix Symphony, Eastman Wind Ensemble.

BRUNDAGE, ANTHONY L. (1968)
Assistant Professor
History

B.A., University of California, Los Angeles, 1964; M.A., 1966; admitted to candidacy, Ph.D.

Experience: Military instructor; research assistant, University of California, Los Angeles.

BRUNS, ROBERT A. (1965)
Associate Professor
Electrical and Electronics Engineering

B.A., M.S., Oregon State University, 1942.

Experience: Instructor, Oregon State University; assistant professor, University of California; lecturer, University of Southern California; engineering specialist; manager of research.

BUTLER, KARL D., Jr. (1968)
Assistant Professor
Animal Science
B.S., California State Polytechnic College, San Luis Obispo, 1965; M.S., Pennsylvania State University, 1967.
Experience: Instructor, Montana State University; assistant instructor, Pennsylvania State University; professional farrier.

BUTTERWORTH, JOHN R. (1961)
Associate Professor
Language Arts
B.A., Syracuse University, 1933; M.A., University of Southern California, 1938; Ph.D., University of California, Los Angeles, 1959.
Experience: Instructor, University of Nevada; assistant professor, University of Southern California.

CANHAM, ALBERT E. (1948)
Professor
Plant and Soil Science
B.S., University of California, Los Angeles, 1941.
Experience: U.S. Navy; manager, citrus and avocado orchards; owner, commercial weed and pest control company; instructor, I-on-F program, Palomar College; industrial consultant.

CARLBERG, GEORGE E. (1949)
Professor
Accounting
B.S., University of California, 1947.
Experience: Livestock buyer, Armour & Company; U.S. Army; field man for quality control, Arden Farms Company.

CARLSTEDT, GEORGE C. (1959)
Assistant Professor
Mathematics
B.S., U.S. Coast Guard Academy, 1924, M.S., Purdue University, 1958.
Experience: Instructor, Bradley University; line officer, U.S. Coast Guard.

CARSON, GEORGE W. (1961)
Associate Professor
Mathematics
A.B., Hanover College, 1927; M.A., University of Illinois, 1935.
Experience: Department chairman, Pikeville College; associate professor, University of Redlands; professor, Grove City College.

CARTER, JOEL W. (1968)
Assistant Professor
Ornamental Horticulture
B.S., Florida State University, 1954; M.S., University of Tennessee, 1955.
Experience: Director of Parks and Recreation, Carpentersville, Ill.; Superintendent of Recreation, Arlington Heights, Ill.; officer, U.S. Navy; teacher, Tennessee schools; recreation leader, camp counselor, park maintenance workman.

CASTRO, DONALD S. (1967)
Assistant Professor
History
A.B., University of California, Los Angeles, 1962; M.A., 1964; admitted to candidacy, Ph.D.
Experience: Research associate, UCLA Latin American Center; teaching assistant, University of California, Los Angeles; Fulbright fellow in Argentina; field research, Argentina.

CHANG, YU (1963)
Associate Professor
Mathematics
B.A., Sacramento State College, 1961; M.A., University of California, Davis, 1963.
Experience: Teaching assistant, University of California, Davis; programmer, computer center, University of California, Davis.

CHEEVER, JOHN K. (1968)
Assistant Professor
Accounting
B.S., University of Nevada, 1959; M.B.A., 1968.
Experience: Certified public accountant; staff, Carlos B. Brown, CPA; instructor, University of Nevada.

CHORNEY, ALEXANDER H. (1962)
Associate Professor
Language Arts
B.A., University of California, Los Angeles, 1948; M.A., 1951, Ph.D., 1963.

Experience: Instructor and assistant professor, University of Southern California, radio, music, writing experience.

CHRISTENSEN, ALLEN C. (1964)
Associate Professor
Animal Science
B.S., Brigham Young University, 1957; M.S., University of California, 1960.
Experience: Teaching assistant, University of California, Brigham Young University; vocational agriculture instructor; co-owner, operator, general farm.

CHURCH, DAVID A. (1962)
Assistant Professor
Language Arts
B.A., Califorina State College at Los Angeles, 1959, M.A., 1961.
Experience: Instructor, California State College at Los Angeles; communications consultant.

CHYLINSKI, RICHARD J. (1964)
Associate Professor
Environmental Design
B. of Arch., University of California, Berkeley, 1962; M. or Arch., 1963.
Experience: Associate planner, draftsman, designer, project architect, climate consultant; private practice, San Francisco and Los Angeles areas.

CLANTON, HENRY M. (1964)
Associate Professor
Electrical and Electronics Engineering
B.S., Louisiana Polytechnic Institute, 1934; M.S., 1948; Ph.D., University of Pennsylvania, 1951; certificates, Harvard Graduate School of Engineering and Massachusetts Institute of Technology.
Experience: Advanced research projects agency office, Secretary of Defense; U.S. Army Rocket and Guided Missle Agency, Air Defense Board, Anti-aircraft Artillery School.

CLARK, DAVID L. (1966)
Assistant Professor
Electrical and Electronics Engineering
B.S.E.E., California State College at Los Angeles, 1960.
Experience: Electronics engineer, General Dynamics and Naval Weapons Center, Corona Laboratories.

COCHRANE, KENNETH H. (1963)
Associate Professor
Physical Education
B.A., San Diego State College, 1959; M.A., 1967.
Experience: U.S. Navy; high school teacher and coach.

COHEN, STANLEY N. (1968)
Assistant Professor
Social Sciences
A.B., University of California, Berkeley, 1954; M.A., University of Southern California, 1961; admitted to candidacy, Ph.D.
Experience: Parole agent; group counseling coordinator, California State Department of Corrections; marriage counselor, Los Angeles County Conciliation Court; director, Center Marriage and Family Counseling, Anaheim, California.

COLE, DAVID E. (1962)
Associate Professor
Agricultural Business Management
B.S., California State Polytechnic College, 1952.
Experience: Manager, grower-shipper organization; produce broker; manager, tomato growers cooperative; dean of students, Natural Resources Development College, Lusaka, Zambia.

COMER, JOHN W. (1962)
Associate Professor
Chairman, Civil Engineering Department
B.S., Oklahoma State University, 1935; M.S., 1950.
Experience: Associate professor, Oklahoma State University; inspector, Bureau of Reclamation; field engineer; U.S. Army; registered professional engineer, Oklahoma.

COMPTON, MEL D. (1958)
Assistant Professor
Chemical Engineering
B.V.E., California State Polytechnic College, San Luis Obispo, 1964.

Experience: College instructor; foreman, Standard Oil Company; quality assurance engineer, U.S. Navy; welding and methods consultant, government shipyards.

CONARD, HAVEN Q. (1946)
Professor
Chairman, Agricultural Engineering Department
B.S., Iowa State University, 1943; M.S., University of California, Riverside, 1968.
Experience: Teacher, Iowa State University; U.S. Air Force; owner-manager, general livestock and grain farm.

CONROY, BRUCE J. (1968)
Assistant Professor
Environmental Design
B.F.A., University of Illinois, 1963; M.L.A., 1968.
Experience: Division of Highways, State of Illinois; landscape architect; resident engineer; vocational education coordinator.

COOPERSMITH, RUTH R. (1962)
Housing Manager
B.A., University of Southern California, 1941.
Experience: Housing counselor, San Bernardino Air Force Base; secretary; housing coordinator.

COREY, GERALD F. (1967)
Assistant Professor
Social Sciences
B.A., M.A., Loyola University of Los Angeles, 1961; Ed.D., University of Southern California, 1967.
Experience: High school teacher; instructor, Rio Hondo Junior College, Loyola University; counselor, Cal Poly; licensed marriage, family and child counselor.

COULTER, CHARLES A. (1961)
Associate Professor
Music
B.S., Indiana University, 1947; M.A., Columbia Teachers College, 1948; studies with Roger Wagner, Howard Swan, and Peter Wilhousky.
Experience: School music teacher; faculty member, Interlochen Music Camp; first trombonist, Phoenix Symphony.

CRETSER, GARY A. (1966)
Assistant Professor
Social Sciences
B.A., University of Southern California; 1965; M.A., 1967; admitted to candidacy, Ph.D.
Experience: Associate professor, University of California at San Diego; research assistant, University of Southern California.

CROISSANT. GERALD L. (1964)
Assistant Professor
Plant and Soil Science
B.S., Colorado State University, 1959; M.S., University of Idaho, 1961; Ph.D., University of Wisconsin, 1965.
Experience: Teaching assistant, University of Wisconsin; research fellow, University of Idaho.

CROKE, REGIS E. (1966)
Medical Officer
B.S., University of Pittsburgh, 1933; M.D., Georgetown University Medical School, 1950.
Experience: Internship, Queen of Angeles Hospital, Los Angeles; residency, Internal Medicine at Queen of Valley Hospital, Los Angeles; general practice.

CULLEN, THEODORE J. (1966)
Associate Professor
Mathematics
B.S., De Paul University, 1955; M.S., 1956.
Experience: Instructor, University of Illinois; assistant professor, Arizona State College, California State College at Los Angeles.

CURRAN, DONALD C. (1966)
Assistant Professor
Aerospace Engineering
B.S., United States Naval Academy, 1944; B.S.A.E., United States Naval Postgraduate School, 1952; A.E., California Institute of Technology, 1953.
Section director, Navy Bureau of Aeronautics; assistant department head, Naval War College; aircraft squadron commanding officer; engineer, Pratt and Whitney, aircraft division.

CUTCHER, DANIEL J. (1967)
Librarian II
Assistant Reference Librarian
B.A., Saint Michael's College of the University of Toronto, 1963; M.A.L.S. Western Michigan University, 1965.
Experience: Music catalog librarian, reference assistant, Oakland University.

DANIEL, RONALD S. (1968)
Assistant Professor
Biological Sciences
B.A., San Jose State College, 1960; M.A., 1963; Ph.D., University of Minnesota, 1968.
Experience: Secondary teacher, San Jose; research fellow, University of Minnesota.

DAUGHERTY, RAYMOND C. (1960)
Professor
Physical Education
B.S., State University of New York 1951; M.S., 1956.
Experience: High school teacher.

de BOISBLANC, WILLIAM R. (1968)
Assistant Professor
Mechanical Engineering
B.S. University of California, Los Angeles, 1963; M.S.M.E., University of Southern California, 1968.
Experience: Engineer, stress analysis, Aerojet-General; instructor, East Los Angeles College, Peace Corps; process engineer, Lockheed, Aeroneutronic Corp.

DEGEN, JAMES L. (1959)
Associate Professor
Ornamental Horticulture
B.S., California State Polytechnic College, 1954.
Experience: Nurseryman, landscape contractor; U.S. Army; instructor, landscape gardening; horticultural consultant.

DELSON, JANE (1967)
Assistant Professor
Language Arts
B.A., University of Oklahoma, 1946; M.A., University of California, Los Angeles, 1962; Ph.D. 1967.
Experience: Assistant professor, Eastern New Mexico University, Humboldt State College; instructor, San Fernando Valley State College.

DENDURENT, MYRON S. (1957)
Assistant Professor
Physical Science
B.S., Kansas State University, 1939; M.S., 1939.
Experience: Engineer, Goodyear Tire & Rubber Company, U.S. Army; instructor, University of Kansas City, Bethany College, Idaho State College.

DEV, VASU (1965)
Assistant Professor
Physical Sciences
B.S., Punjab University, 1951; M.S., 1954; Ph.D., University of California, Davis, 1962.
Experience: Instructor, Department of Pharmacology, Medical College, Patiala, India; research associate, University of Chicago; assistant professor, University of Tennessee.

DIMITMAN, JEROME E. (1949)
Professor
Biological Sciences
B.S., University of California, Berkeley, 1943; M.S., University of California, Riverside, 1949; Ph.D., University of California, Berkeley, 1958.
Experience: Research assistant, University of California, Los Angeles; plant pathologist, California Department of Agriculture; U.S. Navy.

DIVELBESS, DIANE (1963)
Assistant Professor
Art
B.A., Scripps College, 1957; M.F.A., Claremont Graduate School, 1959.
Experience: High school teacher; professional painter and designer.

DODD, ALAN (1967)
Publications Editor
B.A., Yale University, 1939.
Experience: Newspaper reporter; public information officer, Washington State University; director of public relations, Claremont Colleges; U.S. State Department press representative.

DONNELLY, CLAIRE K. (1961)
Supervising Nurse
R.N., St. John's Hospital School of Nursing, St. Louis, Mo., 1946.

Experience: Inter-Community Hospital, Covina; Marr-Jacobs Medical Group, Pomona.

DOWELL, DOUGLAS C. (1968)
Associate Dean of Engineering
B.S., University of Iowa, 1949; M.S., Air Force Institute of Technology, 1956; Ph.D., Iowa State University, 1964.
Experience; Industrial machinist and designer; surveyor; aircraft mechanic and flight engineer; project engineer, U.S. Air Force, Atomic Energy Commission; tenure associate professor, deputy head, mechanics department, U.S. Air Force Academy; registered professional engineer, Idaho; Lt. Col. (ret.) U.S. Air Force.

DUNN, NORMAN K. (1960)
Associate Professor
Manager, Arabian Horse Department
B.S., Colorado State University, 1951; M.S., Kansas State University, 1960.
Experience: County agricultural agent, Colorado; lecturer, University of California, Riverside, Mt. San Antonio Junior College.

DURHAM, JOHN P. (1967)
Assistant Professor
Language Arts
B.A., Grinnell College, 1951; M.A., State University of Iowa, 1954; Ph.D., Occidental College, 1967.
Experience: High school English teacher; assistant professor, California State College at Los Angeles; writer-in-residence, Los Angeles City Schools, free-lance writer.

DUSTMAN, JACK R. (1962)
Associate Professor
Business Management
B.S., Arizona State University, 1958; M.S., 1959; admitted to candidacy, D.B.A., University of Southern California.
Experience: Collateral and note department, Midland National Bank, Minneapolis; assistant to president, Holmberg Organ Mfg. Co., Rockford, Ill.

DUTRA, RAMIRO C. (1959)
Associate Professor
Chairman, Foods and Nutrition Department
B.S., University of California, 1954; M.S., 1956; Ph.D., 1958.
Experience: Food specialist, California Agricultural Experiment Station; lecturer, University of California.

EAGLETON, ROBERT D. (1968)
Assistant Professor
Physical Sciences
B.S., Abilene Christian College, 1959; M.S., Oklahoma State University, 1962; Ph.D., 1969.
Experience: Instructor, U.S. Naval Nuclear Power School.

EAVES, RONALD W. (1968)
Assistant Professor
Business Management
B.A., San Jose State College, 1959; M.A., 1962.
Experience: Instructor, Fullerton Junior College; data processing equipment operator, programmer, systems analyst and salesman; consultant.

EBERSOLE, WALTER J. (1958)
Associate Professor
Mechanical Engineering
B.A., Santa Barbara State College, 1941.
Experience: Project engineer, Shaffer Tool Works; designer, University of Southern California Engineering Center; process engineer, B. H. Hadley Company; instructor, Mt. San Antonio Junior College.

EDMONDS, W. DAVID (1968)
Assistant Professor
Biological Sciences
B.S., Texas Agricultural and Mechanical University, 1963; Ph.D., University of Kansas, 1968.
Experience: Naturalist, National Park Service; teacher and research assistant, University of Kansas.

EISCHEN, JOSEPH C. (1967)
Assistant Professor
Accounting
B.A., Fresno State College, 1950; M.B.A., University of Oregon, 1953; J.D., University of Southern California, 1966.

Experience: Certified public accountant; public, governmental, and private accounting; industrial, legal, and administrative positions; practicing attorney, member of the California Bar.

EMERY, LYNNE (1968)
Assistant Professor
Physical Education
B.S., Bowling Green State University, 1956; M.S., University of California, Los Angeles, 1958; admitted to candidacy, Ph.D., University of Southern California.
Experience: Associate professor, University of California, Los Angeles; high school teacher and swimming coach.

ENGELKE, GEORGE F. (1965)
Assistant Professor
Mechanical Engineering
A.B., Occidental College, 1958; B.S., California Institute of Technology, 1958; M.S., 1959.
Experience: Associate engineer, Ai-Research; research engineer, Marquardt; design engineer, Astropower, Douglas Aircraft; senior engineer, R.D. Bowerman, Consulting Engineers.

ENGLUND, CARL R. (1948)
Dean, School of Agriculture
B.S., University of California, Berkeley, 1939.
Experience: Director of high school and junior college vocational agriculture; head, crops department, California State Polytechnic College, Voorhis unit.

EPPS, MAX (1960)
Professor
Chemical Engineering
B.S., University of Southern California, 1934; M.S., 1935.
Experience: Assistant to chief engineer, Fairchild Aircraft; chief engineer, General Petroleum Company; research engineer, U.S. Navy.

ERSPAMER, JACK L. (1956)
Professor
Biological Sciences
B.S., University of Washington, 1941; Ph.D., University of California, Berkeley, 1953.
Experience: Teaching assistant, University of Washington, University of California; naturalist, National Park Service; research assistant, University of California Citrus Experiment Station, Riverside.

EVANS, WILLIAM M. (1968)
Assistant Professor
History
A.B., University of North Carolina, 1948; M.A., 1950; Ph.D., 1965.
Experience: Assistant professor, California Lutheran College, Westminster College of Salt Lake City; counselor, Reading Laboratory of Philadelphia.

EWERT, LEONORE H. (1966)
Assistant Professor
Language Arts
B.A., Upland College, 1958; M.A., Claremont Graduate School, 1962; Ph.D., 1967.
Experience: School teacher; assistant professor, Upland College; Fulbright lecturer, Munich Secondary Schools, Germany.

FARRELL, JOSEPH R. (1967)
Assistant Professor
Language Arts
B.A., Gannon College, 1963; M.A., University of Southern California, 1965; Ph.D., 1968.
Experience: Lecturer, University of Southern California; supervisor, foreign language laboratory, Gannon College; field work, National University of Mexico; language tutor; interpreter.

FAUSCH, HOMER D. (1956)
Professor
Animal Science
B.S., University of Minnesota, 1947; M.S., 1950; Ph.D., 1953.
Experience: U.S. Navy Air Corps; associate professor and head, Animal Husbandry Department, N.W. Experiment Station, University of Minnesota.

FEENEY, ROBERT G. (1965)
Associate Professor
Chemical Engineering
B.S., University of Pennsylvania, 1939.
Experience: Chemical engineer, Bu-

reau of Mines; building engineer, Oak Ridge; group leader, Celanese technical manager, Colgate Palmolive; instructor, Newark College of Engineering.

FELGEMAKER, GERHARDT H. (1966)
Assistant Professor
Environmental Design
B.F.A.. University of Illinois, 1964; M.L.A., University of Pennsylvania, 1966.
Experience: Planner and landscape architect, Harland Bartholomew & Associates; landscape architect, George Patton & Associates; lecturer, University of California, Riverside; private practice.

FERGUSON, MARION S. (1967)
Librarian II
Assistant Catalog Librarian
B.A., University of California, Los Angeles, 1939; M.S.L.S., University of Southern California, 1958.
Experience: Librarian, Los Altos High School.

FERNANDES, SUE M. (1964)
Librarian III
Reference Librarian
B.A., California State College at Long Beach, 1962; M.L.S., University of California, Los Angeles, 1964.
Experience: Catalog department, California State College at Long Beach; catalog assistant, Washington State Law Library.

FERRIS, HORACE G. (1958)
Professor
Physical Sciences
B.A., Pomona College, 1936; M.A., University of California, Los Angeles, 1939; Ph.D., 1949.
Experience: Physicist, California Institute of Technology, Scripps Institute of Oceanography; lecturer, Pomona College, University of Southern California; instructor, San Diego State College.

FIGGINS, ROSS F. (1965)
Assistant Professor
Language Arts
B.A., San Fernando Valley State College, 1960; M.A., 1962; M.A., University of Illinois, 1964.
Experience: Teaching assistant, San Fernando Valley State College; instructor, University of Illinois.

FILLHART, DANIEL H. (1961)
Assistant Professor
Industrial Engineering
B.V.E., California State College at Los Angeles, 1966.
Experience: U.S. Army; manufacturing research engineer; tool and die maker, toolroom leadman, experimental machinist, instrument machinist, manufacturing consultant.

FIRSTMAN, BRUCE L. (1962)
Associate Professor
Biological Sciences
A.B., Stanford University, 1952; M.A., 1954.
Experience: Associate in biology, San Jose State College; laboratory assistant, Stanford University; teaching fellow, University of California, Santa Barbara; instructor, City College of San Francisco.

FISHER, DONALD A. (1966)
Financial Aid Officer
B.A., University of Chicago, 1956.
Experience: Peace Corps; student personnel, Pomona College.

FLYNN, THOMAS J. (1959)
Assistant Professor
Mathematics
B.S., United States Naval Academy, 1927; M.S., Purdue University, 1959.
Experience: Command of U.S. Naval Weapons Station; command of battleship, cruiser and tanker; section director, research division, Bureau of Ordnance.

FORCE, DONALD C. (1965)
Associate Professor
Biological Sciences
A.B., Fresno State College, 1954; M.S., University of California, Davis, 1958; Ph.D., University of California, Berkeley, 1963.
Experience: Entomologist, Entomology Research Division, U.S.D.A., Berkeley, California; Columbia, Missouri.

FORD, BARBARA H. (1968)
Assistant Professor
Physical Education
B.S., California State Polytechnic College, Kellogg-Voorhis, 1963; M.A., California State Polytechnic College, San Luis Obispo, 1965.
Experience: High school teacher.

FORD-LIVENE, CARLOS (1964)
Assistant Professor
Mathematics
A.B., Fisk University, 1958; M.A., University of Southern California, 1964.
Experience: Instructor, Stillman College; teaching assistant and lecturer, University of Southern California.

FOX, WILLIAM E. (1961)
Associate Professor
Marketing
B.S., Ohio State University, 1951; M.B.A., University of Miami, 1959; admitted to candidacy, Ph.D., University of Southern California.
Experience: Agent, Prudential Insurance Co.; owner, Phoenix Research Associates; consultant, Management Training Corp.; instructor, Arizona State University, University of California Extension.

FRANCIS, JOHN W. (1960)
Foundation Manager
B.A., University of California, Los Angeles, 1950; J. D., 1960.
Experience: California Bar, 1961.

FREEMAN, JOHN F. (1966)
Assistant Professor
History
B.A., Antioch College, 1963; M.A., University of Michigan, 1964; admitted to candidacy, Ph.D.
Experience: Teaching assistant, University of Michigan.

FRENCH, JERE S. (1957)
Professor
Environmental Design
B.A., Washington University, St. Louis, 1951; B.S., Michigan State University, 1956.
Experience: U.S. State Department; National Park Service; landscape architect, Frederick B. Stresau; private practice, registered landscape architect, California.

FRENCH MILTON L. (1961)
Associate Professor
Language Arts
B.S., New York University, 1932; M.A., Columbia University, 1936; Ph.D., New York University, 1938.
Experience: Instructor, Monmouth College; director of beginning English, American College, Sofia, Bulgaria; assistant professor, Baylor University.

FRIEDMAN, STUART M. (1967)
Director of Institutional Studies
B.A., Columbia University, 1948; M.A., Columbia University, 1949; Ed.D., University of Southern California, 1966.
Experience: High school teacher; instructor, department chairman, institutional research and computer specialist, Los Angeles Harbor College; senior engineer in computing.

FROST, JACK B. (1967)
Assistant Professor
Physical Education
B.S., California State Polytechnic College, San Luis Obispo, 1956; M.S., 1961.
Experience: High school coach and teacher; coach and teacher, Antelope Valley College.

FULBECK, JOHN F. (1958)
Professor
Language Arts
A.B., University of Southern California, 1951; Ph.D., 1960.
Experience: Lecturer, University of Southern California, Chouinard Art Institute; coordinator, business management program, University of Southern California; editor.

GALBRAITH, EDWARD D. (1962)
Assistant Professor
Mechanical Engineering
B.S.M.E., University of Toledo, 1952; M.I.E., 1960.
Experience: Assistant professor, University of Toledo; specifications engineer, Owens Illinois Glass Company; consultant, Toledo Edison Company; engineer, Southern California Edison Company.

GALBREATH, GEORGE T. (1953)
Professor
Economics
A.B., Stanford University, 1948; M.A., 1949.
Experience: Instructor, California State Polytechnic College, San Luis Obispo; assistant professor, Armstrong Business College; manager, Galbreath Orchards; economic consultant.

GALLARDO, DIANA M. (1967)
Assistant Professor
Physical Education
B.A., California State College at Los Angeles, 1958; M.A., University of Southern California, 1967.
Experience: High school teacher; instructor, Cerritos Junior College.

GANSTER, LOUISE W. (1968)
Assistant Professor
Foods and Nutrition
B.S., University of Wisconsin, 1941; M.S., University of Washington, 1968.
Experience: Administrative dietetic internship, University of Washington, Seattle; food service director, Helen Bush-Parkside School, Seattle.

GANTZ, BENJAMIN S. (1963)
Associate Professor
Social Sciences
B.A., University of Southern California, 1942; M.A., University of Chicago, 1956; Ph.D., Claremont Graduate School, 1966.
Experience: Instructor, University of Alaska; psychological consultant, Naval Weapons Center; U.S. Navy.

GARRITY, RODMAN F. (1962)
Director,
Teacher Preparation Center
A.B., California State College at Los Angeles, 1950; M.A., Southern Methodist University, 1955; Ed.D., University of Southern California, 1962.
Experience: School teacher, principal and psychologist; junior college instructor; consulting psychologist; assistant director educational placement, lecturer, University of Southern California; licensed psychologist.

GASSER, OTTO F.W. (1966)
Assistant Professor
Physical Education
B.A., University of California, Los Angeles, 1964; M.S., 1965.
Experience: Instructor, laboratory technician, lecturer, University of California, Los Angeles.

GELLER, IRWIN (1962)
Associate Professor
Physical Sciences
B.A., Emory and Henry College, 1943; M.S., University of Puget Sound, 1954; Ph.D., Pennsylvania State University, 1958.
Experience: Research assistant, Pennsylvania State University; research chemist, Aerojet-General Corporation.

GENDELMAN, SAMUEL (1964)
Associate Professor
Mathematics
B.A., University of Wisconsin, 1938, M.A., University of Southern California, 1961.
Experience: Teaching assistant, University of Wisconsin; lecturer, University of Southern California; assistant professor, California State College at Los Angeles.

GESLER, JACK T. (1957)
Professor
Animal Science
B.S., California State Polytechnic College, 1952; M.S., Kansas State University, 1956.
Experience: Instructor, Washington State University, Kansas State University.

GLASER, WALTER W. (1960)
Associate Professor
Art
B.A., University of California, Los Angeles, 1953; M.F.A., Claremont Graduate School, 1959.
Experience: Teacher, San Gabriel City Schools; freelance artist and designer.

GOEHLER, BRIGITTE H. (1967)
Assistant Professor
Biological Sciences
Staatsexamen, Martin Luther Universität, 1951; M.S., Wayne State University, 1960; Ph.D., 1964.

Experience: Biologist, Deutsche Akademie der Landwirtschaftswissenschaften zu Berlin; assistant professor, Wayne State University; National Institute of Health postdoctoral fellow, University of California, Davis.

GOODIN, JAMES D. (1962)
Assistant Professor
Mechanical Engineering
B.S.M.E., University of Southern California, 1957; B.D., Fuller Theological Seminary, 1966.
Experience: Research engineer, Jet Propulsion Laboratory; test engineer, Aerojet-General Corporation; production supervisor, Union Carbide Corporation; junior mechanical engineer, Southern California Edison.

GRAVES, GEORGE R. (1958)
Professor
Aerospace Engineering
B.S., Marquette University, 1955; M.S., California State College at Long Beach, 1968.
Experience: Engineer, Douglas Aircraft; consultant, U.S. Air Force, Aerojet-General, C. F. Braun.

GRAY, MARGARET S. (1958)
Librarian II
Serials Librarian
B.A., Whittier College, 1931; B.S., University of Southern California, 1942.
Experience: U.S. Army Library Service; assistant reference librarian, Pomona College; cataloger, Claremont Colleges, Pomona Public Library.

GREEN, KENNETH A. (1965)
Associate Dean, Counseling and Testing
B.A., University of California, Berkeley, 1948; M.S.W., 1950.
Experience: Social worker; marriage and family counselor; assistant director, L.A. Conciliation Court; instructor, California State Polytechnic College.

GREEN, SIMON S. (1964)
Professor
Mathematics
Actuary Diploma, University of Vienna, 1933; M.S., 1934; Ph.D., University of Pittsburgh, 1952.
Experience: Assistant professor, Lincoln University; professor, Philander Smith College, Arizona State University; associate professor, Tulsa University; research associate, Boeing.

GREGORY, VERNON L. (1953)
Professor
Biological Sciences
B.S., University of Miami, 1941; M.A., DePauw University, 1947.
Experience: Graduate assistant, DePauw University; instructor, U.S. Navy, University of Miami; curriculum specialist, associate dean of arts and sciences, California State Polytechnic College.

GRIFFIN, JAMES M. (1949)
Professor
Ornamental Horticulture
B.S., California State Polytechnic College, 1949; M.A., 1952.
Experience: Instructor, Veterans Training Program; landscape and nursery business; horticultural consultant.

GRISELLE, SHERMAN W. (1966)
Professor
Environmental Design
B.S., Michigan State University, 1953; B.S.U.P., 1954; M.U.P., 1958.
Experience: Planner, City of Lansing; chief of planning administration; Tulsa Metropolitan Area Planning Commission; director of planning, City of Downey.

HALDERMAN, DONALD L. (1959)
Professor
Physical Education
B.S., University of Southern California, 1951; M.S., 1960.
Experience: High school teacher and coach.

HAND, ROBERT F. (1964)
Assistant Professor
Physical Education
B.S., Louisiana Polytechnic Institute, 1941; M.S., University of Arkansas, 1948.
Experience: Athletic trainer, Louisiana Polytechnic Institute; U.S. Naval Training Center.

HARDING, FENTON (1965)
Assistant Professor
Civil Engineering
B.S., Texas Technological College, 1933; M.S., Armour Institute, 1940.
Experience: Consulting engineer; instructor to associate professor, Texas Technological College; professor, University of Southern Louisiana; registered structural engineer, Texas; registered civil engineer, Louisiana.

HARMER, RUTH M. (1960)
Associate Professor
Language Arts
B.A., Barnard College, 1941; M.A., Columbia University, 1942.
Experience: Instructor, University of Southern California, Mexico City College; lecturer, University of California, Los Angeles, Extension Division; newspaper reporter; editor; writer.

HARRIS, WILLIAM M. (1960)
Professor
Chemical Engineering
B.S., Missouri School of Mines and Metallurgy, 1950; B.S.M.E., 1952.
Experience: Materials and process engineer, metallurgical engineer, senior research engineer; instructor, Missouri School of Mines and Metallurgy; registered professional engineer, California, Missouri.

HART, GEORGE P. (1966)
Assistant Professor
Social Sciences
B.A., University of California, Santa Barbara, 1959.
Experience: Insurance underwriter; budget analyst, University of California; staff assistant to Governor of Utah.

HARTHILL, MARION P. (1968)
Assistant Professor
Biological Sciences
B.A., Eastern Washington State College, 1934; M.S., University of Utah, 1964; Ph.D., 1968.
Experience: High school teacher; ranger, naturalist, Washington.

HARWOOD, C. EDWIN (1966)
Professor
Chairman, Language Arts Department
A.B., Olivet College, 1935; M.A., University of Michigan, 1940; Ph.D., University of Colorado, 1958.
Experience: Personnel technical instructor, General Motors Institute of Technology; instructor, University of Colorado; professor, Pasadena College; chairman, Division of the Humanities, North Carolina Wesleyan College.

HAUGH, CHARLES R. (1968)
Associate Professor
Environmental Design
B.F.A., University of Illinois, 1955; M.L.A., Harvard University, 1959.
Experience: Landscape architect; instructor, Monterey Peninsula College; assistant professor, University of Oregon; private practice.

HEALEY, ROBERT J. (1958)
Professor
Business Management
B.S., State Teachers' College, Salem, Massachusetts, 1950; M.S., Oklahoma State University, 1952.
Experience: High school teacher; instructor, Oklahoma State University; office manager; athletic director, assistant to the dean, California State Polytechnic College; AID consultant, Zambia, Africa.

HEATH, FREDERICK B. (1962)
Associate Professor
History
A.B., Syracuse University, 1949; M.A., 1950; Ph.D., University of Southern California, 1958.
Experience: Lecturer, University of Southern California, California State College at Long Beach, California State College at Los Angeles; instructor, Chouinard Art Institute; U.S. Army.

HENDERSON, LAUREN J. (1962)
Medical Director
M.D., State University of Iowa, 1932; internship, Jersey City Medical Center, 1932–1933; residency, Hudson County Hospital, New Jersey, 1933—1936.

Experience: General and surgical practice; U.S. Army, command of field hospital, surgical platoon.

HERBER, LAWRENCE J. (1966)
Assistant Professor
Physical Sciences
B.S., St. Joseph's College, 1959; M.S., New Mexico Institute of Mining and Technology, 1963; Ph.D., University of Nevada, 1968.
Experience: Instructor, St. Joseph's College; research assistant, New Mexico Institute of Mining and Technology, University of Nevada; teaching assistant, University of Nevada.

HERMSEN, RICHARD J. (1967)
Associate Professor
Electrical and Electronics Engineering
B.S.E.E., University of Wisconsin, 1959; M.S.N.E., 1960; Ph.D., 1963.
Experience: Senior dynamics engineer, design specialist, technical staff member, U.S. Air Force.

HERZOG, EMIL R. (1968)
Associate Professor
Mathematics
M.A., University of Basel, Switzerland, 1947; Ph.D., 1947.
Experience: Teacher, Institut Athenaeum, Basel; senior research fellow, California Institute of Technology; visiting associate professor, University of Southern California.

HESSE, WALTER H. (1956)
Professor
Physical Sciences
B.S., California State Polytechnic College, 1952; M.S., Cornell University, 1953; Ph.D., 1955.
Experience: Research assistant, Cornell University; teaching and research, University of Nevada; research, California Institute of Technology.

HIEMENZ, PAUL C. (1965)
Associate Professor
Physical Sciences
B.S., Loyola University, 1958; Ph.D., University of Southern California, 1964.
Experience: Teaching assistant, research fellow, University of Southern California; instructor, Los Angeles Pierce College; research chemist, Dow Chemical Company.

HILL, JAMES R. (1967)
Assistant Professor
Marketing
B.A., DePauw University, 1949; M.B.A., Miami University, 1967.
Experience: Instructor, Miami University, Michigan State University, Arizona State University; marketing research consultant.

HO, FRANKLIN Y. H. (1961)
Associate Professor
Chairman, Economics Department
B.A., National Southwestern Associated University, 1942; M.A., University of Southern California, 1951; Ph.D., 1957.
Experience: Senior economist, Consad Research Corporation; associate professor, University of Portland; instructor, National Sun Yat-sen University; industrial engineer.

HO, SHIU K. (1968)
Assistant Professor
Physical Sciences
B.S., University of Hong Kong, 1957; B.S. (Honors), 1958; M.S., 1960; Ph.D., University of Oxford, 1963.
Experience: Post-doctoral fellow, University of Alberta; research associate, Brookhaven National Laboratory; technical staff member, Aerospace Corporation.

HOBBS, KENNETH R. (1950)
Professor
Plant and Soil Science
B.S., Oregon State University, 1946; M.A., 1948; Ph.D., 1955.
Experience: Technician and curator, Department of Entomology, Oregon State University; agricultural inspector, Los Angeles County and State Nursery Service; field representative; structural pest control.

HORWITZ, DAVID A. (1965)
Associate Professor
Mathematics
B.A., University of Southern California, 1955; M.S., 1959; M.A., California State College at Los Angeles, 1963.

Experience: High school teacher; instructor, Los Angeles Trade Technical College; lecturer, assistant professor, California State College at Los Angeles.

HOULE, GEORGES J. (1968)
Librarian II
Assistant Acquisitions Librarian
B.A., University of Southern California, 1965; M.S., Western Michigan University, 1967.
Experience: Head, technical services, Corona Public Library.

HOUSE, HENRY (1947)
Dean of Students
B.S., California State Polytechnic College, 1943.
Experience: Associate dean of activities, California State Polytechnic College; director of high school vocational agriculture; U.S. Marine Corps.

HOWELL, JOHN N. (1967)
Assistant Professor
Biological Sciences
B.A., Kalamazoo College, 1961; Ph.D., University of California, Los Angeles, 1968.
Experience: Laboratory assistant, Kalamazoo College; teaching assistant, University of California, Los Angeles.

HSIA, YU-PING (1968)
Assistant Professor
Physical Sciences
B.S., Tunghai University, 1959; M.A., University of California, Santa Barbara, 1963; Ph.D., Illinois Institute of Technology, 1967.
Experience: Teaching assistant, research assistant, University of California, Santa Barbara, Illinois Institute of Technology; assistant professor, University of Bridgeport.

HUFFMAN, ALICE A. (1965)
Assistant Professor
Mathematics
B.A., University of California, Riverside, 1956; M.A., 1965.
Experience: Associate in Mathematics, University of California, Riverside; teacher, University of California Extension, Riverside.

HUGHES, WILLIAM C. (1967)
Assistant Professor
Agricultural Business Management
B.S., California State Polytechnic College, Kellogg-Voorhis, 1965; M.S., University of Nevada, 1967.
Experience: Ranch management; real estate sales; member of the board of directors, Agricultural Personnel Directors Association.

HUMPHREY, THEODORE C. (1968)
Assistant Professor
Language Arts
B.A., Oklahoma State University, 1956; M.A., University of Arkansas, 1962; admitted to candidacy, Ph.D.
Experience: Teaching assistant, Oklahoma State University; instructor, University of Arkansas and University of Cincinnati; assistant professor, Central Missouri State College.

HUNT, JAMES L. (1967)
Admissions Officer
B.S., Lycoming College, 1962; M.A., Syracuse University, 1965.
Experience: School teacher, counselor; public relations.

HUTCHINSON, RALPH B. (1968)
Associate Professor
Economics
A.B., University of California, Berkeley, 1953; M.A., 1960; admitted to candidacy, Ph.D., University of California, Los Angeles.
Experience: Instructor, Long Beach State College, American Institute of Banking, University of California, Riverside; assistant professor, Sacramento State College.

INDVIK, GAYLORD I. (1967)
Assistant Professor
Accounting
B.S., Iowa State Teachers College, 1938; M.B.A., Northwestern University, 1941.
Experience: Certified public accountant; instructor, George Washington University; high school teacher, auditor; public accountant; bureau chief; U.S. Air Force; office manager.

IRWIN, LARRY D. (1965)
Assistant Professor
Mathematics
B.A., Hardin-Simmons University, Texas, 1961; M.S., New Mexico State University, 1963.
Experience: Project engineer, Sperry Utah Company; research engineer, General Dynamics Corp.

IVES, QUAY D. (1960)
Associate Professor
Industrial Engineering
B.S., Texas College of Arts and Industries, 1950; M.S., 1951; admitted to candidacy, Ed.D., University of California, Los Angeles.
Experience: School instructor; factory superintendent and assistant engineer; instructor, Del Mar College, Corpus Christi, Texas; tool and die maker; manufacturing engineer.

JACKMAN, CLARENCE H. (1960)
Associate Professor
Business Management
B.S., Northwestern University, 1935; M.A., 1939; M.B.A., Bradley University, 1956.
Experience: Instructor, University of Illinois, Bradley University; general manager, Schafer Feed Co.; auditor, Air Force; certified public accountant, Arthur Young.

JACKSON, LEON S. (1961)
Associate Professor
Physical Education
B.S., California State Polytechnic College, Kellogg-Voorhis, 1960; M.A., 1965.
Experience: U.S. Army Special Services.

JANSON, MARTHA (1966)
Assistant Professor
Mathematics
B.S., Marian College, Indianapolis, 1959; M.S., Purdue University, 1964.
Experience: High school instructor; assistant professor, State University of New York.

JAQUES, DAVID G. (1968)
Assistant Professor
Economics
B.A., University of California, Berkeley, 1962; M.A., Claremont Graduate School, 1965; admitted to candidacy, Ph.D.
Experience: Manpower specialist, U.S. Department of Labor; staff associate, Claremont Graduate School.

JENKINS, GEORGE B. (1968)
Assistant Professor
Social Sciences
A.B., University of California, Berkeley, 1952; M.S.W., Atlanta University, 1954.
Experience: Senior social caseworker, Los Angeles County Bureau of Adoptions; deputy probation officer, Los Angeles County Probation Department.

JOHNSEN, ARTHUR (1967)
Assistant Professor
Marketing
B.S., Northwestern University, 1950; M.B.A., University of Southern California, 1962.
Experience: Coordinator, distributive education, Riverside City College; instructor, University of Redlands, Chapman College; director of marketing; merchandising manager; national sales manager.

JOHNSON, ALBEN C. (1966)
Assistant Professor
Electrical and Electronics Engineering
B.S., California State Polytechnic College, San Luis Obispo, 1954.
Experience: Chief engineer, Exactar, Inc., Iowa; research and development of missile guidance systems, General Dynamics, Johns Hopkins University.

JOHNSON, ANDREW J. (1968)
Assistant Professor
Accounting
Ph.B., University of Chicago, 1928; M.B.A., Harvard University, 1935.
Experience: Certified public accountant; associate professor, Michigan Tech.; controller, chief accountant, U.S. Post Office, American Can Company, Lybrand, Ross Bros. & Montgomery.

JONES, JOHN E. (1968)
Director of Placement
B.S., California State Polytechnic College, San Luis Obispo, 1947.

Experience: Director of placement, University of Southern California; manager, manufacturing and recruiting, General Electric Company; placement officer, California State Polytechnic College, San Luis Obispo; U.S. Navy.

KACHUN, JOSEPH (1959)
Professor
Mathematics
B.A., University of Pittsburgh, 1940.
Experience: Assistant professor, University of Pittsburgh; navigation instructor, U.S. Navy; instructor, Duquesne University, Pennsylvania State University.

KAPLAN, CAROLA M. (1968)
Assistant Professor
Language Arts
B.A., Brooklyn College, 1963; M.A., Cornell University, 1964; admitted to candidacy, Ph.D.
Experience: Instructor, Ithaca College; teaching assistant, Cornell University.

KAUFMAN, LOUIS (1961)
Dean, School of Business Administration
B.S., University of California, Los Angeles, 1940; M.B.A., University of Southern California, 1961; D.B.A., 1963.
Experience: Instructor, University of Southern California; associate dean, associate professor, California State Polytechnic College, Kellogg-Voorhis; industrial consultant; officer, USAR.

KEATING, EUGENE K. (1964)
Associate Professor
Animal Science
B.S., Kansas State College, 1953; M.S., 1954; Ph.D., University of Arizona, 1964.
Experience: Rancher; farm manager and instructor, Midwestern University.

KELLY, EDWARD M. (1957)
Professor
Physical Sciences
B.S., Pennsylvania State University, 1943; M.S., 1945; Ph.D., Brown University, 1950.
Experience: Assistant professor, University of Maine; research physicist, Atomics International, Aerojet-General Corp.

KENNINGTON, MACK H. (1958)
Associate Professor
Animal Science
B.S., University of Idaho, 1946; M.S., Purdue University, 1956; Ph.D., 1958.
Experience: Visiting professor, Cornell University; Idaho Cooperative Extension Service; U.S. Air Force.

KERSHAW, JOHN (1966)
Assistant Professor
History
B.A., University of Oxford, 1934; Diploma in Education, 1935; M.A., 1937; admitted to candidacy, Ph.D., University of California, Los Angeles.
Experience: High school teacher, Bancroft's School, London; lecturer, University of California Extension, Los Angeles.

KESSLER, CHARLES J. (1960)
Associate Professor
Mechanical Engineering
B.S.,M.E., University of Michigan, 1941
Experience: Associate professor, University of Missouri; assistant professor, University of Florida, Kent State University, Case Institute of Technology; engineer, McDonnell Aircraft; works manager; registered professional engineer.

KIEFER, DOROTHY L. (1962)
Associate Professor
Physical Education
B.S., University of California, Los Angeles, 1943.
Experience: High school teacher.

KING, DONALD W. (1961)
Associate Professor
Civil Engineering
A.B., Stanford University, 1947; M.S.C.E., 1948; Engineer's Degree, 1949.
Experience: Head, Civil Engineering Program, Tanzania; consultant, Air Force, Rapid Transit District; superintendent-engineer, Kiewit, Lockheed, Aetron; lecturer, Stanford University.

KING, LOUIS J. (1958)
Professor
Social Sciences

B.A., University of California, Los Angeles, 1943; M.S.W., University of Southern California, 1951; Ed.D., 1958.

Experience: Teacher, child welfare supervisor, Los Angeles City Schools; probation officer, Los Angeles County; vocational counselor, Veterans Administration; marriage and personal counselor.

KING, THOMAS M. (1966)
Assistant Professor
Mathematics

A.B., University of California, 1963; M.A., Western Washington State College, 1966.

Experience: Teaching assistant, Western Washington State College; high school teacher; research assistant, University of California.

KLINGER, JESSIE I. (1961)
Associate Professor
Physical Education

B.S., Oregon State University, 1953; M.S., University of California, Los Angeles, 1966.

Experience: Instructor, University of Idaho; high school teacher; city recreation director; camp riding and swimming director.

KNIGHT, BARRY A. (1964)
Associate Professor
Accounting

B.S., University of California, Los Angeles, 1960.

Experience: Certified public accountant; supervisor, Lybrand, Ross Bros. & Montgomery; visiting lecturer, Pomona College; U.S. Army Security Agency.

KNILL, LAMAR M. (1960)
Associate Professor
Biological Sciences

B.S., Colorado State University, 1951; M.S., 1955; Ph.D., 1967.

Experience: Research physiologist, armed forces special weapons project; fellow, National Institute of General Medical Sciences.

KNUDSEN, A. RUSSELL (1960)
Assistant Professor
Electrical and Electronics Engineering

A.B., Brigham Young University, 1941.

Experience: Assistant dean of education, Valparaiso Technical Institute; special instructor in electronics, Valparaiso University; instructor, National Science Foundation, Oklahoma State University; engineer.

KONIGSBERG, ALBERT (1961)
Assistant Professor
Mathematics

B.S., U.S. Naval Academy, 1930; M.S., Purdue University, 1960.

Experience: Captain, U.S. Navy (ret.); director of material, optical company; instructor, Claremont Men's College.

KONKLE, GAIL S. (1968)
Assistant Professor
Mathematics

B.S., Colorado State University, 1960; M.A., University of Missouri, 1962; Ed.D., Arizona State University, 1968.

Experience: Teaching fellow, University of Missouri; instructor, Park College; assistant professor and teaching assistant, Arizona State University.

KOONCE, GARY W. (1968)
Assistant Professor
Mechanical Engineering

B.S., Texas Agricultural and Mechanical College, 1964; M.S., University of Missouri, 1966; admitted to candidacy, Ph.D., Arizona State University.

Experience: Engineer, scientist, Douglas Aircraft; engineer, Rocketdyne.

KORDUS, HENRY (1964)
Assistant Professor
Environmental Design

M.S., University of Agriculture, Warsaw, Poland, 1951; M.A., University of Warsaw, 1957.

Experience: Landscape designer; professor, Lyceum of Landscape Architecture; assistant professor, Uni-

versity of Agriculture, Warsaw, Poland; landscape architect for construction engineers.

KRAMER, LLOYD A. (1963)
Librarian IV
Chief, Reader Services Division
B.A., University of California, 1948; B.L.S., 1950.
Experience: Hoover Institute and Library; social sciences librarian, Washington State University; head, technical services, Humboldt State College Library; director, technical services, Pomona Public Library.

KRIEGE, KENNETH B. (1957)
Professor
Mathematics
B.S., California State Polytechnic College, 1951; M.A., 1951.
Experience: High school teacher; instructor, Citrus College; computer science division, Aerojet-General Corp.

LABOUNTY, HUGH, O., JR. (1953)
Vice President for
Academic Affairs
B.A., M.A., University of Redlands, 1951; Ed.D., University of California, Los Angeles, 1960.
Experience: Department chairman, English and social sciences; coordinator, teacher education; executive dean; dean of the college, California State Polytechnic College.

LACY, MILO G. (1959)
Associate Professor
Agricultural Business Management
B.S., University of Oregon, 1938.
Experience: Junior college instructor; marketing specialist, United States Department of Agriculture; supermarket manager; instructor, food distribution, University of Southern California.

LANE, BERNARD O. (1963)
Associate Professor
Physical Sciences
B.S., University of North Carolina, 1950; M.S., Brown University, 1955; Ph.D., University of Southern California, 1962.
Experience: Oil company geologist; lecturer, University of Nevada; curator of geology, Santa Barbara Museum of Natural History.

LANSFORD, FRANK D. (1964)
Associate Professor
Physical Education
B.S., Tennessee Polytechnic University, 1953; M.A., George Peabody College, 1954; admitted to candidacy, Ph.D., University of California, Los Angeles.
Experience: Physical education instructor, Young Men's Christian Association.

LANTHORNE, GEORGE D. (1965)
Assistant Professor
Chemical Engineering
B.A., University of California, Santa Barbara, 1958.
Experience: Welding specialist, U.S. Air Force; industrial sales representative; sales engineer.

LAPP, RUSSELL V. (1962)
Assistant Professor
Journalism
Experience: News staff photographer, Los Angeles *Examiner;* free lance photographer.

LASSWELL, MARCIA E. (1961)
Associate Professor
Social Sciences
B.A., University of California, Berkeley, 1949; M.A., University of Southern California, 1952.
Experience: Instructor, George Pepperdine College; consultant, Affiliated Psychological Consultants; marriage counselor and psychometric consultant; school consultant.

LECOCQ, VERNE L. (1966)
Assistant Professor
Electrical and Electronics Engineering
B.S.E.E., South Dakota School of Mines and Technology, 1958.
Experience: Electronics engineer, senior electronics engineer.

LEE, KEI A. (1965)
Assistant Professor
Mathematics
B.S., University of Michigan, 1960; B.S., 1961, M.S., 1962.

Experience: Research assistant, University of Michigan; assistant professor, Piedmont College.

LEFFLER, ESTHER B. (1967)
Assistant Professor
Physical Sciences
B.S., Pennsylvania State University, 1945; Ph.D., University of Virginia, 1950; post-doctoral study, Cambridge University.
Experience: Instructor, Randolph-Macon Woman's College; professor and department chairman, Sweet Briar College; research associate and visiting lecturer, Stanford University.

LEVERING, DAVID L. (1963)
Associate Professor
History
B.A., University of Redlands, 1950; M.A., Claremont Graduate School. 1960; admitted to candidacy, Ph.D.
Experience: Regional executive, World University Service; associate in humanities, University of California, Riverside.

LI, SEUNG P. (1968)
Assistant Professor
Electrical and Electronics Engineering
B.S., Hong Kong University, 1954; M.S., Princeton University, 1960; Ph.D., University of Colorado, 1966.
Experience: Engineer, Scott & Wilson, Kirkpatrick & Partners; lecturer and department chairman, Chung Chi College, The Chinese University of Hong Kong.

LIEB, THEODORE L. (1964)
Associate Professor
Plant and Soil Science and Agricultural Engineering
B.S., California State Polytechnic College, 1947.
Experience: Teacher, Federal Government; dairy farmer; head farmer, California State Polytechnic College.

LINDAUER, JACQUELINE S. (1966)
Assistant Professor
Language Arts
B.A., University of Arizona, 1953; M.S., Kansas State University, 1954.
Experience: Instructor, Oklahoma State University, Glendale College.

LINDLEY, DEAN C. (1968)
Assistant Professor
Biological Sciences
B.S., M.S., and D.V.M., Washington State University, 1946.
Experience: Research assistant, Washington State University; instructor, California State Polytechnic College, San Luis Obispo; private practice, veterinary medicine.

LINGENFELTER, BARBARA H. (1964)
Associate Professor
Teacher Preparation Center
B.A., Santa Barbara State College, 1934; M.E., University of California, Los Angeles, 1955.
Experience: Elementary public school teacher; county elementary consultant; primary coordinator; instructor, University of California Extension, Los Angeles and Riverside.

LINT, HAROLD L. (1947)
Professor
Biological Sciences
A.B., University of California, Los Angeles, 1940; M.A., 1942; admitted to candidacy, Ph.D., Oregon State University.
Experience: Inspector, U.S. Food and Drug Administration; ranger, naturalist, U.S. National Park Service.

LISOWSKI, MARTI L. (1959)
Librarian III
Curriculum Librarian
B.A., University of California, Los Angeles, 1933; M.S.L.S., University of Southern California, 1959.
Experience: School teacher, counselor, placement officer, library aide, Los Angeles City Schools; Los County Library; California State Department of Employment.

LOCKWOOD, THOMAS J. (1968)
Assistant Professor
Ornamental Horticulture
B.S., California State Polytechnic College, 1967.
Experience: Nurseryman; Wholesale sales manager, Boething Treeland Nursery Company.

LOGGINS, CHERYL L. (1966)
Assistant Professor
Foods and Nutrition
B.S., University of California, Los Angeles, 1955; M.S., 1958.
Experience: Dietetic Internship, Veterans Administration Center; research dietitian, University of California, Los Angeles; City, county public health nutritionist, Los Angeles.

LORD, DAVID G. (1968)
Assistant Professor
Social Sciences
B.A., Michigan State University, 1964; M.A., 1967.
Experience: Instructor, Springfield College.

LOVEWELL, IRENE M. (1958)
Supervising Evaluator
Admissions and Records
B.A., University of Idaho, 1940.
Experience: Social caseworker; executive secretary to fund campaign director, Los Angeles area, American National Red Cross.

LUGO, EDWARD A. (1966)
Assistant Professor
Animal Science
B.S., California State Polytechnic College, 1964; M.S., Kansas State University, 1966.
Experience: Graduate research assistant, instructor, Kansas State University.

LYLE, JOHN T. (1968)
Assistant Professor
Environmental Design
B.S., Tulane University, 1957; M.L.A., University of California, Berkeley, 1966.
Experience: Fulbright scholar, Royal Academy of Fine Arts, Copenhagen; architectural designer and draftsman; associate planner, Stanford University; urban designer, John Carl Warnecke and Associates; private practice.

MacDONALD, KENNETH A. (1962)
Associate Professor
Mathematics
B.A., University of Arizona, 1956; M.A., University of Vermont, 1958.
Experience: Instructor, Idaho State College, San Diego State College.

MACROPOL, JOHN (1960)
Associate Professor
Physical Sciences
B.A., University of California, 1954; M.S., Michigan State University, 1955.
Experience: Dynamics engineer, Convair, San Diego; department head, Lawrence Institute of Technology.

MAKOW, YORAM (1965)
Associate Professor
Audio-Visual
B.A., University of California, Los Angeles, 1963; M.A., 1965.
Experience: Free lance product designer; consutlant, industrial graphics; designer, Northwestern; research and teaching assistant, University of California, Los Angeles.

MARGHERITA, SALVATORE S. (1968)
Assistant Professor
Biological Sciences
A.B., San Jose State College, 1951; M.A., University of California, Berkeley, 1953; Ph.D., 1962.
Experience: Assistant professor, University of Alberta; post-doctoral fellow, Temple University Medical School, University of Oklahoma Medical School.

MARKS, GREGORY H. (1967)
Assistant Professor
Physical Education
B.S., Pepperdine College, 1960; M.A., 1965.
Experience: Instructor and coach, Pepperdine College.

MARSHALL, ROBERT D. (1957)
Librarian III
Administrative Assistant
A.B., University of Washington, 1940; B.L.S., University of California, 1953.
Experience: Librarian, University of Oregon.

MARSHALL, ROBERT R. (1967)
Assistant Professor
Electrical and Electronics Engineering
B.S.E.E., California Institute of Technology, 1957.

Experience: Electronic design engineer.

MARTI, WERNER H. (1956)
Professor
Chairman, History Department
A.B., University of California, Los Angeles, 1943; M.A., Claremont Graduate School, 1951; Ph.D., University of California, Los Angeles, 1953.
Experience: School teacher, Webb School; teaching assistant, University of California, Los Angeles; instructor, University of California Extension, Los Angeles.

MARTIN, WILLIAM C. (1967)
Assistant Professor
Social Science
B.A., University of Redlands, 1963; M.A., University of Southern California, 1966; admitted to candidacy, Ph.D.
Experience: Instructor, El Camino College.

MARTINEK, GEORGE W. (1967)
Assistant Professor
Biological Sciences
B.S., Concordia Teachers College, 1953; M.A., California State College at Los Angeles, 1960; Ph.D., University of California, Los Angeles, 1968.
Experience: Elementary teacher; instructor, Concordia Teachers College; research and teaching assistant, University of California, Los Angeles.

MATTERN, DAVID C. (1964)
Librarian III
Acquisitions Librarian
B.A., Wesleyan University, 1961; M.S.L.S., University of Southern California, 1962.
Experience: Reference librarian, Anaheim Public Library; catalog librarian, Professional Library Service.

MATTHEWS, FLOYD V., JR. (1968)
Associate Professor
Agricultural Engineering
B.S., Virginia Polytechnic Institute, 1950; M.S., Oklahoma State University, 1951; Ph.D., Michigan State University, 1966.
Experience: Farm machinery design engineer; assistant professor and associate professor, University of Maryland.

MAURER, ROBERT L. (1948)
Director of Graduate Studies
B.A., Western Reserve University, 1935; M.A., 1936; Ph.D., Ohio State University, 1951.
Experience: Instructor, Oregon State University; professor, dean of arts and sciences, acting administrative vice president, California State Polytechnic College; California licensed psychologist.

MAVES, WILBUR W. (1966)
Assistant Professor
Electrical and Electronics Engineering
B.A., University of Wisconsin, 1929.
Experience: Head, electrical evaluations, U.S. Naval Ordnance; chief engineer, general manager, consulting engineer, registered professional engineer.

MELLARD, GEORGE A. (1957)
Associate Professor
Electrical and Electronics Engineering
B.S.E.E., B.S.M.E., Kansas State University, 1947; M.S., 1952.
Experience: Foundation consultant; senior research engineer; senior electronic engineer; aerodynamist; instructor, Kansas State University; senior scientist.

MERCER, EDWARD K. (1968)
Assistant Professor
Biological Sciences
B.A., University of California, Santa Barbara, 1958; M.A., 1962; Ph.D., Auburn University, 1968.
Experience: Laboratory technician, University of California, Santa Barbara; citrus ranch manager; parisitologist; NIH, Honolulu; research assistant, University of California, Riverside, Auburn University.

MERTZ, E. RICHARD (1968)
Assistant Professor
Mechanical Engineering
B.S., Missouri School of Mines, 1933; M.S., Texas Agricultural and Mechanical College, 1939; Ph.D., University of California, Los Angeles, 1953.

Experience: Professor, University of Hawaii, University of Southern California, Stanford University, University of Adelaide (Australia); engineering consultant, nuclear engineer; manager, research and development, Aerojet-General Corp., North American Aviation.

MITCHELL, GEORGE E. (1968)
Assistant Professor
Language Arts
B.A., University of San Francisco, 1961; M.A., University of Notre Dame, 1962; Ph.D., 1968.
Experience: Teaching assistant, University of Notre Dame; resident lecturer, Indiana University; instructor, Holy Cross College.

MOONEY, JAMES E. (1968)
Assistant Professor
Music
B.A., Arizona State University, 1952; M.A., 1953; Ph.D., Brigham Young University, 1968.
Experience: Secondary school band and orchestra director; assistant band director, Brigham Young University; solo clarinetist, Phoenix Symphony.

MOORE, LYDIA P. (1964)
Assistant Professor
Mathematics
B.A., University of California, Los Angeles, 1959; M.A., California State College at Los Angeles, 1964.
Experience: Lecturer, California State College at Los Angeles; director, resource Teen Post program.

MORALES, RAY (1961)
Associate Professor
Civil Engineering
B.S., Loyola University, 1960; M.S., Stanford University, 1961; Engineer's Degree, 1965.
Experience: Assistant civil engineer, field and design engineering.

MORAN, GABRIEL T. (1948)
Professor
Physical Sciences
B.A., Whittier College, 1942.
Experience: Industrial chemist; chemistry laboratory; district agricultural laboratory.

MORGAN, HORATIO O. (1963)
Associate Professor
Aerospace Engineering
B.A., Pomona College, 1928.
Experience: U.S. Air Force group commander, base commander, deputy wing commander, executive officer, air inspector, director of personnel; director of electrical engineering, Claremont Colleges; colonel (ret.), USAF.

MORRIS, GLENDA M. (1968)
Psychometrist
Counseling
B.A., California State College at Los Angeles, 1967.
Experience: Probation officer, Los Angeles County; guidance assistant, California State College at Los Angeles.

MORRIS, THOMAS S. (1968)
Assistant Professor
Mechanical Engineering
B.S.M.E., California State Polytechnic College, San Luis Obispo, 1958; M.S.E., University of California, Los Angeles, 1963.
Experience: Consulting engineer, aerospace structural analyst, senior structures engineer, registered professional engineer.

MOSSUTO, JULIUS J. (1968)
Librarian II
Assistant Catalog Librarian
B.A., University of Pittsburgh, 1949; M.S.L.S., University of Southern California, 1965.
Experience: Assistant reference librarian, Pomona Public Library; young adult librarian, Ontario City Library; junior high school teacher.

MURPHY, JOHN E. (1966)
Director of Housing
A.B., California State College at Long Beach, 1961; M.A., 1962; M.S., University of Southern California, 1964.
Experience: High school teacher; instructor, Long Beach City College, Pasadena City College.

MYERS, LEONHARD M. (1964)
Assistant Professor
Industrial Engineer
A.B., University of Missouri, 1956; B.S.I.E., 1960.

Experience: Industrial engineer, human factors engineer, industrial engineering consultant; instructor, University of Missouri.

MYLANDER, HARVEY A. (1958)
Associate Professor
Mechanical Engineering
B.S.M.E., University of Arizona, 1931.
Experience: Engineer, U.S. Naval Ordnance Laboratory; instructor, Mt. San Antonio Junior College; consulting engineer; manager, DeLaval Steam Turbine, American Hoist & Derrick; engineer, U.S. Geological Survey; registered mechanical engineer.

McALLISTER, JAMES A. (1964)
Associate Professor
Electrical and Electronics Engineering
B.S., U.S. Naval Academy, 1939; M.S., University of California, Los Angeles, 1949.
Experience: Assistant professor, California Western University; director of underseas research, Navy Department; assistant director, NATO laboratory, Italy, Navy Electronics Laboratory, Point Loma; captain, U.S. Navy.

McCORMIC, RALPH C. (1959)
Professor
Language Arts
B.A., Oklahoma State University, 1947; M.A., Stanford University, 1950.
Experience: Instructor, San Francisco State College; associate professor, University of Texas; command entertainment director, Germany; executive director, Los Altos Community Theater.

McELHOE, FORREST L., JR. (1968)
Assistant Professor
Social Sciences
B.A., University of Washington, 1948; M.A., 1950; Ph.D., Ohio State University, 1955.
Experience: Instructor, Ohio State University; instructor, assistant professor, University of Kentucky.

McINTOSH, WILLIAM C. (1951)
Professor
Coordinator, Scheduling and Special Services
A.B., University of California, Berkeley, 1948; M.A., 1950.
Experience: High school teacher; assistant professor, California State Polytechnic College, San Luis Obispo and Kellogg-Voorhis.

McKOWN, RUTH J. (1968)
Assistant Professor
Physical Sciences
B.A., Glenville State College, 1963; Ph.D., West Virginia University, 1968.
Experience: Teaching and research assistant, West Virginia University.

McLACHLIN, HARRY B. (1959)
Professor
Animal Science
B.S., North Dakota State University, 1930.
Experience: U.S. Navy; extension animal husbandman; livestock marketing specialist; ranch management; associate professor, California State Polytechnic College, San Luis Obispo.

McMILLAN, JOHN C. (1962)
Associate Professor
Electrical and Electronics Engineering
B.A., Pomona College, 1948; M.A., Claremont Graduate School, 1956.
Experience: Chief engineer, electronic instrument development, senior electronics engineer; communications-electronics officer, USAF; electronic instrumentation consultant; instructor, Mt. San Antonio College.

NELSON, EDWARD A. (1958)
Professor
Animal Science
B.S., Utah State University, 1952; M.S., 1953; Ph.D., Kansas State University, 1958.
Experience: Graduate research assistant, Kansas State University; owner, operator, livestock ranch; farm manager; visiting professor, Massey University, New Zealand.

NELSON, RICHARD T. (1961)
Associate Professor
Business Management
B.A., California State College at Long Beach, 1959; M.S., 1961.
Experience: Treesweet Products Co.; traffic manager, Aerojet General, Sacramento; operations control analyst; interstate commerce practitioner; private business.

NESIN, DANIEL J. (1967)
Assistant Professor
Electrical and Electronics Engineering
B.S., Columbia University, 1951; M.S., University of Southern California, 1965.
Experience: Chief development engineer; senior engineer; project supervisor; manager of electrical engineering.

NEWBERRY, CONRAD F. (1964)
Assistant Professor
Aerospace Engineering
B.E.M.E., University of Southern California, 1957.
Experience: Senior engineer, North American Aviation, Inc., Atlantic Research Corporation; senior design engineer, Lockheed Aircraft Service Company.

NEWELL, LLOYD A. (1956)
Associate Professor
Plant and Soil Science
B.S., South Dakota State University, 1941.
Experience: Agricultural inspector; instructor, I-on-F program, adult education, high schools, Palomar College; orchard manager; agricultural consultant; livestock superintendent, USMCR.

NEWMAN, PAUL M. (1965)
Assistant Professor
Language Arts
B.A., M.A., San Fernando Valley State College, 1961; admitted to candidacy, Ph.D., State University of Iowa.
Experience: Instructor, State University of Iowa, University of California, Santa Barbara, University of California, Riverside; political research, Datamatics, Inc.

NISE, NORMAN S. (1963)
Associate Professor
Electrical and Electronics Engineering
B.S.E.E., Drexel Institute of Technology, 1960; M.S.E.E., Lehigh University, 1962.
Experience: Instructor, Purdue University; Remington Rand, Univac; systems engineer, Hughes Aircraft Company.

NOWATZKI, EDWARD A. (1968)
Associate Professor
Civil Engineering
B.A., St. Joseph's College, 1957; B.C.E., Manhattan College, 1962; M.S.C.E., University of Arizona, 1965; Ph.D., 1966.
Experience: Research scientist, lunar and planetary environments, Grumman Aircraft Engineering Corporation; research associate, nuclear weapons effects, University of Arizona.

O'DONNELL, PATRICK I. (1966)
Administrative Assistant to the President
B.A., University of Southern California, 1955; M.A., 1961; Ed.D., 1967.
Experience: Junior high school teacher; assistant registrar, University of Southern California; registrar, director of admissions, California Lutheran College; registrar, California State Polytechnic College.

OGLE, CLAUDE B., JR. (1966)
Assistant Professor
Civil Engineering
B.S.C.E., University of Southern California, 1943; M.S.C.E., 1947.
Experience: Chief engineer, vice president; lecturer, University of Southern California; designer, heavy equipment; consultant; USNR (ret.).

OURY, THOMAS H. (1966)
Counselor
B.A., Pomona College, 1950; M.S., University of Southern California, 1953; Ed.D., 1968.
Experience: High school teacher, counselor; field supervisor (counselor education), University of Southern California.

OYSTER, VIRGIL (1967)
Librarian II
Assistant Catalog Librarian
B.A., Fresno State College, 1960; M.L.S., University of California, Berkeley, 1963.
Experience: Research assistant, School of Librarianship, University of California, Berkeley; cataloguer and referenece librarian, Hayward Public Library.

PACKARD, ROBERT H. (1967)
Associate Professor, Animal Science
College Veterinarian
B.S., Colorado State University, 1953; D.V.M., 1955.
Experience: Private practice; California Department of Agriculture, Bureau of Animal Health.

PALATNICK, BARTON (1968)
Assistant Professor
Physical Sciences
B.A., Yale University, 1962; M.A., Columbia University, 1964; Ph.D., 1968.
Experience: Research physicist, Columbia University.

PARE, RONALD C. (1968)
Assistant Professor
Mechanical Engineering
B.S., Washington State University, 1965.
Experience: Instructor, Washington State University; consultant, Tracy, Brunstrom & Dudley Engineers; engineer, Alcoa.

PARISH, RUSSELL A. (1958)
Professor
Industrial Engineering
B.S., Wisconsin State University, 1932.
Experience: Instructor, General Motors Institute; teacher, writer, conductor management training conferences; tool and die maker; training director.

PARK, DAVID J. (1965)
Associate Professor
Economics
B.A., Claremont Men's College, 1957; M.A., University of Southern California, 1959; Ph.D., 1962.
Experience: Assistant professor, La-Verne College, University of Maryland.

PARKER, VINCENT E. (1967)
Dean
School of Science
A.B., Evansville College, 1936; Ph.D., Indiana University, 1940.
Experience: Deputy director, Oak Ridge Associated Universities; professor and head, department of Physics and Astronomy, Louisiana State University; professor and chairman, Department of Physics, University of Delaware.

PAUGSTAT, WILLIAM C. (1956)
Assistant Professor
Mathematics
A.B., Miami University, 1952; M.S., Cornell University, 1954.
Experience: Assistant professor, Upland College; quality control chemist, Exchange Orange Products.

PAUL, FRANK (1960)
Professor
Accounting
B.B.A., City College of New York, 1942; M.A., University of San Francisco, 1958.
Experience: CPA; statistical accountant; cost accountant; chief accountant and office manager; staff accountant; partner; associate professor, Armstrong College.

PETERS, GILBERT A. (1967)
Associate Dean of Students
Activities and Housing
B.S., University of Wisconsin, 1961; J.D., 1961.
Experience: Law clerk, activities advisor and outing director, University of Wisconsin; ASI business manager, housing coordinator, Cal Poly, Pomona.

PETERSON, DANIEL E. (1968)
Lecturer
Physical Education
B.S., University of California, Los Angeles, 1959; M.S., 1968.
Experience: Assistant football coach, University of California, Los Angeles; athletic representative, Johnson & Johnson; team salesman.

PETERSON, RONALD M. (1967)
Assistant Professor
Social Sciences
B.A., Brigham Young University, 1964; admitted to candidacy, Ph.D., Claremont Graduate School.
Experience: Lecturer, San Fernando Valley State College.

PFLUEGER, DONALD H. (1952)
Professor
Chairman, Social Sciences Department
B.A., Pomona College, 1949; M.A., Stanford University, 1951.
Experience: U.S. Navy; high school teacher; cultural attaché American Embassy, Amman, Jordan; member, California Constitution Revision Commission.

PHILBRICK, JOSEPH L. (1960)
Associate Professor
Social Sciences
B.A., Baylor University, 1949; M.A., 1950; Ph.D., 1955.
Experience: Elementary school; registrar and department chairman, California Baptist Theological Seminary; dean of student personnel services, Howard Payne College; instructor, Fullerton Junior College, Cerritos College, University of California Extension; resident counselor, American Institute of Family Relations.

PIATT, THEODORE J. (1968)
Assistant Professor
Business Management
B.A., Pomona College, 1959; J.D., Hastings School of Law, University of California, 1966.
Experience: Office of public defender, Los Angeles County; private practice of law.

POLLOCK, FRANCES H. (1963)
Associate Professor
Language Arts
A.B., University of California, 1943; M.A., University of California, Los Angeles, 1959; Ph.D., University of Southern California, 1968.
Experience: Instructor, Hartnell College; actress, off-Broadway and stock, New York, New Hampshire; managing director, Berkeley Community Theatre; co-producer, Gallery Theatre, Hollywood.

POMERENING, JAMES A. (1965)
Associate Professor
Plant and Soil Science
B.S., University of Wisconsin, 1951; M.S., Cornell University, 1956; Ph.D., Oregon State University, 1961.
Experience: Assistant professor, University of Maryland, Oregon State University; soil surveyor; aerial photograph interpreter, soils consultant.

POMEROY, JACK L. (1964)
Associate Professor
Industrial Engineering
B.S., Stout State University, 1967.
Experience: Engineering consultant; member of technical staff, Hughes Aircraft Company; mechanical engineer, Celon Company; tool design engineer, Gisholt Machine Company.

PROCSAL, ROBERT L. (1949)
Professor
Chairman, Plant and Soil Science
B.S., California State Polytechnic College, 1946.
Experience: Assistant plant manager, Borden's Company; instructor, vocational agriculture; farm manager; agricultural consultant; navigator, U.S. Air Force.

PROUT, KATHREEN R. (1967)
Assistant Professor
Music
B.M. University of the Pacific, 1933; M.M., Indiana University, 1949.
Experience: Lecturer, California State Polytechnic College; instructor, Indiana University; staff pianist and organist, radio studios; concerts under West-Coast management.

PYE, EARL L. (1967)
Professor
Chairman, Physical Sciences Department
A.B., Chico State College, 1958; M.S., University of California, Davis, 1961; Ph.D., Louisiana State University, 1966.
Experience: Research chemist, University of California; chemist, Standard Oil Company of California; associate professor, Parsons College.

QUANEY, ROBERT A. (1959)
Professor
Industrial Engineering
B.S., Stanford University, 1954; M.S., 1965.
Experience: Senior manufacturing engineer; acting head, Industrial Engineering Department; production planning supervisor; manufacturing research engineer; process engineer; consultant; registered professional engineer, California.

RAUCH, RAYMOND C. (1963)
Associate Professor
Business Management
B.S., University of Oregon, 1951; M.B.A., 1959.
Experience: Insurance underwriter, risk manager, agent, and insurance management consultant.

RICE, ELMER H. (1959)
Professor
Physical Sciences
A.B., Whittier College, 1947; Ph.D., University of Southern California, 1958.
Experience: Research biochemist, University of California School of Medicine; director, summer science training program, National Science Foundation, California Museum of Science and Industry.

RICHARDS, RICHARD C. (1964)
Assistant Professor
Social Sciences
B.A., University of California, Santa Barbara, 1957; M.A., University of California, Los Angeles, 1964; admitted to candidacy, Ph.D.
Experience: Instructor, San Fernando Valley State College, California State College at Los Angeles.

RIDDLE, JEWEL M. (1959)
Professor
Accounting
B.A., San Jose State College, 1951.
Experience: Certified public accountant; instructor, Golden Gate and Los Angeles Metropolitan Colleges, UCLA Extension; staff accountant.

RIDLEY, JOHN W. (1967)
Assistant Professor
Mechanical Engineering
B.S., Drexel Institute of Technology, 1963; M.S., 1964.
Experience: Instructor, Gannon College; research associate, Amsco; acting chief engineer, high temperature instruments; engineer, Bausch & Lomb; research assistant, Wyeth Laboratories.

RIGBY, GERALD (1968)
Professor
Social Sciences
B.A., Louisiana State University, 1950; M.A., 1952; Ph.D., University of California, Los Angeles, 1960.
Experience: Associate professor, University of Southern California, University of Wyoming; Congressional Fellow American Political Science Association; Louisiana Legislative Council.

RITTER, DONALD L. (1968)
Assistant Professor
Chemical Engineering
B.S., Lehigh University, 1961; M.S., Massachusetts Institute of Technology, 1963; D.Sc., Metallurgy, 1966.
Experience: Assistant to plant metallurgist, Rochester Products Division of General Motors; research metallurgist, INCO Research Labs, International Nickel Company; research exchange fellow, Baikov Institute, Moscow, USSR; senior physicist, General Dynamics.

ROACH, HAROLD L. (1967)
Associated Students Business Manager
Student Personnel
B.S., California State Polytechnic College, Kellogg-Voorhis, 1967.
Experience: General manager parts jobber warehouse, San Bernardino; President, Big "B" Battery Company, Inc., Costa Mesa, California.

ROBERTS, JOHN M. (1967)
Assistant Professor
Environmental Design
B.S., California State Polytechnic College, Kellogg-Voorhis, 1961.
Experience: Landscape architect, San Diego City School District; Wimmer & Yamada, San Diego;

Linesch & Reynolds, Long Beach; consulting practice, Orange County.

ROBINSON, LARRY K. (1968)
Assistant Professor
Language Arts
B.S., Southeast Missouri State College, 1962; Diplome d'Etudes, University of Grenoble, France, 1965; M.A., University of Michigan, 1967.
Experience: Language teacher; evening director, Washtenaw Juvenile Home; Foreign student teaching fellow, English Language Institute, University of Michigan.

ROBINSON, MARCELLE (1967)
Assistant Professor
Teacher Preparation Center
B.A., University of Southern California, 1954; Ph.D., 1961; post-doctoral study, University of Oregon and Oregon State College.
Experience: School consultant; clinical psychologist in private practice; assistant professor, Pepperdine College, Cal Poly; psychologist, Rancho Los Amigos County Hospital.

ROCHE, EDWARD T. (1959)
Professor
Biological Sciences
B.A., San Diego State College, 1948; M.S., University of Southern California, 1952; Ph.D., 1957.
Experience: Teaching associate University of Southern California; field and laboratory research associate for Office Naval Research and U.S.A.F.; instructor, Compton College; consultant in marine biology.

ROEDER, WALTER H. (1968)
Librarian II
Assistant Reference Librarian
B.S., State Teachers' College, Buffalo, N.Y., 1950; M.S., Syracuse University, 1954.
Experience: Reference librarian, Grosvenor Reference Library; assistant department head, Buffalo and Erie County Public Library.

ROSS, FLOYD H. (1967)
Lecturer, Social Sciences
A.B., Butler University, 1930; B.D., Garrett Seminary, 1933; M.A., Northwestern University, 1933; Ph.D., Yale University, 1935.
Experience: Director, Blaisdell Institute for Advanced Study in World Cultures and Religions; Comparative Religion, Claremont Graduate School; University of Southern California.

ROWLEY, WILLIAM P. (1958)
Professor
Chairman, Agricultural Business Management Department
B.A., University of California, Los Angeles, 1933.
Experience: California State commodity supervisor; U.S. Department of Agriculture, fieldman and state director; public relations director, Produce Dealers Association.

RUPP, THOMAS A. (1967)
Assistant Professor
Physical Education
B.S., Kansas University, 1957; M.S., Ft. Hays Kansas State College, 1960.
Experience: High school teacher and athletic coach.

SABO, R. RICHARD (1967)
Assistant Professor
Business Management
B.S., San Jose State College, 1965; M.B.A., 1966.
Experience: Manufacturing analyst; assistant foreman; customer services staff; life insurance underwriter; U. S. Navy.

SANFORD, ALBERT D. (1964)
Assistant Professor
Aerospace Engineering
B.S., University of Colorado, 1956.
Experience: Technical staff, National Engineering Science Company, Marquardt Corporation; engineer, Boeing Company; research engineer, Rocketdyne.

SCHAEFER, D. JUNE (1962)
Activities Program Coordinator
Activities and Housing
B.A., Scripps College, 1940; M.A., Claremont Graduate School, 1962.
Experience: Executive director, Camp Fire Girls.

SCHEITZACH, JOSEPH C. (1968)
Counselor
Counseling and Testing
B.A., University of California, Los Angeles, 1952; M.A., 1960; Ph.D., 1968.
Experience: Staff psychologist, Suicide Prevention Center; staff counseling psychologist, University of California, Los Angeles; staff clinical psychologist, Metropolitan State Hospital.

SCHIPPERS, RICHARD H. (1966)
Assistant Professor
Industrial Engineering
B.S., Michigan State University, 1951; M.S., California State College at Los Angeles, 1968.
Experience: Time study engineer; chief estimator; plant industrial engineer; chief industrial engineer; divisional industrial engineer; registered professional engineer, California.

SCHMITZ, GEORGE W. (1961)
Associate Professor
Plant and Soil Science
B.S., University of Arizona, 1948, M.S., 1950; Ph.D., Ohio State University, 1952.
Experience: Industrial agronomist; assistant professor, assistant soil scientist, Oregon State University, Oregon Agricultural Experiment Station, Fresno State College.

SCHNEIDER, KENNETH J. (1961)
Associate Professor
Chairman, Mechanical Engineering Department
B.S.M.E., University of Southern California, 1958; M.S.M.E., 1961; Candidate for E.M.E., Engineer's degree.
Experience: Technical consultant, Aerojet-General; civil engineer, U.S. Department of Interior; instructor, Citrus College; research engineer, General Dynamics; design engineer, Braun.

SCHNEIDER, ROBERT R. (1966)
Associate Professor
Civil Engineering
B.S., University of New Mexico, 1944; M.S., University of Southern California, 1950; Degree of Civil Engineering, 1956.
Experience: Assistant professor, University of Southern California; design engineer, chief engineer, regional development engineer; company president; consultant, U.S. Navy; registered professional engineer.

SCHOENWETTER, EARL E. (1960)
Assistant Professor
Electrical and Electronics Engineering
B.S., University of Wisconsin, 1957; certificate, Radio-Television Technician, Milwaukee School of Engineering, 1952.
Experience: Flight test engineer; development engineer; test engineer.

SCHONING, RICHARD H. (1963)
Professor
Chairman, Business Management and Marketing Departments
A.B., University of California, Berkeley, 1943; M.B.A., Wharton School, University of Pennsylvania, 1959.
Experience: Surveyor, U.S. Engineers; transportation officer, U.S. Army; instructor, U.S. Army Transportation School, U.S. Army Command and General Staff College.

SCHWIEDER, ROBERT M. (1966)
Assistant Professor
Social Sciences
B.A., University of Southern California, 1959; M.A., 1965.
Experience: Instructor, University of Southern California, University of California Extension, Los Angeles and Irvine; U.S. Navy.

SCOLINOS, JOHN H. (1960)
Professor
Physical Education
B.S., Pepperdine College, 1950; M.S., University of Southern California, 1952.
Experience: Instructor and head coach, Pepperdine College; professional baseball player; scout Detroit Tigers; U.S. Army.

SEIBERT, KATHERINE B. (1963)
Associate Professor
Business Management
B.A., New Mexico Highlands University, 1948; M.A., 1951.
Experience: High school teacher; associate professor, Chaffey College; certified professional secretary; instructor, University of Alabama, Extension Division; contract instructor, Maxwell AFB, Alabama.

SELLE, MARY ETTA (1961)
Associate Dean, Women
Student Personnel
B.A., University of Southern California, 1937; M.A., 1938; Ph.D., 1960.
Experience: Associate Dean of Women; California State Polytechnic College, San Luis Obispo; high school department chairman; teacher.

SEUBERLING, HARRISON P. (1963)
Associate Professor
Civil Engineering
C.E., University of Cincinnati, 1939.
Experience: Associate engineer, U.S. Engineer Office; engineer; construction analyst; partner, consulting firm; registered professional engineer and surveyor, Ohio and Kentucky.

SHAFFER, RALPH E. (1963)
Associate Professor
History
A.B., University of California, Los Angeles, 1951; M.A., University of California, Berkeley, 1955; Ph.D., 1962.
Experience: Instructor, Oakland City College; University of California Extension, Riverside; high school teacher.

SHAFIA, FRED (1964)
Associate Professor
Biological Sciences
B.S., California State Polytechnic College, San Luis Obispo, 1957; M.S., Brigham Young University, 1960; Ph.D., University of Nebraska, 1963.
Experience: Teaching and research assistant, Brigham Young University, University of Nebraska; predoctoral fellowship, U.S. Public Health Service; assistant professor of microbiology, Rutgers University.

SHAPIRO, MILTON M. (1962)
Associate Professor
Economics
A.B., Brooklyn College, 1943; Ph.D., University of Southern California, 1963.
Experience: Instructor, University of Southern California, Occidental College; economist and marketing analyst, National Industrial Conference Board, Marquardt Corporation; Jewish Agency for Palestine; World Trade Foundation.

SHELDON, ALFRED E., JR. (1966)
Assistant Professor
Language Arts
B.S., United States Military Academy, 1955; M.A., Washington State University, 1963.
Experience: U.S. Air Force; assistant professor, United States Air Force Academy.

SHIEH, JOHN T. (1967)
Assistant Professor
Economics
B.S., Chunghsing University, 1956; M.S., Kansas State University, 1960.
Experience: Senior economic analyst, American Can Company; assisant professor, Northwestern State College.

SHIELDS, MAI (1968)
Librarian II
Assistant Reference Librarian
A.B., University of Southern California, 1963; M.A., University of Denver, 1966.

SHRAGER, SIDNEY (1960)
Associate Professor
Language Arts
B.A., University of Southern California, 1949; M.A., University of California, Los Angeles, 1951.
Experience: Instructor, University of Southern California, Chouinard Art Institute.

SHRIVER, BRUCE D. (1967)
Assistant Professor
Aerospace Engineering
B.S., California State Polytechnic College, Kellogg-Voorhis, Pomona, 1963; M.S., West Coast University, 1967.

Experience: Research engineer, NASA; systems engineer, M. D. Shriver Company.

SIEGEL, BEN (1957)
Professor
Language Arts

B.A., San Diego State College, 1948; M.A., University of California, Los Angeles, 1950; Ph.D., University of Southern California, 1956.

Experience: Teaching assistant, University of California, Los Angeles, University of Southern California; lecturer, University of Southern California, Chouinard Art Institute; Danforth fellow, University of Chicago; University of California Extension, Los Angeles; newspaper columnist, radio and advertising writer, magazine editor.

SIMMONS, HAROLD F. (1958)
Professor
Chairman, Mathematics Department

B.A., Wichita State University, 1950; M.A., 1952; Ph.D., Iowa State University, 1958.

Experience: Assistant professor, Wichita State University.

SIMPSON, ERNEST (1968)
Assistant Professor
Physical Sciences

B.S., University of New Mexico, 1963; M.S., 1966; Ph.D., 1967.

Experience: Teaching and research assistant, University of New Mexico; assistant professor, Pomona College.

SKAMSER, HAROLD P. (1958)
Dean, School of Engineering

B.E., Wisconsin State College, 1931; M.A., University of Minnesota, 1945; B.S.E.E., Michigan State University, 1948.

Experience: Assistant professor, Virginia Polytechnic Institute; professor Michigan State University; engineer with aircraft, motor, iron and railroad companies.

SKOUSEN, OWEN K. (1960)
Professor
Electrical and Electronics Engineering

B.A., University of California, Los Angeles, 1949; M.S., Stanford University, 1950; Engineer's Degree, 1952.

Experience: Engineering design specialist, Lockheed Aircraft Company; senior electronics research engineer, General Dynamics Corporation; technical staff member, Sandia Corporation.

SMEDLEY, DONALD B. (1959)
Associate Professor
Electrical and Electronics Engineering

B.S.E.E., University of Oklahoma, 1956; M.S.E.E., California State College at Los Angeles, 1969.

Experience: Senior electronics engineer, General Dynamics Corporation; technical consultant, Aerojet General Corporation; instructor, University of California Extension.

SMITH, DONALD D. (1965)
Associate Professor
Physical Sciences

B.S., University of Oklahoma, 1947; M.S., 1948; Ph.D., Purdue University, 1953.

Experience: Senior chemist, Aerojet; project leader, research chemist, industry; research fellow and teaching assistant, Purdue University; instructor, University of Oklahoma.

SMITH, LAURA DUCLOS (1968)
Librarian II
Assistant Reference Librarian

B.A., University of California, Los Angeles, 1952; M.S.L.S., University of Southern California, 1962; M.A., California State College at Los Angeles, 1968.

SMITH, RICHARD H. (1960)
Associate Professor
Business Management

B.S., Massachusetts Institute of Technology, 1948; M.B.A., Northwestern University, 1954.

Experience: Industrial engineer; management consultant; instructor, Illinois Institute of Technology, Menlo College; systems analyst, specialist senior programmer; certificate in data processing.

SMITH, STANLEY B. (1963)
Associate Professor
Business Management and Marketing
B.S., University of Utah, 1953; M.B.A., 1962.
Experience: U.S.A.F.; department manager, J. C. Penney Co.; assistant director of personnel, University of Utah; assistant to president, California State Polytechnic College, Kellogg-Voorhis.

SMITH, WILLIAM A. (1964)
Associate Professor
History
B.A., Fresno State College, 1953; M.A., Claremont Graduate School, 1960; Ph.D., 1965.
Experience: Instructor, Pomona College, Mt. San Antonio; visiting professor, Claremont Graduate School, University of California, Riverside.

SNODGRASS, MILTON M. (1967)
Professor
Chairman, International Agriculture Department
Coordinator, Overseas Educational Programs
B.S., Pennsylvania State University, 1951; M.S., 1955; Ph.D., Purdue University, 1956.
Experience: Professor, Purdue University; visiting professor, Kasetsart University, Bangkok, Thailand; agribusiness consultant; U.S. Air Force.

STALLINGS, DALE G. (1964)
Assistant Professor
Economics
B.S., University of Idaho, 1950; M.S., University of Minnesota, 1952; Ph.D., 1962.
Experience: Research assistant, University of Minnesota; associate agricultural economist, University of California; agricultural economist, United States Department of Agriculture.

STARK, CHARLES M. (1967)
Assistant Professor
Agricultural Engineering
B.S., California State Polytechnic College, San Luis Obispo, 1960.
Experience: Agricultural equipment manager and dealer; instructor, Fred C. Nelles School for Boys, Whittier.

STEWART, GLENN R. (1963)
Associate Professor
Biological Sciences
B.S., California State Polytechnic College, San Luis Obispo, 1958; M.A., Oregon State University, 1960; Ph.D., 1963.
Experience: Graduate assistant, Oregon State University; zoologist, National Audubon Society.

STONE, JOICS B. (1968)
Executive Assistant to the President
A.B., Brigham Young University, 1947; M.S., University of Utah, 1950; Ph.D., 1952.
Experience: Industrial psychologist; assistant professor, Brigham Young University; associate dean, Counseling and Testing, Academic Planning, California State Polytechnic College, San Luis Obispo.

STONER, MARTIN F. (1967)
Assistant Professor
Biological Sciences
B.S., California State Polytechnic College, Kellogg-Voorhis, Pomona, 1963; Ph.D., Washington State University, 1967.
Experience: Research assistant, Washington State University.

STULL, ROBERT B. (1947)
Professor
Physical Education
A.B., Whittier College, 1941; M.A., 1947.
Experience: Graduate manager, Whittier College; junior and high school teacher; U.S. Navy.

STUMPF, ROBERT V. (1968)
Assistant Professor
Business Management
B.A., San Jose State College, 1961; M.S., Stanford University, 1968.
Experience: Operations research analyst, Dole Company; programmer analyst, San Bernardino County; physical scientist, White Sands Missile Range, U.S. Army; certified data processor.

SUGAR, ALVIN C. (1968)
Associate Professor
Mathematics
B.S., Illinois Institute of Technology, 1933; M.S., University of Chicago, 1934; Ph.D., University of California, 1936.
Experience: Research associate, Brown University; associate professor, Oklahoma State University, University of Southern California; professor, Northern Michigan University, Bradley University; professional engineer.

SUTER, RICHARD W. (1967)
Assistant Professor
Language Arts
B.A., University of California, Santa Barbara, 1964; M.A., San Francisco State College, 1967.
Experience: Production management; instructor, foreign student program, San Francisco State College.

SUTHERLAND, RODNEY D. (1960)
Professor
Chairman, Aerospace Engineering Department
B.S., University of California, Los Angeles, 1952; M.S., 1953.
Experience: Rocket design and chemical engineer, U.S. Naval Weapons Center; senior thermodynamics engineer, General Dynamics.

SUTTON, ARTHUR W., JR. (1961)
Associate Professor
Electrical and Electronics Engineering
B.S.E.E., Rose Polytechnic Institute, 1956.
Experience: Project engineer, Wright Air Development Division, Dayton, Ohio.

SUTTON, JAMES E. (1964)
Associate Professor
Economics
B.S., University of Wisconsin, 1955.
Experience: Teaching assistant, University of Wisconsin; instructor, University of Michigan, Pomona College, research coordinator, Southern California Research Council.

SWENSON, RICHARD M. (1968)
Administrative Vice President
Athletic Director
B.S., Brigham Young University, 1946; M.S., University of Massachusetts, 1948; Ph.D., Iowa State University, 1951.
Experience: Instructor, assistant professor, Iowa State University; associate professor, professor, assistant dean and director of resident instruction, College of Agriculture and Natural Resources, Michigan State University.

SYVERSON, MAGNUS (1957)
Professor
Physical Education
B.S., Oregon College of Education, 1942; M.S., University of Oregon, 1950; Ed.D., 1952.
Experience: Assistant professor, University of California, Los Angeles.

SZIJJ, LASZLO J. (1962)
Associate Professor
Biological Sciences
B.A., University of Sciences, Budapest, Hungary, 1954; M.A., 1955; Ph.D., University of Toronto, 1962.
Experience: Assistant curator of birds, National Museum, Hungary; research assistant, Royal Ontario Museum, Canada; laboratory instructor, University of Toronto; instructor, Loyola University, Chicago.

TAPP, D. RODNEY (1966)
Assistant Professor
Environmental Design
B.S.L.A., Michigan State University, 1964; M.S.L.A., 1966.
Experience: Instructor, Michigan State University; landscape architect, Munson-Anderson Associates; National Park Service; Hancock Regional Planning Commission; site planning consultant.

TAYLOR, HALSEY P. (1967)
Assistant Professor
Language Arts
A.B., Colorado College, 1943; M.A., University of Southern California, 1952; Ph.D., Claremont Graduate School, 1964.
Experience: Teacher, Glendale College; high school department chairman; staff associate, Claremont Grad-

uate School; reading clinician; associate professor, Cal State Los Angeles.

TENNANT, FRANK A. (1955)
Professor
Communication Arts
A.B., University of California, Los Angeles, 1950; M.S., 1953.
Experience: Editor, Monterey Park *Californian;* reporter, L. A. *Mirror;* press relations director, Title Insurance and **Trust.**

TERGAS, LUIS E. (1968)
Assistant Professor
International Agriculture; Plant and Soil Science
B.S., University of Florida, 1964; M.S., 1965; Ph.D., 1968.
Experience: Teaching assistant, Escuela Agricola Panamericana, Honduras; research fellow, Center for Tropical Agriculture, University of Florida.

THOMAS, WILLIAM O. (1960)
Associate Professor
Electrical and Electronics Engineering
B.S., New Mexico State University, 1951.
Experience: Electrical engineer and estimator, Southern California Edison Company; communications officer, U.S. Army; laboratory supervisor, New Mexico State University.

THOMASSEAU, D. JEAN (1961)
Placement Supervisor
Placement Center
B.A., Willamette University, 1946; M.A., California State College at Los Angeles, 1959.
Experience: Teacher; professional employment agency.

THOMPSON, BEN F. (1961)
Associate Professor
Communication Arts
A.B., Lycoming College, 1950; M.J., University of California, Berkeley, 1961.
Experience: State editor, Williamsport *Sun-Gazette;* business editor, Honolulu *Star-Bulletin;* technical editor, University of California at Berkeley; field representative, Dudley-Anderson-Yutzy, New York.

THORNBURGH, PAUL A. (1962)
Counselor
B.A., University of California, Santa Barbara, 1955; M.S., Cal State, Los Angeles, 1966.
Experience: Psychometrist, Los Angeles City Schools.

THROP, NANCY A. (1968)
Administrative Assistant to the President
B.S., California State Polytechnic College, Pomona, 1964; M.S., University of California at Los Angeles, 1965.
Experience: Director of news and publications, assistant professor, La Verne College.

TODD, JAMES P. (1967)
Assistant Professor
Mechanical Engineering
B.S., Stanford University, 1953; M.S., 1954.
Experience: Aerospace consultant; senior engineer, Plasmadyne, Lycoming, Aerojet-General, Pratt and Whitney Aircraft; instructor, Bridgeport Engineering Institute; registered professional engineer.

TROW, RUBY L. (1968)
Lecturer
Foods and Nutrition
B.A., California State College at Los Angeles, 1964; M.A., California State College at Long Beach, 1968.
Experience: Junior high school teacher, Long Beach; homemaking department chairman, Los Altos High School, Hacienda Heights.

TUCKER DOROTHY M. (1957)
Professor
Teacher Preparation Center
B.S., University of Minnesota, 1945; M.S., Illinois State University, 1949; Ed.D., University of California, Los Angeles, 1959.
Experience: Recreation director; instructor, high schools, Lincoln College, Western Illinois University; counselor, San Bernardino Valley College; California licensed psychologist.

TUNISON, ELIZABETH L. (1968)
Associate Professor
Teacher Preparation Center
B.A., Whittier College, 1943; M.E., 1963.
Experience: Teacher, principal, curriculum director, television teacher; instructor, California State College, Fullerton, Whittier College.

TURNER, FRANKLIN R. (1964)
Assistant Professor
Physical Sciences
B.S., University of California, 1957; M.S., Purdue University, 1959; Ph.D., University of California at Davis, 1964.
Experience: Graduate research micrometeorologist, Purdue University; research chemist, University of California at Davis.

TUUL, JOHANNES (1965)
Assistant Professor
Physical Sciences
B.S., University of Sweden, Stockholm, 1955; M.A., 1956, M.S., Brown University, 1957; Ph.D., 1960.
Experience: Instructor, Stockholm Technical Institute, Pasadena City College; research assistant and associate, Brown University; senior research physicist.

VIERICH, RICHARD W. (1966)
Librarian IV
Chief, Technical Services Division
B.S., University of Redlands, 1952; M.S.L.S., University of Southern California, 1964.
Experience: Administrative assistant, Pomona Public Library; U.S. Navy.

VOLLMAR, ARNULF (1965)
Associate Professor
Physical Science
University of Heidelberg, Diplomchemiker, 1956; Ph.D., 1957.
Experience: Research assistant, University of Heidelberg; post-doctoral fellow, University of California, Los Angeles; oil company research chemist.

VOLSKI, CHESTER A. (1962)
Associate Professor
Environmental Design
B.S., Michigan State University, 1956; M.L.A., Harvard University Graduate School of Design, 1957.
Experience: Landscape architect; site planner, Michigan State University; planner and landscape architect; urban planner, U.S. Air Force.

VOORHIS, JERRY L. (1968)
Assistant Professor
History
B.A., Grinnell College, 1960; M.A., Northwestern University, 1962; Ph.D., 1968.
Experience: Instructor, Chicago Teachers College North; assistant professor, Wisconsin State University.

VOUGHT, ELDON J. (1961)
Associate Professor
Mathematics
A.B., Manchester College, 1957; M.A., University of Michigan, 1958; Ph.D., University of California, Riverside, 1967.
Experience: Instructor, Pomona College; mathematician, Naval Ordnance Laboratory.

WAGNER, ESTHER B. (1967)
Assistant Professor
Language Arts
A.B., Bryn Mawr College, 1939; M.A., 1939; Ph.D., 1950.
Experienece: Instructor, Bryn Mawr College, Lake Forest College, University of Puget Sound, Pitzer College; writer.

WAGNER, GERALD E. (1966)
Associate Professor
Business Management
B.A., University of Northern Iowa, 1960; M.A., 1963; Doctoral Candidate, UCLA.
Experience: Data processing equipment operator; computer programmer; systems analyst; operations supervisor; consultant; data processing instructor, Fullerton Junior College; certified data processor.

WANG, MARTIN I. (1959)
Associate Professor
Communication Arts
B.A., University of Southern California, 1949; M.S., 1950.
Experience: Instructor, Torrance, Long Beach, El Camino College; teaching assistant and instructor, University of Southern California.

WARE, JAMES M. (1967)
Assistant Professor
Language Arts
B.A., Claremont Men's College, 1962; M.A., University of Minnesota, 1963.
Experience: Instructor, Harvey Mudd College, Chapman College.

WARHURST, DON E. (1957)
Professor
Physical Education
B.A., University of California at Berkeley, 1943; M.S., University of Southern California, 1951.
Experience: High school teacher, coach; coach, San Bernardino Valley College.

WASSEL, GUSTAV N. (1961)
Associate Professor
Electrical and Electronics Engineering
B.S.E., California Institute of Technology, 1960; M.S.E.E., 1962.
Experience: Instructor, U.S. Air Force; graduate research assistant, California Institute of Technology; senior systems design engineer.

WEEKS, LOWELL K. (1947)
Professor
Music
B.A., University of New Mexico, 1938.
Experience: Instructor, Los Lunas, New Mexico; Air Force band leader, U.S. Army at Albuquerque, Palm Springs, and Long Beach.

WEISEND, PAUL F. (1968)
Assistant Professor
Business Management
B.A., Duquesne University, 1949; LL.B., St. Mary's Law School, Texas, 1955; M.A., Mississippi State University, 1962; LL.M., Cornell University Law School, 1967.
Experience: U.S. Air Force; real estate appraisal; administrative assistant in industry; associate professor, University of Southern Mississippi.

WEISSBUCH, THEODORE N. (1962)
Associate Professor
Language Arts
B.A., California State College at Los Angeles, 1955; M.A., 1956; Ph.D., University of Iowa, 1964.
Experience: Instructor, University of Nebraska, University of Iowa.

WELCH, HARRY V. JR. (1947)
Building Program Coordinator
B.S., University of California, Los Angeles, 1941; M.S., 1953.
Experience: University of California Citrus Experiment Station, Riverside; Farm Security Administration.

WELCH, JOHN C., JR. (1965)
Medical Officer
B.S., University of California, 1952; M.D., University of Southern California, 1959.
Experience: Internship, San Joaquin County General Hospital; general and surgical practice; member, Mental Health Advisory Board, San Jose, California.

WELLS, HAROLD F. (1954)
College Librarian
B.A., University of British Columbia, 1951; M.L., University of Washington, 1952.
Experience: Reference assistant, Eastern Washington College of Education, Assistant reference librarian, Fresno State College.

WESTING, TOM W. (1967)
Assistant Professor
Animal Science
B.S., California State Polytechnic College, San Luis Obispo, 1962; M.S., Purdue University, 1964.
Experience: Agricultural fieldman; laboratory technician; submarine service, U.S. Navy.

WHITE, MILTON R. (1959)
Director of Development
B.S., California State Polytechnic College, 1950; M.A., Claremont Graduate School, 1966.
Experience: Agricultural consultant, Los Angeles Chamber of Commerce; sales and trade association executive; sales representative; U.S. Marine Corps.

WHITLEY, MARY E. (1961)
Associate Professor
Business Management
B.S., Northeastern State College, 1946; M.S., Oklahoma State University, 1954.
Experience: Secretary, superintendent of schools; secretary, department of vocational education; high school department chairman.

WHITMORE, FRANK C. (1968)
Professor
Physical Sciences
A.B., Gettysburg College, 1949; M.S., University of Delaware, 1951; Ph.D., Texas Agricultural and Mechanical University, 1960.
Experience: Research physicist, group manager, department director, Southwest Research Institute; research physicist, Jet Propulsion Laboratories; associate professor, Trinity University and Texas Agricultural and Mechanical University.

WHITNEY, WALTER R. (1965)
Associate Professor
Language Arts
B.S., Bowdoin College, 1923; M.A., Harvard University, 1935.
Experience: Instructor, professor, University of Maine, Loyola University, New Orleans, Fresno State College.

WICKSTROM, GAIL G. (1967)
Assistant Professor
Social Sciences
B.S., University of Texas, 1963; M.A., University of California at Los Angeles, 1967.
Experience: Legislative assistant, Texas State Senate; teacher and department chairman; instructor, Rio Hondo Junior College, Whittier College.

WILDS, LILLIAN (1968)
Assistant Professor
Language Arts
A.B., University of California at Los Angeles, 1962; M.A., 1964; Ph.D. candidate, University of California at Los Angeles.
Experience: Teaching assistant, University of California at Los Angeles; instructor, Glendale College; academic program adviser, University of California at Los Angeles.

WILLIAMS, DUDLEY W. (1967)
Assistant Professor
Business Management
B.S., California State Polytechnic College, Kellogg-Voorhis, 1966; M.B.A., University of Southern California, 1967.
Experience: Accountant, accounting supervisor, administrative supervisor.

WILLIAMS, EDWIN H. (1960)
Associate Professor
Mechanical Engineering
B.S.M.E., University of California at Berkeley, 1949; M.S.M.E., University of Southern California, 1966.
Experience: Associate engineer, City of San Francisco; design engineer, California Packing Corporation; development engineer, Fraser and Johnston Company; registered professional engineer.

WILSON, AUBREY V. (1967)
Assistant Professor
Language Arts
B.A., University of Arizona, 1962; M.A., University of Denver, 1964.
Experience: Instructor, Moorhead State College; cameraman, CBS; technical director, University of Denver; designer, Kennebunkport Playhouse, Maine.

WILSON, BRUCE E. (1963)
Associate Professor
Social Sciences
B.A., University of Miami, 1960; M.A., 1966; admitted to candidacy, Ph.D., Claremont Graduate School.
Experience: Newspaper editor; magazine editor; instructor, University of Miami, Mt. San Antonio College.

WILSON, H. LYNN (1967)
Assistant to the Dean of Students
Student Personnel
B.S., Cornell University, 1956.
Experience: Meteorologist, U.S. Air Force; insurance sales; lending officer and assistant manager; commercial bank consultant.

WILSON, HARRY A. (1960)
Assistant Professor
Mathematics
B.S., University of Southern California, 1953; M.B.A., 1954.
Experience: Owner-manager Growell Shoes; lecturer, University of Southern California.

WILSON, JOHN J. (1959)
Associate Professor
Economics
B.S., Middlebury College, 1926; M.A., Claremont Graduate School, 1959; U.S. Army Command and General Staff School; U.S. Air Force Staff School.
Experience: Director of procurement and production, comptroller, U.S. Air Force.

WINCHELL, KARL E. (1967)
Assistant Professor
Art
B.A., San Diego State College, 1963; M.A., 1964.
Experience: Instructor, Palomar City College; professional artist and potter.

WINSLOW, DOROTHY V. (1959)
Assistant Professor
Physical Sciences
B.A., University of California at Berkeley, 1957; Ph.D., University of California at San Francisco, 1966.
Experience: Research biochemist, University of California Medical School at San Francisco.

WINTERBOURNE, ROBERT J. (1953)
Counselor
B.S., California State Polytechnic College, 1950; M.A., 1952.
Experience: Director of vocational agriculture; director of agriculture; high school vice principal; associate dean, California State Polytechnic College.

WOLF, HARRY K. (1942)
Professor
Electrical and Electronics Engineering
A.B., Arizona State College, 1933; A.M., University of Arizona, 1941; Ed.D., University of Southern California, 1953.
Experience: Engineer for the Agricultural Adjustment Administration; high school teacher; electronics instructor for Signal Corps, National Bureau of Standards; electronic engineer.

WOOTTON, WILLIAM T. (1963)
Associate Professor
Electrical and Electronics Engineering
B.S., U.S. Naval Academy, 1943; B.S.E.E., U.S. Naval Postgraduate School; 1952; S.M., Massachusetts Institute of Technology.
Experience: Assistant professor, Rice Institute; manager, weapon system R&D programs, ship commander, Commander (ret.) U.S. Navy.

WORLEY, G. DOW (1964)
Associate Professor
Business Management
B.B.A., North Texas State University, 1950; M.B.A., 1954; D.B.A. candidate, University of Southern California.
Experience: Production planner, Convair Corp.; industrial engineer, Texas Aircraft Corp; assistant professor, Baylor University, California State College at Los Angeles; system analyst, computer project, U.S.C.

WRIGHT, J. GARRARD (1962)
Associate Professor
Industrial Engineering
B.S., Oregon State University, 1954; M.B.A., University of Washington, 1966.
Experience: Production engineer; quality control engineer; industrial engineer; tool engineer; instructor, San Bernardino Valley College; methods engineer; registered professional engineer.

WU, JIA-HSI (1966)
Assistant Professor
Biological Sciences

B.A., Taiwan University, Formosa, 1950; M.A., Cornell University, 1952; Ph.D., Washington University, St. Louis, 1958.

Experience: Post-doctoral research, University of Wisconsin; assistant botanist, University of California at Los Angeles; assistant biologist, University of California at San Diego; assistant professor, Texas Technological College.

WYMER, JOSEPH P. (1961)
Professor
Chairman, Industrial Engineering Department

B.S.I.E., Virginia Polytechnic Institute, 1947; M.S.I.E., University of Southern California, 1969.

Experience: Industrial engineering consultant; chief industrial engineer; manufacturing engineer; senior industrial engineer; methods and standards engineer; instructor, Virginia Polytechnic Institute; registered professional engineer.

YORK, RICHARD G. (1961)
Associate Dean
Admissions and Records

B.S., California State Polytechnic College, 1950.

Experience: Director high school vocational agriculture; ranch manager; manufacturing production superintendent; U.S. Air Force; registrar, California State Polytechnic College.

YOSHIKAWA, TOM T. (1962)
Assistant Professor
Ornamental Horticulture

B.S., California State Polytechnic College, 1950.

Experience: Adult education instructor, nursery operator, agricultural chemical salesman, head propagator and nursery production foreman, horticultural consultant, landscape contractor.

ZEIDLIK, WILLIAM J. (1967)
Assistant Professor
Business Management

B.B.A., Southern Methodist University, 1956; M.B.A., University of Denver, 1957.

Experience: Real estate officer, Denver Urban Renewal; executive vice president, Columbine Mortgage Company; faculty, University of Denver, Colorado and Colorado State University.

ZELL, DARRYL C. (1964)
Associate Professor
Mechanical Engineering

B.M.E., University of Minnesota, 1958; M.S.E., University of California, Los Angeles.

Experience: Senior research engineer, Jet Propulsion laboratory, Pasadena; senior dynamics engineer and design engineer, General Dynamics, Pomona.

ZIMMERMAN, BERNARD B. (1968)
Assistant Professor
Environmental Design

B.A., University of California at Berkeley, 1952; M.A., University of Southern California, 1959.

Experience: Professional architect and planner; licensed architect, State of California; director of environmental design collaborative, Los Angeles.

ZRIMC, RUDOLF (1968)
Assistant Professor
Language Arts

B.A., Western Reserve University, 1954; M.A., Harvard University, 1956; Ph.D., 1961.

Experience: Teaching fellow of Russian at Harvard University; assistant professor, Ohio State University, University of Southern California.

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BRUNS, ROBERT A.
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OGLE, CLAUDE B.
SCHOENWETTER, EARL S.
SMITH, RICHARD H.

INDEX

A

Absences, 54
Academic Calendar, 4–6
Academic policies, 54–58
Accounting, 218–221
  courses, 219–221
  department, 218
  major, 218
Accreditation, 16
Activities, student, 85
ACT test, 33, 34, 37
Adding courses, 42
Administration
  building, 20
  California State Colleges, 12
  California State Polytechnic College, 17
Admission
  application for, 33
  California high school graduates, 33
  fee, 33
  foreign students, 36, 39
  freshmen, 33
  graduate students, 37
  high school graduates, 33
  non high school graduates, 34
  non-residents, 34
  provisional admission, 36
  recommended preparation, 35
  requirements, 33
  teacher credential program, 78
  undergraduate transfers, 35
Advanced placement, 58–59
Aerospace Engineering, 241–246
  courses, 243–246
  department, 241
  major, 241
Agricultural Biology
  courses, 146–148
  major, 140–142
  option, 142
Agricultural Business concentration, 116
Agricultural Business Management, 106–111
  courses, 109–111
  department, 106
  major, 106
  options, 108–109
Agricultural courses, related, 153
Agricultural Economics option, 108
Agricultural Engineering, 112–113
  building, 21
  courses, 112–113
  department, 112
Agriculture, International, 131
Agriculture, School of, 105–153
  departments
    Agricultural Business Management, 106
    Agricultural Engineering, 112
    Animal Science, 114
    Environmental Design, 121
    Foods and Nutrition, 127
    International Agriculture, 131
    Ornamental Horticulture, 134
    Plant and Soil Science, 140
  facilities, 21
Agronomy
  courses, 148–150
  major, 140, 142–144
Alumni Association, 27
American Civilization courses, 206
Animal Production concentration, 116
Animal Science, 114–120
  concentrations, 116
  courses, 116–120
  department, 114
  major, 114
  option, 116
Anthropology courses, 206–207
Application
  for admission, 33
  for graduation, 51
Arabian horse
  program, 27–28
  show, 21
Architecture
  courses, 123–124
  option, 123
Architecture, Landscape, 123, 125
Art courses, 188–190
Arts, School of, 159–211
  departments
    Communication Arts, 160
    Economics, 164
    History, 169
    Language Arts, 174
    Music & Art, 186
    Physical Education, 191
    Political Science, 199
    Social Sciences, 203
  facilities, 21
Associated Students, Inc., 85
  membership fee, 85
Athletics, 86
  eligibility, 86–87
Attendance, 54
Audio-Visual courses, 190
Auditing a course, 43

B

Bachelor of Arts degrees
  English, 174
  History, 169
  Political Science, 199
Bachelor's Degree
  list, 49–50
  requirements, 51

Bacteriology courses, 291–292
Biological Sciences, 285–298
  department, 285
  major, 285
Biology
  courses, 292–294
  major, 287–288
Biology, Agricultural, 140
Board of Trustees, 12
Botany
  courses, 295–296
  major, 288–289
Broadcast Journalism concentration, 161
Buildings and facilities, 20–23
Business Administration, School of, 217–233
  departments
    Accounting, 218
    Business Management, 222
    Marketing, 231
  facilities, 22
Business Management, 222–230
  courses, 226–227
  department, 222
  major, 223
Business Management, Agricultural, 106
Business Systems and Programming concentration, 225

C

Calendar, academic, 4–6
California Collegiate Athletic Association, 86
California State Colleges, 11
  administration, 13
  Chancellor, 13
  list of colleges, 14
  Trustees, 12–13
California State Polytechnic College, 15–28
  accreditation, 16
  administration, 17
  history, 15–16
Campus map, 24
Career placement, 88
Challenging of courses, 59
Chancellor, California State Colleges, 13
Changes
  in curriculum, 44
  in major, 43
  in program, 42
Chemical Engineering, 247–251
  courses, 249–250
  department, 247
  major, 248
Chemistry
  courses, 308–311
  major, 305–306
Civil Engineering, 252–258
  courses, 254–258
  department, 252
  major, 252
  option, 253–254
Clubs, 85
College Entrance Examination Board, 58
College store, 22
Communication Arts, 160–163
  concentrations, 161
  courses, 162–163
  department, 160
  major, 160
Conduct, student, 99
Continuing education, 25
Counseling services, 88
Course Numbering System, 44
Courses, for credential programs, 77–78
Credential Programs, 77
  admission to, 78–79
  advisory committee, 76
  course requirements, 77–78
  courses for, 80
Credit
  by examination, 59
  for military service, 59
  transfer, 53
  units required for graduation, 51
Crop Science, 140
Curriculum Deviation, 44

D

Dairy Husbandry courses, 119
Data Processing
  concentrations, 225
  courses, 228–229
  major, 224
Dean's honors list, 60
Degrees and credentials offered, 49–50
  requirements for, 51
Department chairmen, 18–19
Dining facilities, 22
Directory, faculty, 321–362
Discipline procedure, 99–100
Dismissal, 42
Disqualification, academic, 55–56
Dormitories, 24, 96
Double majors, 54
Drama
  activities, 86
  courses, 183–185
Dropping courses, 42
Dual registration, 41
Duplex, 22–23

E

Early admission, 74
Economic Entomology concentration, 142
Economics, 164-168
  courses, 166-168
  department, 164
  major, 165
Economics option, 204
Education courses, 80
Educational Center, 25
Electrical and Electronics Engineering, 259-265
  concentrations, 261
  courses, 261-265
  department, 259
  major, 259
Electrical Power Systems concentration, 261
Electronics concentration, 261
Elementary education, 76
Eligibility, athletic, 86
El Patio college store, 22
Employment, student
  part-time, 89
  summer, 89
  work-study, 95
Engineering, School of, 239-278
  departments
    Aerospace, 241
    Chemical, 247
    Civil, 252
    Electrical and Electronics, 259
    Industrial, 266
    Mechanical, 272
  facilities, 22
English
  courses, 178-181
  major, 175
Entomology
  Agricultural, 140
  courses, 296
  Economic, concentration, 142, 140
  Systematic, concentration, 285
Entomology courses, 296-297
Entrance requirements, 33
Environmental Design, 121-126
  courses, 124-125
  department, 121
  major, 121
  options, 123
Examination
  credit by, 59
  entrance, 33
  physical, 88
Expenses, 97

F

Facilities, 20-23
Facility location map, 24
Faculty, list of, 321, 363
Faculty, overseas, 363
Fees and expenses, 97
Finance, Insurance and Real Estate
  courses, 229-230
  major, 226
Financial Aids, 89-95
Food Distribution option, 108
Foods and Nutrition, 127-130
  courses, 128-130
  department, 127
  major, 127
Foreign language courses, 181
Foreign students, admission, 36
Foundation, Kellogg Unit, 26
French courses, 181
Fruit Industries
  courses, 150-151
  major, 140

G

General Education requirements, 51-53
Geography courses, 207
Geology courses, 312
German courses, 181
Government, student, 85
Grades, incomplete, 56-57
Grading system, 56
Graduate
  classified, 38
  courses taken by undergraduates, 58
  test requirements, 40
  unclassified, 38
Graduate Studies Program, 61-73
  academic policies, 66-68
  advancement to candidacy, 64-65
  course numbering system, 71
  requirements for master's, 62
  standards, 61
  thesis, 63
Graduation
  application for, 51
  fee, 97
  requirements, 51
  with honors, 60

H

Health Center, 23
  services, 88
History
  college, 15
  department, 169
History, department, 169-173
  courses, 170-173

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