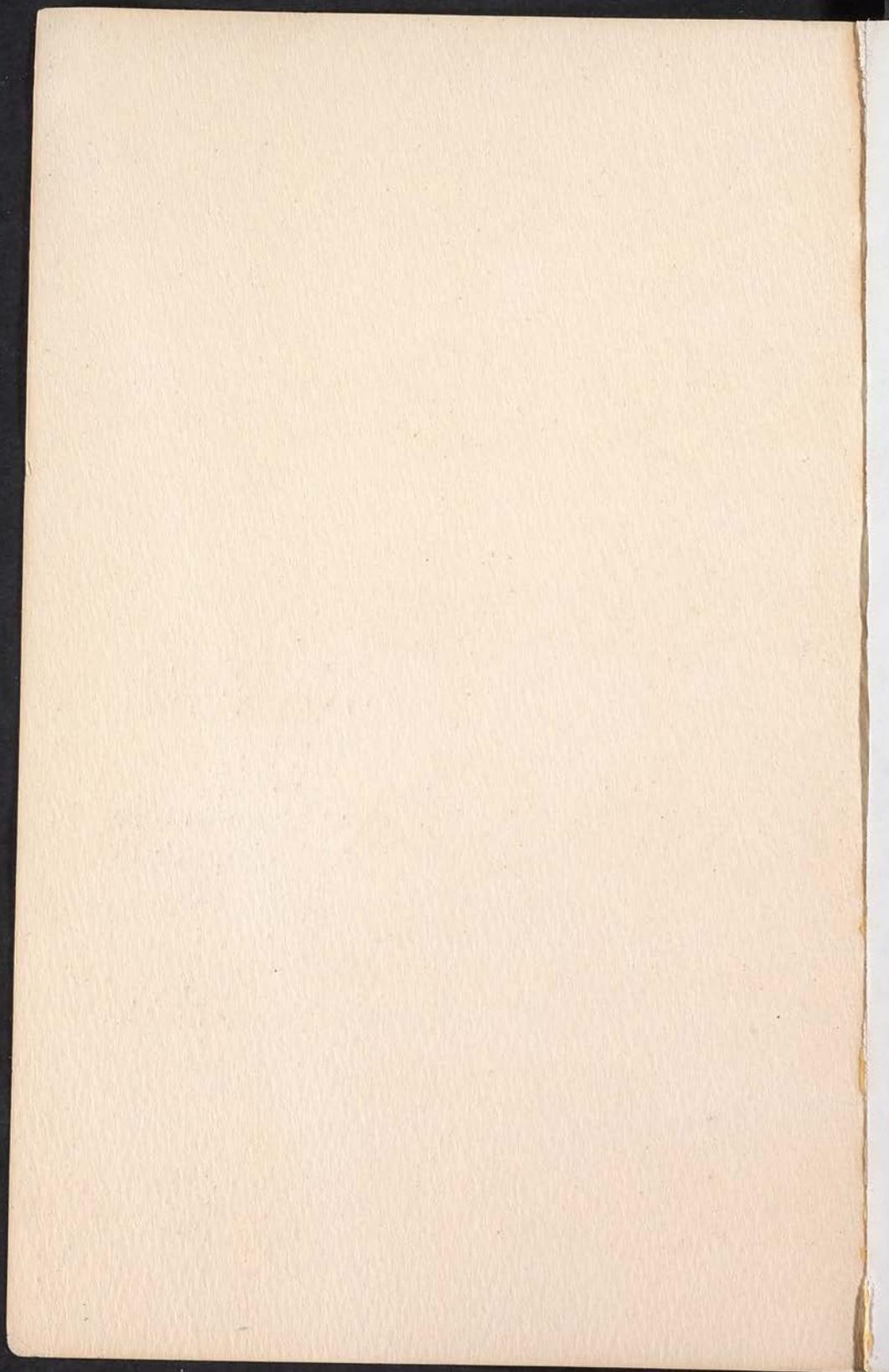




CALIFORNIA STATE POLYTECHNIC COLLEGE
KELLOGG-VOORHIS
POMONA

1967-68 CATALOG



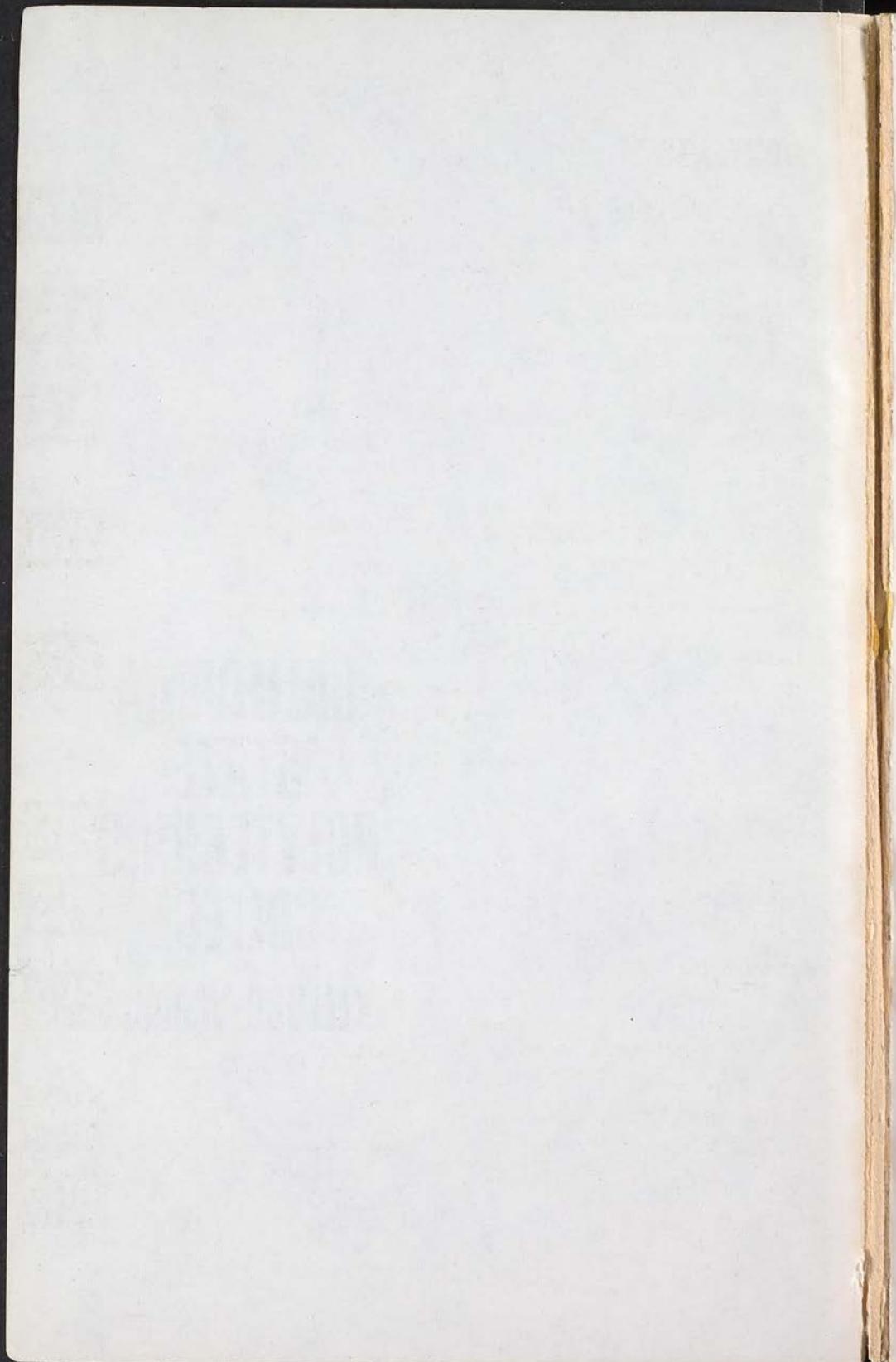


**CALIFORNIA
STATE
POLYTECHNIC
COLLEGE**

KELLOGG-VOORHIS

POMONA

**CATALOG
1967-68**



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ACADEMIC CALENDAR—1967—68

1967

JUNE

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Classes

Examinations

Summer Quarter, 1967

May 12	Deadline to apply for admission to summer quarter
June 13	Last day to register without penalty
June 15	Orientation of new students
June 19	Beginning of the college year
	Classes begin for all students
June 23	Last day to add classes or register late
July 3	Last day to withdraw from classes without penalty
July 4	Independence Day—Academic Holiday
August 18	Deadline to apply for admission to fall quarter
August 30— September 1	Final examinations
September 1	End of summer quarter

Fall Quarter, 1967

August 18	Deadline to apply for admission to fall quarter
September 18	Beginning of quarter for faculty
September 19—22	Orientation of new students
September 19	Last day to register without penalty
September 25	Classes begin for all students
September 29	Last day to add classes or register late
October 9	Last day to withdraw from classes without penalty

NOVEMBER

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1968

JANUARY

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- November 11.....Veteran's Day — Academic Holiday
November 23-24—Thanksgiving—Academic Holiday
November 24-.....Deadline to apply for admission to winter quarter
December 9-13.....Final examinations
December 13.....End of fall quarter
December 14-
January 1.....Christmas — Academic Holiday

Winter Quarter, 1968

- November 24.....Deadline to apply for admission to winter quarter
December 26.....Last day to register without penalty
December 28.....Orientation of new students
January 2.....Classes begin for all students
January 8.....Last day to add classes or register late
January 16.....Last day to withdraw from classes without penalty
February 16.....Deadline to apply for admission to spring quarter
March 13-16.....Final examinations
March 16.....End of winter quarter
March 18-22.....Academic Holiday

Spring Quarter, 1968

- February 16.....Deadline to apply for admission to spring quarter
March 19.....Last day to register without penalty

	Classes
	Examinations

APRIL

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AUGUST

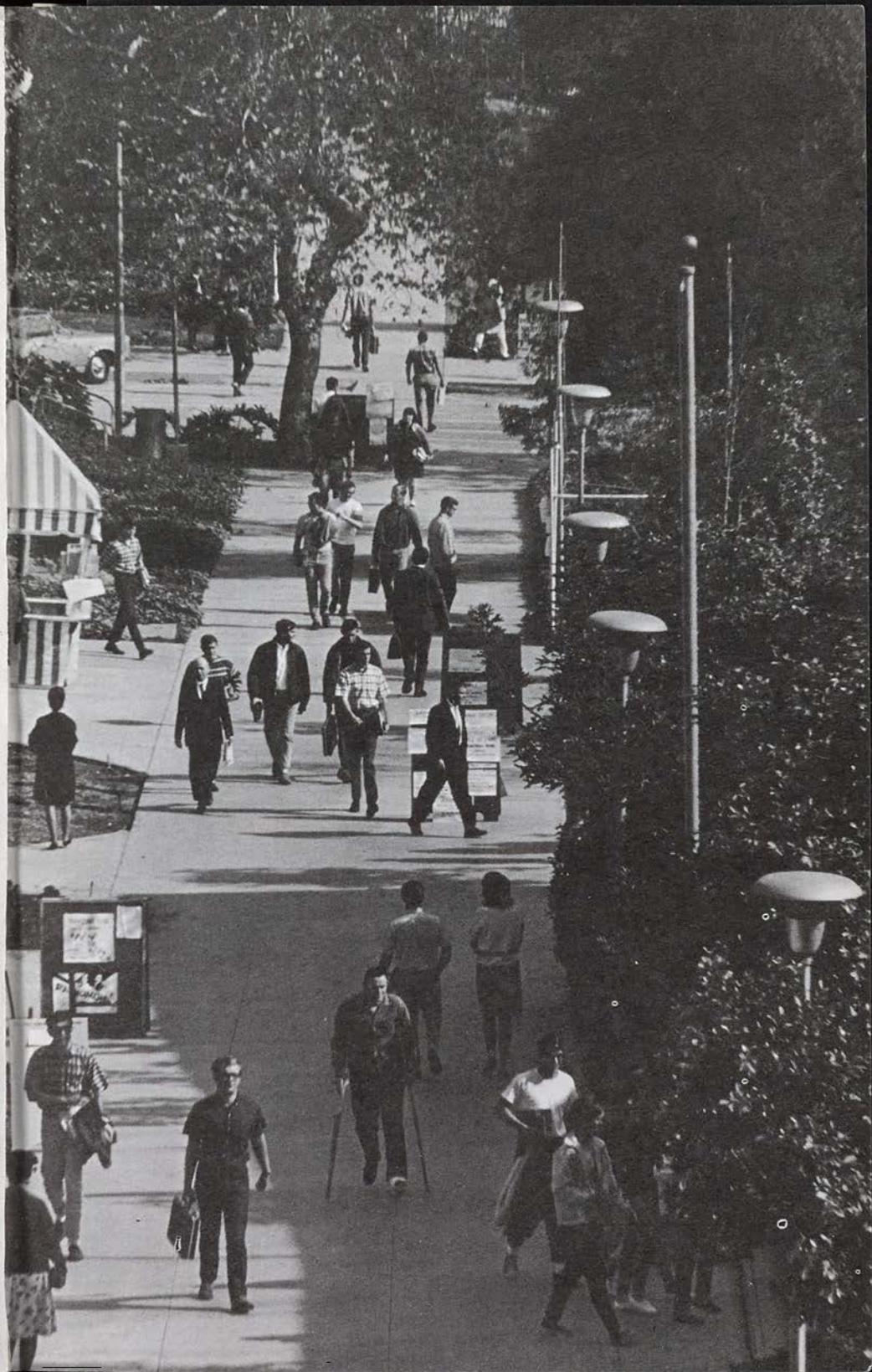
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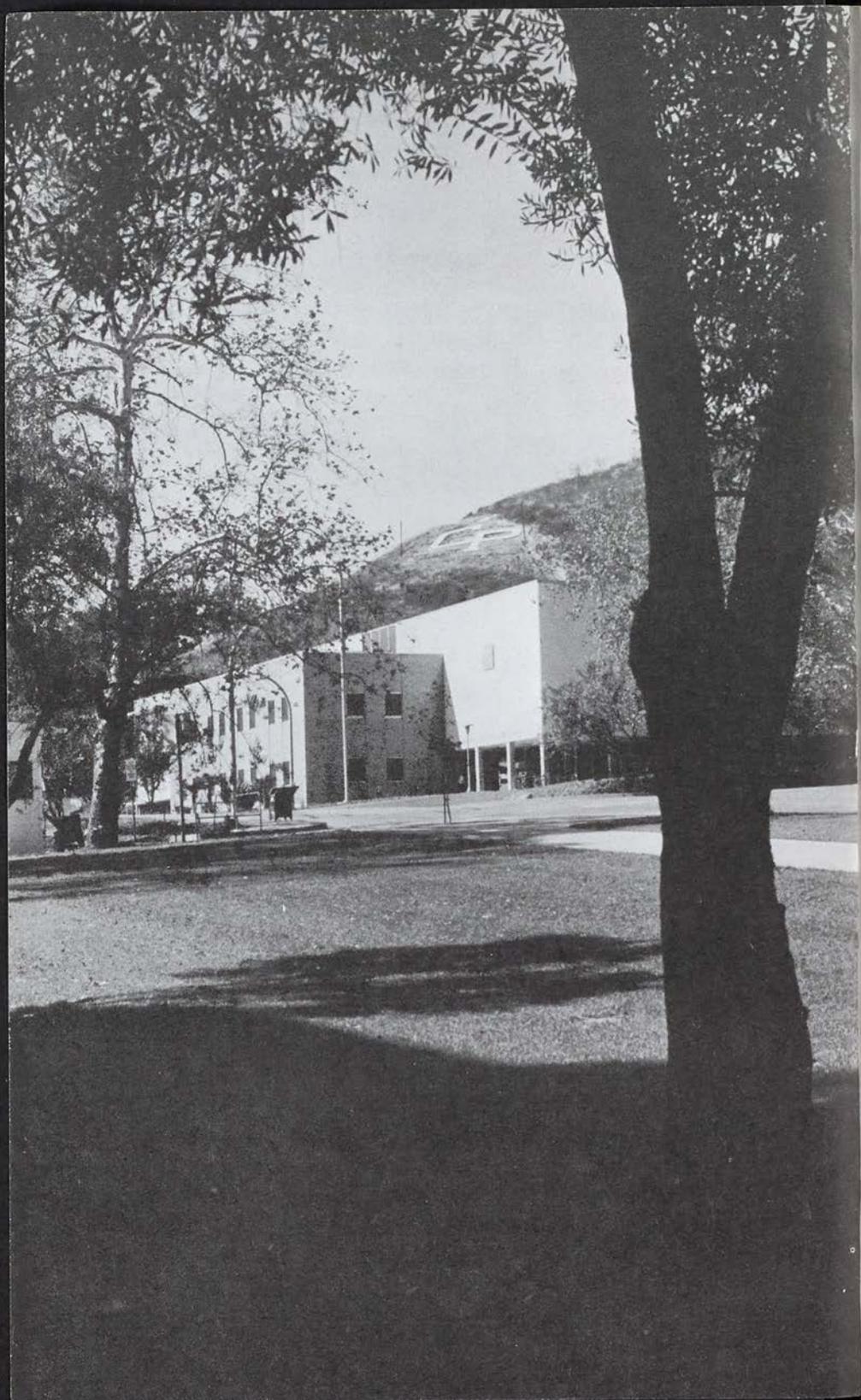
	Classes
	Examinations

March 21.....	Orientation of new students
March 25.....	Classes begin for all students
March 29.....	Last day to add classes or register late
April 8.....	Last day to withdraw from classes without penalty
April 11.....	Last day to apply for June commencement
April 12.....	Good Friday—Academic Holiday
May 10.....	Deadline to apply for admission to summer quarter
May 30.....	Memorial Day — Academic Holiday
June 4-7.....	Final examinations
June 8.....	Commencement—End of college year

Tentative Summer Quarter, 1968

May 10.....	Deadline to apply for admission to summer quarter
June 11.....	Last day to register without penalty
June 13.....	Orientation of new students
June 17.....	Beginning of the college year
	Classes begin for all students
June 21.....	Last day to add classes or register late
July 1.....	Last day to withdraw from classes without penalty
July 4.....	Independence Day—Academic Holiday
August 16.....	Deadline to apply for admission to fall quarter
August 28-30.....	Final examinations
August 30.....	End of summer quarter





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ADMINISTRATION OF THE CALIFORNIA STATE COLLEGES

Trustees of the California State Colleges

EX OFFICIO TRUSTEES

- Ronald Reagan, B.A. _____ State Capitol, Sacramento 95814
Governor of California and President of the Trustees
- Robert H. Finch, B.A., LL.B. _____ State Capitol, Sacramento 95814
Lieutenant Governor of California
- Jesse M. Unruh, B.A. _____ State Capitol, Sacramento 95814
Speaker of the Assembly
- Max Rafferty, A.B., M.A., Ed.D. _____ 721 Capitol Mall,
State Superintendent of Public Instruction Sacramento 95814
- Glenn S. Dumke, A.B., M.A., Ph.D., LL.D., L.H.D.
5670 Wilshire Blvd., Los Angeles 90036
Chancellor of the California State Colleges

APPOINTED TRUSTEES

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

- Louis H. Heilbron, A.B., LL.B., LL.D. (1969)
44 Montgomery Street
San Francisco 94104
- Donald M. Hart, B.A. (1968)
P.O. Box 1556
Bakersfield 93302
- Charles Luckman, LL.D., A.F.D. (1974)
9220 Sunset Boulevard
Los Angeles 90069
- Paul Spencer, B.A. (1969)
1323 La Terracita Drive
San Dimas 91773
- Theodore Meriam, A.B. (1971)
P.O. Box 370
Chico 95927
- Albert J. Ruffo, LL.B., B.S. in E.E. (1971)
600 Bank of America Building
San Jose 95113
- Mrs. Philip Conley, B.A. (1972)
3729 Huntington Boulevard
Fresno 93702
- E. Guy Warren, B.A. (1973)
P.O. Box 59
Hayward 94541

The California State Colleges

- Daniel H. Ridder, B.A. (1975)
604 Pine Street
Long Beach 90801
- George D. Hart, A.B. (1975)
111 Sutter Street
San Francisco 94104
- Gregson E. Bautzer, B.A., LL.B. (1968)
190 North Canon Drive
Beverly Hills 90210
- James F. Thacher, A.B., LL.B. (1970)
310 Sansome Street
San Francisco 94104
- Victor H. Palmieri, B.A., LL.B. (1970)
10889 Wilshire Boulevard, Suite 1550
Los Angeles 90024
- Alec L. Cory, B.A., LL.B. (1973)
530 B Street, Suite 1900
San Diego 92101
- William A. Norris, A.B., LL.B. (1972)
609 South Grand
Los Angeles 90017
- Edward O. Lee, B.A. (1974)
1100 67th Street
Oakland 94621

OFFICERS OF THE TRUSTEES

Governor Ronald Reagan
President
Donald M. Hart
Vice-Chairman

Albert J. Ruffo
Chairman
Chancellor Glenn S. Dumke
Secretary-Treasurer

Office of the Chancellor, The California State Colleges

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

Glenn S. Dumke.....Chancellor
Raymond A. Rydell.....Executive Vice Chancellor
.....Vice Chancellor, Academic Affairs
Harry E. Brakebill.....Vice Chancellor, Business Affairs
C. Mansel Keene.....Assistant Chancellor, Faculty and Staff Affairs

The California State Colleges

List of the California State Colleges

California State College,
Dominguez Hills
801 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
714 871-3300

California State College at Hayward
25800 Hillary Street
Hayward, California 94542
Fred F. Harclerod, President
415 538-8000

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
Presidency Vacant
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
209 222-5161

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
Ralph Prator, President
213 349-1200

San Francisco State College
1600 Holloway Avenue
San Francisco, California 94132
John Summerskill, 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
Rohnert Park, California 94928
Ambrose R. Nichols, President
707 795-2386

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

The California State College System

The California State Colleges are a unique development of the democratic concept of tax-supported public higher education for all qualified students.

Spanning the state from Humboldt County in the north to San Diego in the south, the 18 campuses of the California State Colleges (with another campus soon to be constructed) represent the largest system of public higher education in the Western Hemisphere and one of the largest in the world. Current enrollment exceeds 170,000 full and part-time students. The faculty and administrative staff numbers approximately 9,000.

The individual colleges, each with a geographic, curricular and academic character of its own, offer a solid basic program in the liberal arts. Beyond this, each college is noted for its individuality in academic emphasis which makes for a diversified system. Course offerings leading to the bachelor's and master's degree are designed to satisfy existing student interests and to serve the technical and professional manpower requirements of the state.

The California State Colleges are dedicated to rigorous academic standards. Constant striving for academic excellence is at the heart of the system. The primary responsibility of each faculty within the system is the instructional process on the teacher-student level, with appropriate recognition of the necessary and constructive role of research in any institution of higher education.

Responsibility for the California State Colleges is vested in the Board of Trustees, which is appointed by the Governor, and the Board's administrative arm, the Chancellor. The Trustees and the Chancellor set broad policy for the colleges while delegating considerable independent responsibility for implementation at the college level. A statewide Academic Senate, made up of representatives elected by the faculty at each college, acts as a consultative body to the Chancellor in the area of academic affairs.

Although the oldest of the colleges, San Jose State College, dates back a century, the California State College system under an independent Board of Trustees was created by the Donahoe Act of 1960. Formerly, the colleges were under the jurisdiction of the State Board of Education.

CALIFORNIA STATE POLYTECHNIC COLLEGE, KELLOGG-VOORHIS

Administration

President

Robert C. Kramer

Dean of the College

Hugh O. LaBounty, Jr.

Executive Dean

Robert G. Bonde

Dean of Students

Henry House

Business Manager

Cecil W. Jones

Foundation Manager

John W. Francis

Educational Center Director

Kenneth H. Kitch

Director of Information Services

Lachlan P. MacDonald

College Librarian

Harold F. Wells

SCHOOL OF AGRICULTURE

Dean, Carl R. Englund

Department Heads

Agricultural Biology

Edward C. Appel, Jr.

Agricultural Business Management

William P. Rowley

Agricultural Engineering

Haven Q. Conard

Agronomy

Robert L. Procsal

Animal Science

Harry B. McLachlin

Foods and Nutrition

Ramiro C. Dutra

Fruit Industries

Albert E. Canham

International Agriculture

Vacant

Landscape Architecture

Howard O. Boltz

Ornamental Horticulture

Oliver A. Batcheller

SCHOOL OF ARTS

Dean, Albert J. Aschenbrenner

Department Heads

Accountancy

George E. Carlberg

Business Management and Marketing

Richard H. Schoning

Economics

George T. Galbreath

Language Arts

C. Edwin Harwood

Music and Art

L. Keith Weeks

Physical Education

Frank D. Lansford

Social Sciences

Rodman F. Garrity

Administration

SCHOOL OF ENGINEERING

Dean, Harold P. Skamser

Department Heads

Aerospace

Rodney D. Sutherland

Chemical

Max Epps

Civil

John W. Comer

Electronics

Richard T. Black

Industrial

Joseph P. Wymer

Mechanical

Walter E. Holtz

Metal Processes

Russell A. Parish

Welding

William M. Harris

SCHOOL OF SCIENCE

Dean,

Department Heads

Biological Sciences

Jerome E. Dimitman

Mathematics

Harold F. Simmons

Physical Sciences

Gabriel T. Moran

The College

EDUCATION AT CAL POLY

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 18 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 opportunities to qualify for significant entry-level 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 San Luis Obispo program was extended to Southern California in 1938. At that time the 157-acre Voorhis School for Boys

The College

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 816-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 30 academic programs and an enrollment of over 5,500 men and women. The number of degrees granted increased from 54 in June, 1957 to over 750 in June, 1967.

From his appointment as president of California State Polytechnic School in 1933 until his retirement in 1966, 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.

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 and the Corona Freeway, the campus is 40 minutes from downtown Los Angeles, and will be convenient for travelers on the Pomona Freeway and the Foothill Freeway.

ADMINISTRATION BUILDING

A large three-story structure facing the central Mall, the Administration building (5)* houses the college executive and business offices, various support services, and instructional units. The latter include a computer center, equipped with an IBM 1620 digital computer and data processing equipment; faculty offices for Language Arts, Mathematics and Art; journalism and student publications laboratories; art instruction studios; and classrooms and conference rooms.

AGRICULTURAL FACILITIES

The chief agricultural facility is the Agriculture building (9) which contains laboratories, classrooms, faculty offices, and the office of the Dean of the School of Agriculture.

The Agricultural Engineering building (21) houses shops, laboratories and classrooms for instruction in farm power and machinery, agricultural mechanics, carpentry, irrigation, and surveying.

* See map at end of section for building location

The College

Agricultural programs are also conducted at the Fruit Industries unit (20)* which includes a complete citrus packing house, and at the Ornamental Horticulture unit (2) which includes fifteen 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 (11) and swine and sheep units (12).

The Arabian Horse unit (19) and horse show arena (18) are operated as an instructional facility and also devoted to the weekly 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

The facilities in the School of Arts include Language Arts, Journalism, and Art classrooms and laboratories in the Administration building.

The Performing Arts Center is a two-building complex for instruction in music and speech and drama. The Speech-Drama building (14) 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 (15) includes choral and orchestra rooms, offices, individual practice rooms, and a music library.

The Business building (7) contains laboratories for the operation of business machines, installation of merchandising displays, classrooms, and faculty offices.

The Physical Education complex (13) 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.

ENGINEERING FACILITIES

The Engineering facilities (6) consist of seven buildings dominated by a five-story Engineering Center, containing the office of

* See map at end of section for building location

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, Electronics, Industrial, and Mechanical Engineering.

SCIENCE FACILITIES

The Science Building (8)*, which was the first academic building on campus, contains two large lecture rooms, and classrooms, laboratories, and faculty offices for the department of Biological Sciences and the department of Physical Sciences which includes Chemistry. Specialized laboratories include biochemistry, botany, earth sciences, entomology, microbiology, radiation biology, radio chemistry, zoology, and others. Mathematics classrooms and faculty offices are located in the Administration building.

LIBRARY

The Library (16) houses a rapidly-growing collection to serve students and faculty in all aspects of college work. Book storage areas are open to library users. Besides the main reading area with individual study units, the library provides facilities for group study, periodicals, faculty reading, typing, and curriculum development. The building also includes an audio-visual center providing instructional aids for faculty and students.

PLANT OPERATIONS CENTER

The various services required for physical plant operations are located at the south-east corner of the campus. The center (22) includes warehouses, maintenance facilities, security offices, motor pool, and the campus fire station.

STUDENT CENTER

The Student Center (17) is a two-building complex containing an 800-seat Dining Hall, 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

* See map at end of section for building location

The College

storage and display areas for the college store, El Patio. Located nearby is one of the original ranch buildings, called the Duplex; it houses the offices of the Associated Students, Inc. and the activities offices of the Student Personnel Division.

RESIDENCE HALLS

Four residence halls (1), three for men and one for women, accommodate 848 students in double rooms. Each air-conditioned building includes a lounge, catering kitchen, laundry facilities, and recreation room.

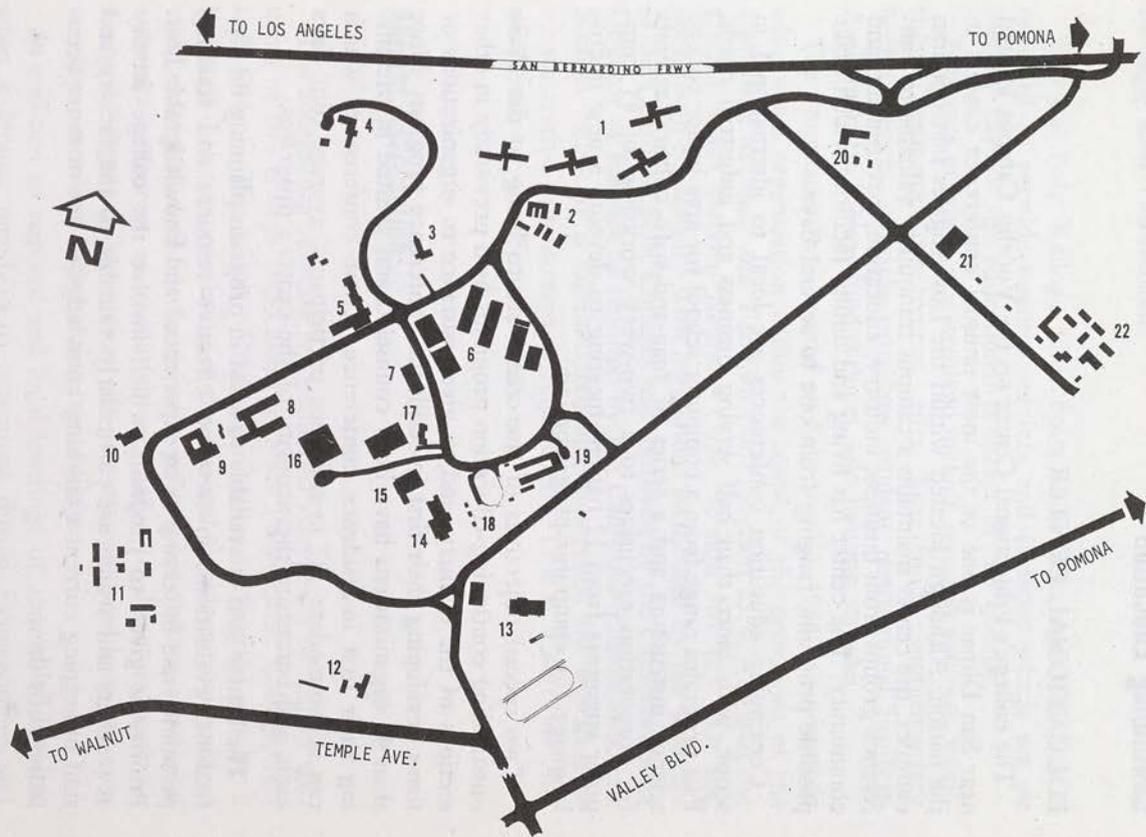
HEALTH CENTER

The Health Center (10)* 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 (3) is the official residence of the college president and his family; Kellogg Hall (4) 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 an unusual natural setting for the campus.

* See map at end of section for building location



Continuing Education

EDUCATIONAL CENTER

The college's 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 micro-language 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 40 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 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 housing services.

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).

Alumni Association

The alumni organization is a combined association of former students of this college and California State Polytechnic College, San Luis Obispo. The affairs of the organization are carried out by a board of directors, consisting of the national president; two national vice presidents, each in charge of a geographic region; a national secretary-treasurer; an executive secretary; 16 directors, each in charge of a geographic section; the past national president; and two ex-officio members representing the college.

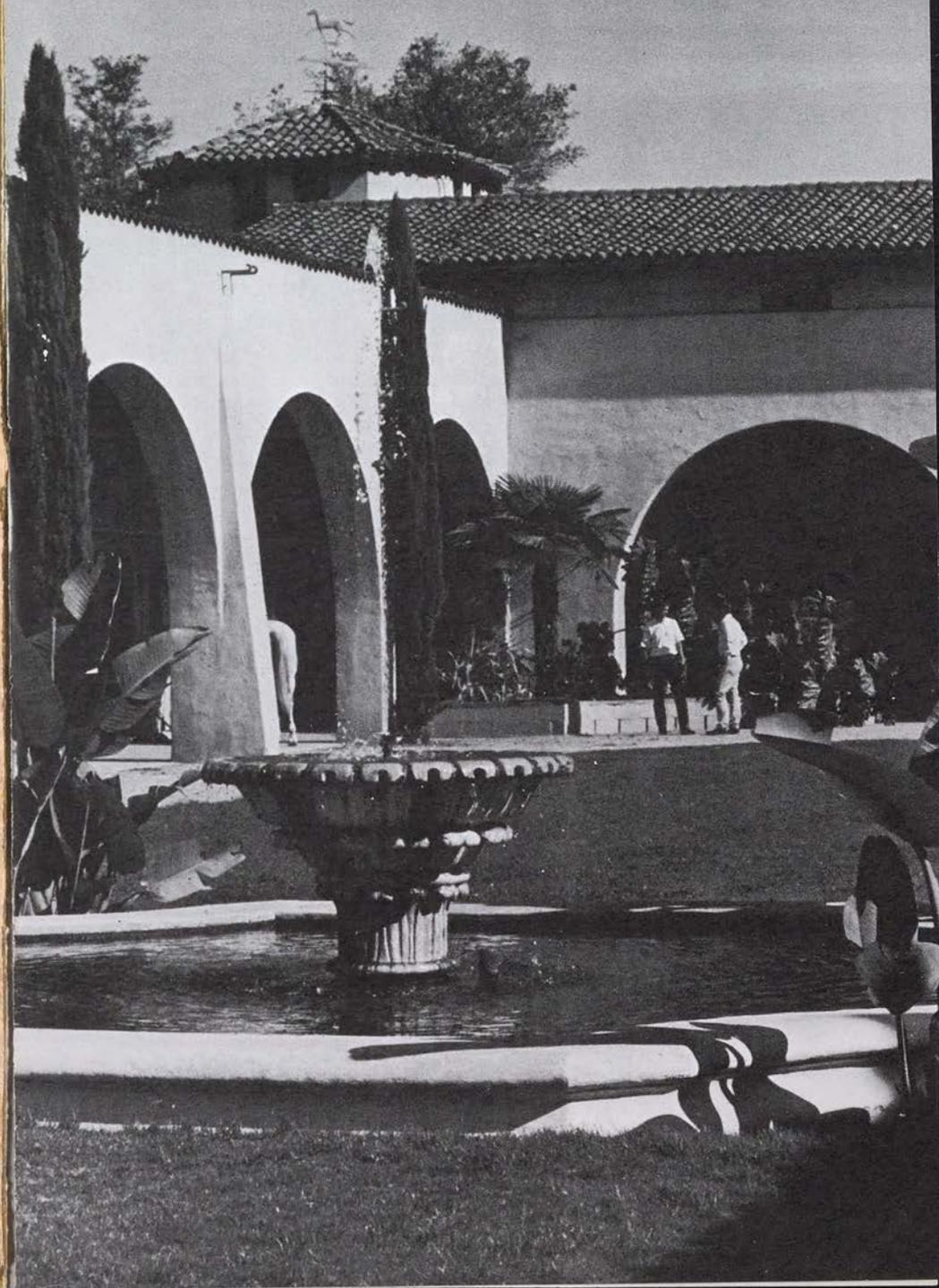
In addition to regional and local meetings of alumni, the association welcomes members to receptions during Homecoming and Poly Vue, maintains an alumni directory and publications, and annually honors an Alumnus of the Year.

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 40 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

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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 a school or college counselor or to contact the college Admissions office.

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 \$5.00 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 total or composite score on the ACT* which provides an eli-

* For 1967-68 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.

Admission

gibility index placing him among the upper one-third of California high school graduates. The grade point average is based upon the last three years of high school and does not include 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 for 1966-67. The minimum required eligibility index for non-residents is ACT-826 and is calculated as in the previous section.

GRADUATES OF HIGH SCHOOLS IN A FOREIGN COUNTRY

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.

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 should complete and submit the results of the American College Test (ACT).

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.

Admission

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.

Admission as a Graduate Student

All persons, including students and graduates of this college, desiring to do graduate work or obtain a teaching credential must apply to the Admissions office for admission as graduate students.

Admission to graduate standing does not imply acceptance as a candidate for the master's degree or for a college-recommended teaching credential.

GRADUATE COURSES TAKEN BY UNDERGRADUATES

Undergraduates who are within 12 quarter units of graduation may petition to use up to 9 quarter units of work in 400 or 500 series courses as graduate credit, when such courses are not required in order to receive the bachelor's degree. Certain 300 series courses may be approved for graduate credit on petition to the Coordinator of Graduate Studies.

REGISTRATION PROCEDURES

General Procedures

Registration instructions and forms are mailed to the new student after he has been officially admitted to the college. Instructions for registration of a continuing student are included in the "Class Schedule" issued prior to the opening of each quarter.

Credit for a course is given only when a student is properly registered in the 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.

The deadlines to complete registration, including the payment of fees, are listed in the academic calendar. Late registration after these dates is permitted, upon payment of a \$5.00 late fee, until the date noted in the academic calendar.

DUAL REGISTRATION

A student who is registered 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 20, 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

Curricular Changes

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 standings.

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

While in continuous attendance, a student is not held for courses added to a curriculum in quarters which he has completed. However, a student shall meet all changes in curricular requirements affecting quarters which he has not completed. The determination of a student's standing, in reference to quarters completed, will be computed upon the basis of the number of units remaining to be completed in the student's selected curriculum.

COURSE NUMBERING SYSTEM

Courses are numbered in a three-digit system.

The first digit (i.e. "2" in 200) indicates the level or year in which the course is normally taught.

1-9—Preparatory courses	300-399—Junior courses
100-199—Freshman courses	400-499—Senior courses
200-299—Sophomore courses	500-599—Graduate courses
	600-699—Professional courses

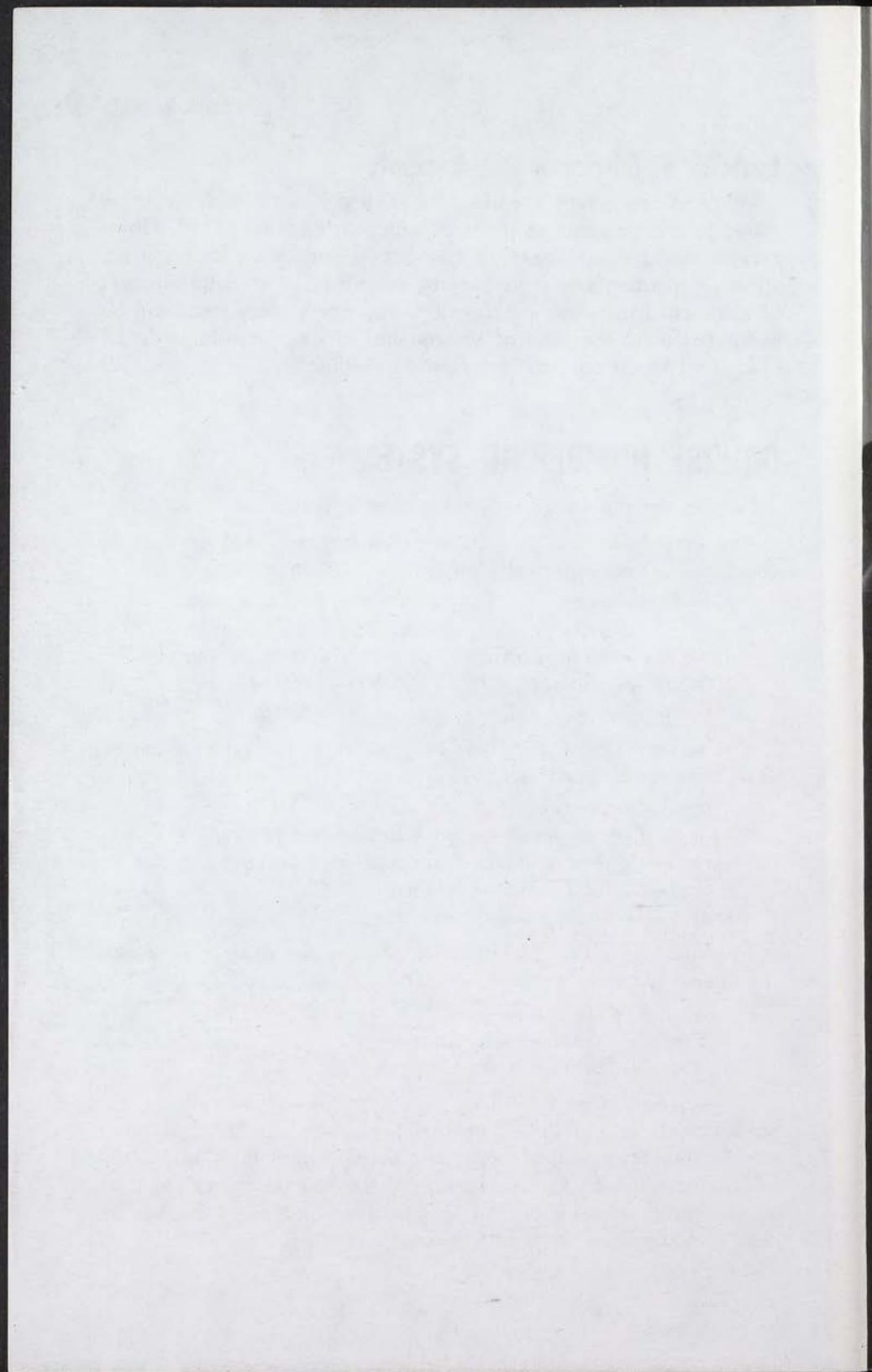
The second digit (i.e. "4" in 240) indicates the type of course with numbers assigned as follows:

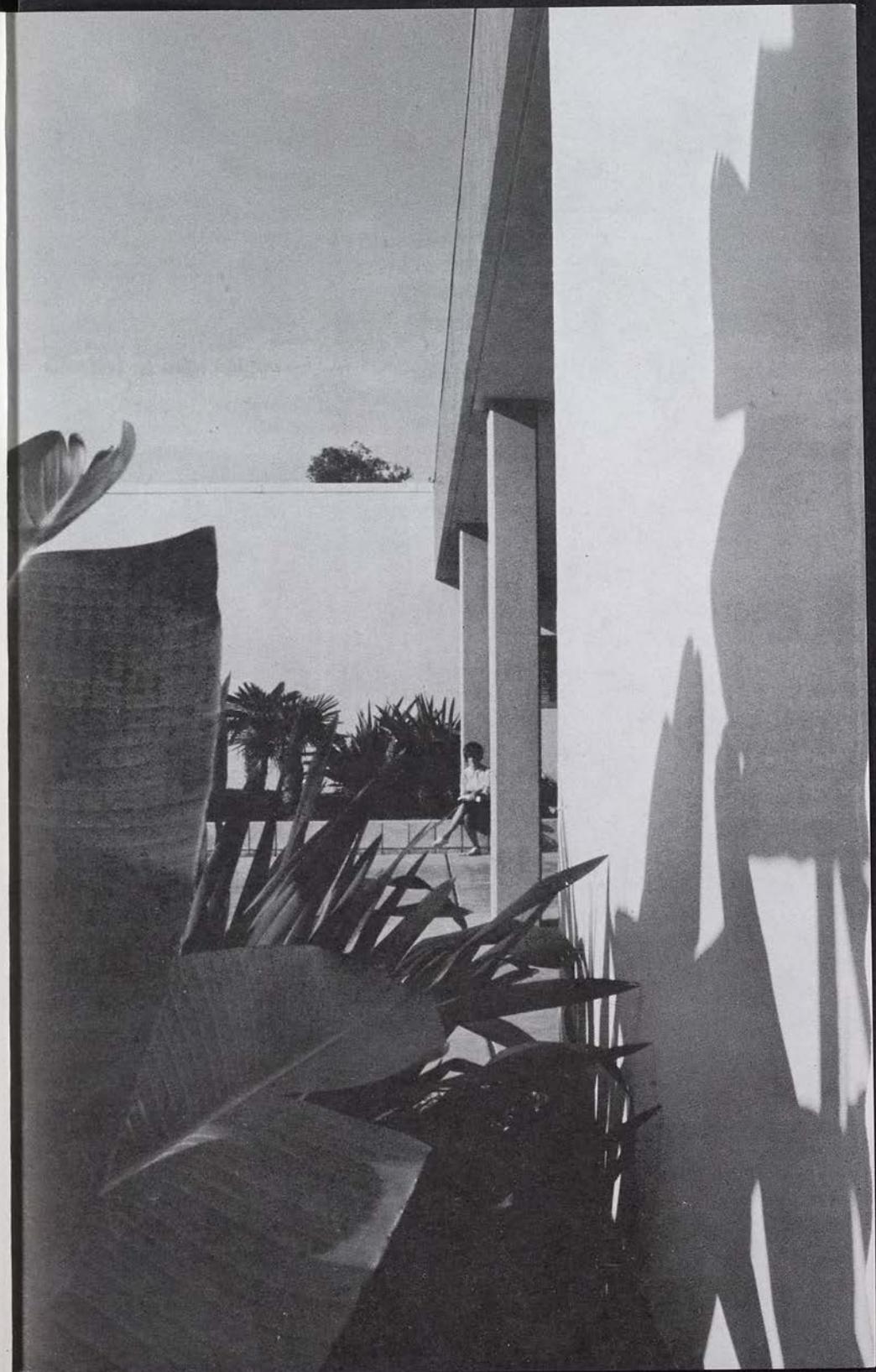
- 0 or 1—Lecture courses
- 2 or 3—Courses involving both lecture and laboratory
- 4 or 5—Courses composed entirely of laboratory work
- 6 or 7—Senior project or seminar
- 8 or 9—Graduate thesis or seminar

The third digit (i.e. "8" in 248) indicates the quarter in which the course is normally taught.

- 1, 4 or 7—Fall quarter course
- 2, 5 or 8—Winter quarter course
- 3, 6 or 9—Spring quarter course

Courses numbered 1-9 carry no credit toward meeting degree requirements in any of the curricula. Courses numbered 300-499 may be used for graduate credit with permission of the Coordinator of Graduate Studies. Courses numbered 600-699 are for professional advancement within a special field and do not carry credit for degree requirements in any of the curricula.







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DEG

BACHELOR OF SCIENCE IN BUSINESS ADMINISTRATION
with majors in:
Accountancy (110) Finance, Insurance, and
Investment Management (105) Real Estate (115)
Child Psychology (110) Marketing (120)

SCHOOL OF ENGINEERING
BACHELOR OF SCIENCE IN ENGINEERING
with majors in:
Aerospace Engineering (110) Chemical Engineering (110)
Computer Engineering (110) Electrical Engineering (110)
Civil Engineering (110)

DEG

DEGREES AND CREDENTIALS OFFERED

All curricula in the college lead to the Bachelor of Science degree. 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:

SCHOOL OF AGRICULTURE

BACHELOR OF SCIENCE IN AGRICULTURE with majors in:

Agricultural Biology	(91)	Foods and Nutrition	(113)
Agricultural Business		Fruit Industries	(117)
Management	(95)	Landscape Architecture	(125)
Agronomy	(102)	Ornamental Horticulture	(132)
Animal Science	(107)	Park Administration	(133)

BACHELOR OF SCIENCE IN INTERNATIONAL AGRICULTURE with a major in:

Latin American Agriculture	(122)
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SCHOOL OF ARTS

BACHELOR OF SCIENCE with majors in:

Economics	(144)	Physical Education	(162)
Language Arts	(147)	Social Sciences	(169)

BACHELOR OF SCIENCE IN BUSINESS ADMINISTRATION with majors in:

Accountancy	(180)	Finance, Insurance, and	
Business Management	(185)	Real Estate	(187)
Data Processing	(186)	Marketing	(193)

SCHOOL OF ENGINEERING

BACHELOR OF SCIENCE IN ENGINEERING with majors in:

Aerospace Engineering	(203)	Electronics Engineering	(219)
Chemical Engineering	(209)	Industrial Engineering	(224)
Civil Engineering	(213)	Mechanical Engineering	(229)

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

Degree Requirements

SCHOOL OF SCIENCE

BACHELOR OF SCIENCE with majors in:

Biological Sciences	(246)*	Mathematics	(255)
Chemistry	(260)	Physical Sciences	(261)

TEACHING CREDENTIAL PROGRAMS

Standard Teaching Credential—Elementary Specialization	(50)
Standard Teaching Credential—Secondary Specialization	(50)

REQUIREMENTS FOR A DEGREE

General Requirements

A candidate for the bachelor's degree shall have:

- †1) completed the courses in one of the listed four-year curricula with a minimum "C" grade average for all units in the major;
- †2) completed the required general education courses;
- 3) spent not less than three quarters in residence, two of these quarters immediately preceding graduation;
- 4) earned not less than 50 quarter units in residence;
- †5) earned a total number of grade points at least equal to twice the number of units attempted (achieve a "C" grade average);
- 6) completed in the Schools of Agriculture, Arts, and Science a minimum of 198 quarter units, or in the School of Engineering 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.

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

† 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.

Transfer Credit

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

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

A maximum of 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.

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.

General Education Requirements

A candidate for the bachelor of science degree must complete a total of 68 units of general education courses in seven areas of study. Within each area there is a minimum number of units which must be taken. Also, there is a maximum number of units in each area which may count toward fulfilling the total general education requirements of 68 units. The maximum in each area does not prevent the student from taking additional general education courses to complete the degree requirements.

The courses shown 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.

To meet the general education requirements, a student must complete:

SOCIAL SCIENCES (Minimum 15 Units—Maximum 21 Units)

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

6 units of Principles of Economics, EC 201, 202

Not more than 6 units (no minimum number of units required) taken from the following courses:

EC 213, 308, 403, 413, 414; HST 101, 102, 103, 321; GEO 312;

BUS 301; SOC 206; ANT 201; PLS 401; ACC 121; ABM 324

NATURAL SCIENCES (Minimum 15 Units—Maximum 24 Units)

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

BIO 110, 115, 145, 200, 201, 213, 228, 229, 303; BAC 221; BOT 116, 124, 125; ZOO 134, 135, 234; ENT 126

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

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

MATHEMATICS (Minimum 3 Units—Maximum 10 Units)

A minimum of 3 units (but not more than 10 units) taken from the following courses:

MAT 101, 102, 103, 104, 105, 107, 108, 109, 114, 115, 116, 204, 205, 206, 207

LITERATURE, PHILOSOPHY, AND ARTS (Minimum 9 Units
—Maximum 13 Units)

A minimum of 2 units (but not more than 13 units) taken from the following English courses:

ENG 110, 111, 201, 202, 203, 207, 211, 212, 213, 306, 403, 406

Not more than 9 units (no minimum number of units required) taken from the following philosophy courses:

PHL 201, 202, 204, 205

Not more than 4 units (no minimum number of units required) taken in fine and practical arts.

HEALTH AND PHYSICAL EDUCATION (Minimum 5 Units—
Maximum 5 Units)

2 units of Health Education, PE 107

3 units of Physical Education, PE 141

PSYCHOLOGY (Minimum 3 Units—Maximum 6 Units)

3 units of General Psychology I, PSY 202

Not more than 3 units (no minimum number of units required) taken from the following psychology courses:

PSY 203, 205, 314

ORAL AND WRITTEN EXPRESSION (Minimum 8 Units—
Maximum 12 Units)

6 units of Freshman Composition, ENG 104, ENG 105

A minimum of 2 units (but not more than 6 units) taken from the following English or speech courses:

ENG 106, 216, 218, 219; SP 200, 203, 300

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

TEACHER PREPARATION PROGRAMS

Rodman F. Garrity, *Coordinator, Teacher Credential Programs*

Elementary Preparation

Barbara H. Lingenfelter
Robert L. Maurer

Secondary Preparation

Dorothy M. Tucker
Thomas C. Wilson, Jr.

COLLEGE-WIDE TEACHER EDUCATION ADVISORY COMMITTEE

Rodman F. Garrity, *Chairman*

Virginia H. Adair
Gertrude C. Boland
Philip R. Browne
George W. Carson
Allen C. Christensen
Charles A. Coulter
Irwin Geller
Walter W. Glaser
Ruth M. Harner
Walter H. Hesse
Alice A. Huffman
Dorothy L. Kiefer
Frank D. Lansford
Barbara H. Lingenfelter
Martie L. Lisowski
Ralph C. McCormic

Robert L. Maurer
Robert L. Procsal
Edward T. Roche
Mary Etta B. Selle
Ralph E. Shaffer
Glenn R. Stewart
Dorothy M. Tucker
Harold F. Wells
Milton R. White
Mary E. Whitley
Thomas C. Wilson, Jr.

Ex-Officio Members:

Dean Albert J. Aschenbrenner
Dean Carl R. Englund
Dean Henry House

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 Coordinator of Teacher Credential Programs and from members of the College-Wide Teacher Education Advisory Committee. Members of this committee act as departmental advisers to the prospective student.

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

ELEMENTARY MAJORS

Biological Sciences
Language Arts

Mathematics
Physical Sciences
Social Sciences

ELEMENTARY MINORS

Biology
 Chemistry
 Economics
 English

History
 Mathematics
 Music
 Physical Education
 Physics

SECONDARY MAJORS

Agriculture
 Biological Sciences
 Business Management
 Language Arts (English, Speech)

Mathematics
 Physical Education
 Physical Sciences (Chemistry,
 Physics)
 Social Sciences (History)

SECONDARY MINORS

Agriculture
 Biology
 Chemistry
 Drama
 Economics

English
 History
 Mathematics
 Music
 Physical Education
 Physics

Courses Required for Credential Programs

The courses listed below are required to gain college recommendation for the Standard Teaching Credential, elementary or secondary specialization. Course descriptions are listed in the Department of Social Sciences. Secondary methods courses are listed under the major and minor departments.

			<i>Elem</i>	<i>Sec</i>
ED	301	Principles of Education (Elementary or Secondary)	3	3
ED	420	Materials and Methods in Elementary Educa-		
	421	tion -----	9	
	422			
ED	430	Student Teaching (Secondary)		12
ED	431	Student Teaching (Elementary)	12	
ED	503	Secondary School Teaching Plans and Tech-		
		niques		3
PSY	305	Child Growth and Development	3	
PSY	306	Adolescent Psychology (Elective) -----	-	-
PSY	312	Educational Psychology	3	3
PSY	503	Counseling and Guidance		3
PSY	504	Evaluation in Education (Elective)	-	-
.....	521	Curriculum and Methods (in Major)		3
.....	521	Curriculum and Methods (in Minor)		3

Teacher Preparation

	<i>Elem</i>	<i>Sec</i>
PHL 501 Philosophy of Education OR		
SOC 508 Educational Sociology	3	3
Total Units of Teacher Preparation Courses	33	33

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 1) to enter the teacher preparation program; 2) to participate in student teaching; 3) to receive the 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.

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.

Academic Policies

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 $22\frac{1}{2}$ or more grade points below a 2.0 (C average).
 - b. a junior (90 to 134 quarter units of college work completed) is $13\frac{1}{2}$ 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—Better than average

C—Average

D—Barely passing

E—Incomplete

F—Failure

P—Passing (workshops only)

W—Withdrew from course without failure

Grade points are assigned to the various grades (except grade P) as follows:

For each unit of Grade A—4 points

For each unit of Grade B—3 points

For each unit of Grade C—2 points

For each unit of Grade D—1 point

For each unit of Grade E—0 point

For each unit of Grade F—0 point

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

Grade E indicates incomplete work. For the purpose of computing grade point averages, a recorded grade E is counted as grade F. An E may be removed within one year from the time it is recorded if all unfinished work as determined by the instructor is completed. The removal of grade E entitles the student to the number of grade points assigned to his completed grade. A student may not, within a period of one year from the time the grade is recorded, retake for credit a course for which a grade E is recorded. If not removed within the one-year period, the grade E remains on the student's permanent record and credit for the course may be obtained only by repeating it.

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.

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.

SPECIAL CREDIT AND ADVANCED PLACEMENT

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. The use of examination results to satisfy institutional 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.

When a re-examination is requested for a course, a six-week period must elapse before a petition for credit by examination 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 $13\frac{1}{2}$ 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 $22\frac{1}{2}$ 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

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.

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.

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.

CREDIT AND ADVANCEMENT

Five units of elective credit will be allowed toward graduation for a student with an honorable discharge from the military service of the United States who submits evidence of satisfactory military training of one year of military training.

An additional five units of elective credit will be allowed toward graduation for a student who submits satisfactory evidence of participation in the Army Reserve or National Guard. A student who has completed the six-month Reserve Training program or the college level general educational development test. Recognition of credit of the American Council on Education is followed in the

Credit to Qualification

Each school will determine its own policy in regard to the award of credit to students in various fields of study.

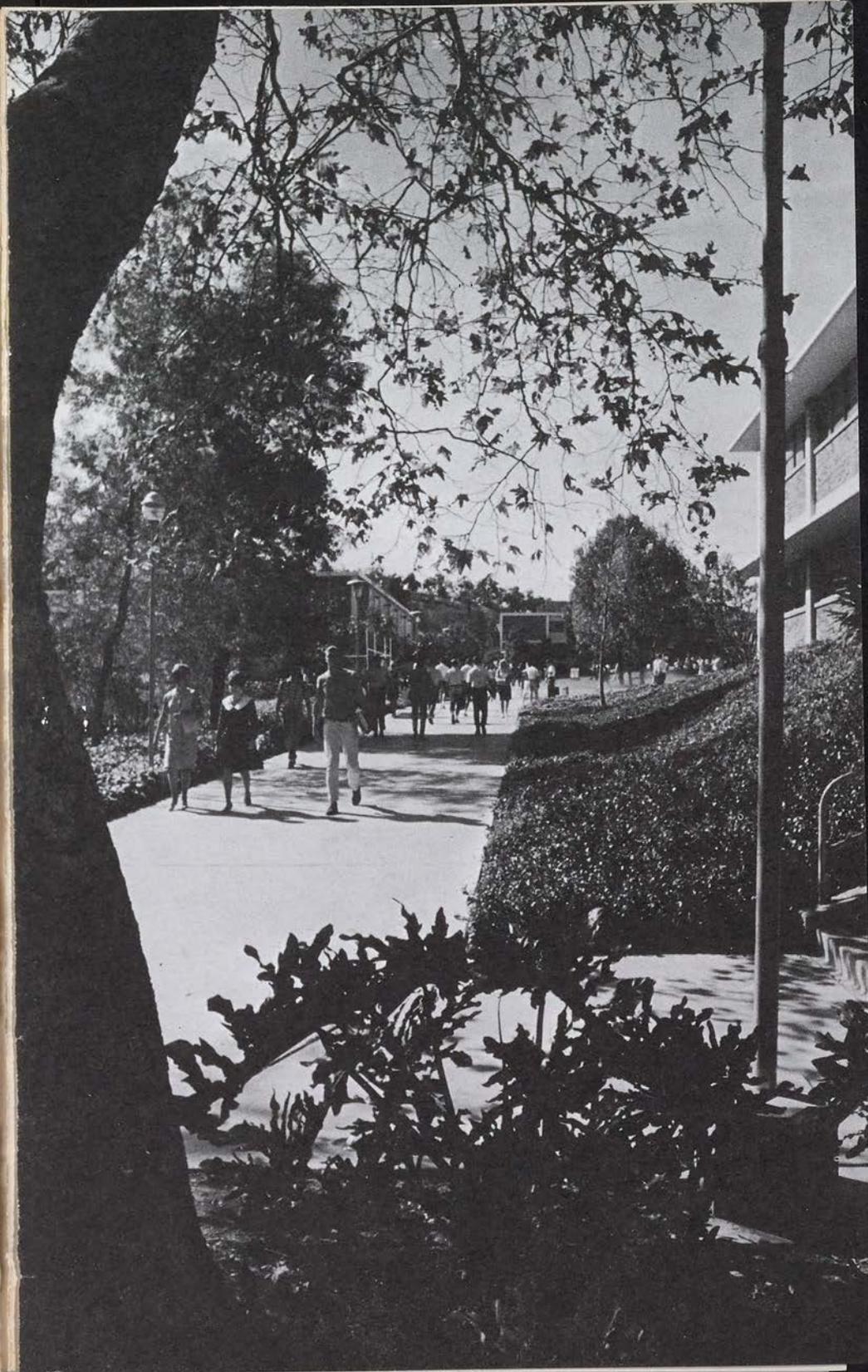
A candidate for a bachelor's degree is eligible for graduation with Honor if at the end of the quarter preceding commencement he has earned a 3.0 or better cumulative grade point average, including all college level work attempted at this college and accepted from other institutions equivalent to that of this college.

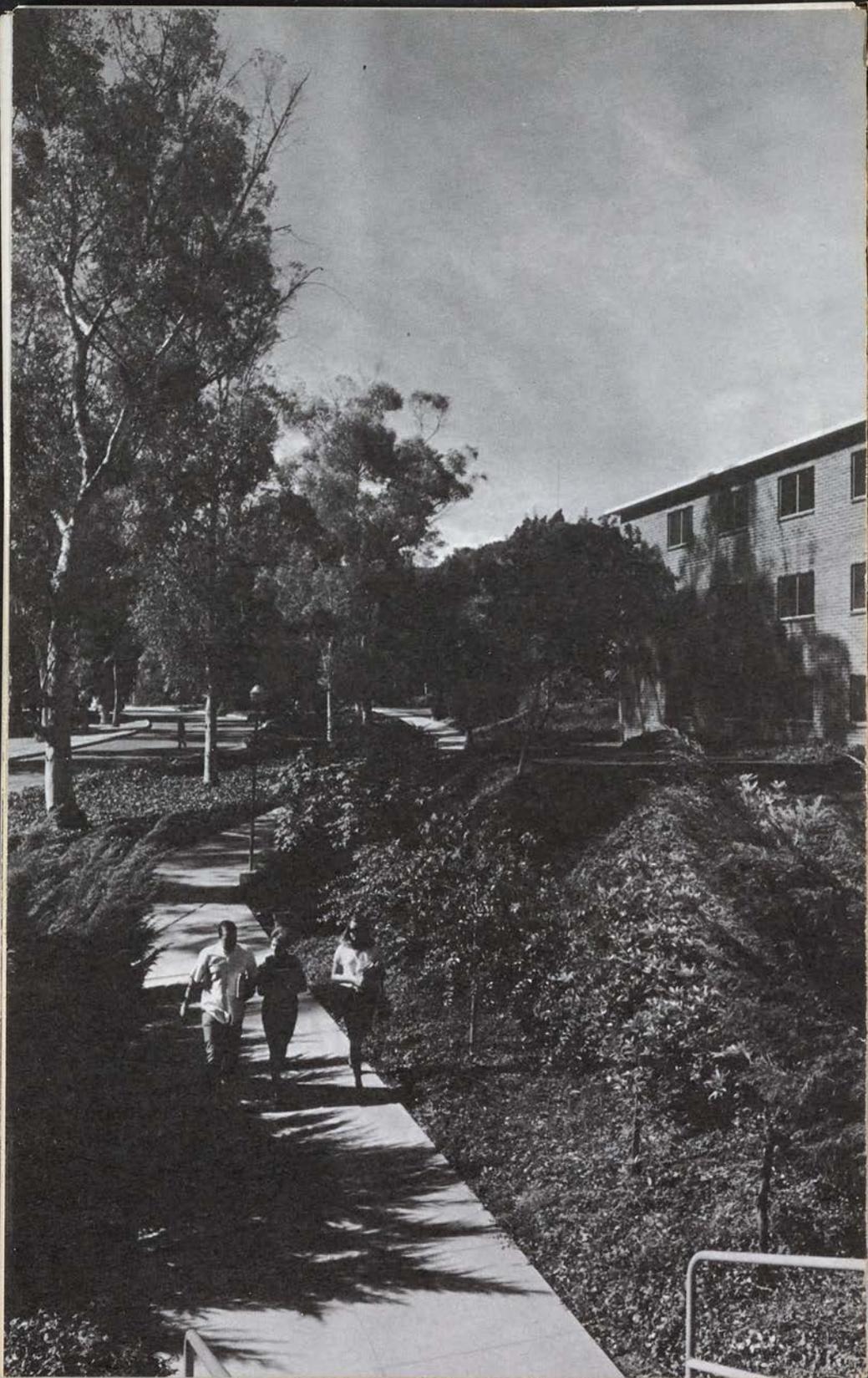
The President's Honor List is announced at the end of the spring semester. Undergraduate students who have a grade point average of 3.0 or better at the completion of the college of 12 or more units during each of the fall, winter and spring quarters.

The Dean's Honor List is announced at the end of each quarter. Undergraduate students who have completed 12 or more units during the quarter with a 3.0 or better grade point average.

The President's Honor List is announced at the end of the spring semester. Undergraduate students who have a grade point average of 3.0 or better at the completion of the college of 12 or more units during each of the fall, winter and spring quarters.

The Dean's Honor List is announced at the end of each quarter. Undergraduate students who have completed 12 or more units during the quarter with a 3.0 or better grade point average.





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STUDENT CONDUCT AND DISCIPLINE

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 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.

Causes for Disciplinary Action

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

Fees

- (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; repeated minor violations of college rules and regulations, including those pertaining to driving and parking of vehicles.

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.

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 non-residents 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)	\$30.00
(6 units or less)	15.00

Non-Residents

In addition to Materials and Service fee:

Tuition (15 or more units) maximum charge	\$200.00 *
(less than 15 units) per unit for the first 14 units ..	13.50 *
for the 15th unit	11.00 *

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 for first 14 units	5.75
for 15th unit	4.50

MISCELLANEOUS FEES

Application to college (charged of all applicants—pay-
able by check or money order at time of applying—
nonrefundable)

\$5.00

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

* Non-resident tuition fee subject to increase by an amount not yet determined, effective 7/1/67.

Financial Aids

Payment of the Associated Students, Inc. membership fees during the fall, winter, and spring quarters, up to the maximum of \$20 per year, entitles a student who also enrolls in the next summer quarter to membership in the ASI for that summer quarter without payment of additional fees.

STUDENT EXPENSES

Estimated expenses for a student living in a campus residence hall are \$472 per quarter. Of the total amount, the student should be prepared to pay from approximately \$350 to \$400, during the registration period.

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.

Typical One Quarter Expenses

Associated Students, Inc. membership (fall quarter, \$10.00; winter and spring quarters, \$5.00 each) -----	\$10.00
Materials and service fee (per quarter) -----	30.00
Room and board (15 meals per week) -----	268.00 *
Books and supplies (estimated) -----	50.00
Weekend meals (estimated \$25 per month) -----	75.00 *
Laundry (estimated \$10 per month) -----	30.00
Parking -----	9.00
Estimated total expenses per quarter -----	<u>\$472.00</u>

FINANCIAL AIDS AND CAREER PLACEMENT

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 employees do much more of the work.

* In-residence costs.

WORK STUDY PROGRAM

The college participates in the U.S. Work Study Program which provides the opportunity of employment for eligible students from lower income families, under the terms of the Higher Education Act of 1965. Employment provisions under this program are the same as for other student employment on campus. Rates of pay vary from \$1.25 per hour to \$2.50 per hour depending on the job requirements and the skills of the worker. Qualified students may work up to 15 hours a week while attending classes.

Scholarships and Awards

Scholarship application blanks are available October 1 and must be completed and returned before April 15 for consideration for a scholarship in the next college year. Applications received after April 15 are considered only in cases of cancellations. Applications may be obtained from the Financial Aids office. Scholarship recipients are selected by the Scholarship and Loan Committee. Scholarships and awards currently available are:

American Society for Quality Control— San Bernardino Section

The society has established a \$100 scholarship (minimum) to assist students interested in quality control studies and careers.

Animal Science

One \$150 scholarship is provided annually to assist a continuing animal science student who demonstrates all-around abilities and qualities for success in his chosen career field.

Arabian Horse Association of Southern California

Two \$250 scholarships are awarded to recognize students who have made a substantial contribution to the promotion of the Arabian horse.

Associated General Contractors of America, Southern California Chapter

One or more scholarships of \$500 are awarded to recognize and provide financial assistance for students preparing for careers in fields directly related to general contracting.

Scholarships

Bandini Fertilizer Company

One \$100 scholarship is awarded to an outstanding student specializing in ornamental horticulture.

Jim Bastady Memorial

An award of \$100 is made annually to a deserving freshman specializing in fruit industries.

Becker CPA Review Course Award for Excellence in Accountancy

An annual \$100 award is made to a junior or senior student majoring in Accountancy.

Bournes, Inc.

Two \$500 scholarships are awarded to deserving juniors or seniors in recognition of outstanding achievement in the fields of electronics, industrial, and mechanical engineering.

Business

Business Management, Accountancy, and Marketing majors are eligible for the Cal Poly Business Award (minimum \$75) sponsored annually by the students and faculty of these business departments.

California Association for Health, Physical Education, and Recreation—Cal Poly Unit

One or more \$100 scholarships are awarded annually to entering students in the Physical Education department.

California Association of Nurserymen

An award of \$100 is made annually to a student demonstrating a high level of ability and desirable qualities for success in ornamental horticulture.

California Congress of Parent-Teachers Association

The association provides a \$400 scholarship to a senior or graduate student preparing for a career in elementary education.

California Fertilizer Association

Two \$100 awards are made annually to qualified continuing students in recognition of outstanding achievement in soil science or agronomy.

California Park and Recreation Society, Inc.

Funds of \$375 or more are provided annually for a junior or senior preparing for a career in park and recreation administration.

California State Polytechnic College Alumni Association

An alumnus of the college provides an annual award of life membership in the Association to an outstanding senior student who has demonstrated a high quality of leadership as a student.

Cal Poly Women's Club

A \$125 scholarship is made available each year to an outstanding woman student. There is no restriction as to major.

Covina, West Covina Altrusa Club

One or more scholarships to aid recipients in meeting the full cost of standard required fees for one regular college year will be awarded to mature women students.

Emblem Club of Pomona

The club provides a \$500 award each year to a qualified senior who plans a career in the mental health field.

Jack Evans Memorial

A \$100 award is made annually to an outstanding junior student majoring in Landscape Architecture.

Gamma Omega Chi

This women's service organization annually provides a \$100 scholarship to a qualified woman student entering directly from high school.

Kellogg Supply Co., Inc.

One annual scholarship of \$125 is available to a qualified and deserving student enrolled in a soil science program, and one scholarship of \$125 to a student enrolled in Ornamental Horticulture.

Lemon Men's Club Annual Award of Merit

A \$150 award is made to an outstanding upperclassman majoring in Fruit Industries.

Los Angeles Chapter, California Association of Nurserymen

The association provides an annual award of \$125 to an outstanding student preparing for a career in Ornamental Horticulture.

Scholarships

Los Angeles County Pomona Grange

The Pomona Grange No. 37 makes a \$200 award to a qualified student who will be entering a career in agriculture.

Enos Spencer Reid Memorial

An award of \$200 or more will be given to a deserving student enrolled in the Agricultural Business Management department. The recipient must have attended the college for at least one year.

Harry E. Rosedale Memorial

An award of \$100 is made available for a student enrolled in Ornamental Horticulture who has completed one year of work in the Ornamental Horticulture department.

San Bernardino County Pomona Grange

An award of \$150 is made available by the Pomona Grange No. 32 to assist a student who shows promise in agricultural endeavors.

San Fernando Valley Arabian Horse Association

The association makes available one \$250 scholarship annually to recognize a student who has excelled academically and has demonstrated interest in the improvement and promotion of Arabian horses.

Millard D. Shriver

A \$250 award is given annually to encourage academic excellence among students majoring in Aerospace Engineering.

Soroptimist Club of Pomona

One \$150 scholarship is awarded to assist a qualified junior or senior woman student.

Sunkist Growers, Inc.

One \$150 scholarship is given as a second-year award to the most outstanding recipient of the following Sunkist Managers Club scholarships.

Sunkist-Central California and Tulare County Managers Club

One \$300 scholarship is awarded to an entering student in Fruit Industries.

Sunkist-Foothill Managers Club

One \$150 scholarship is awarded to an entering student in Fruit Industries.

Sunkist-San Diego and Orange Counties Managers Club

One \$150 scholarship is awarded to an entering student in Fruit Industries.

Sunkist-Tri-County Managers Club

One \$150 scholarship is awarded to an entering student in Fruit Industries.

Wagner Landscape Contractors

A \$100 annual award is made to an outstanding upperclass student preparing for a career in landscape contracting.

Western Electric

A scholarship covering the cost of required fees, books, and other materials in an amount of not less than \$400 is provided to an undergraduate student majoring in engineering.

Other Scholarships

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 non-institutional scholarships is on file in the Financial Aids office.

Student Loan Programs

A number of student loan funds provide temporary assistance to qualified students of the college. Loans from these funds are made for varying periods of time, according to regulations determined by a faculty committee and in conformance with conditions prescribed in the establishment of the particular fund. Emergency short-term loans are normally repaid within the same quarter they are taken. Applications should be made to the Financial Aids office.

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

ESTABLISHED LOAN FUNDS

Animal Science Club

The club established the fund with an original grant of \$200, to which the Arabian Horse Association of Southern California has contributed an additional \$200. Although preference is given to students majoring in Animal Science, other students are not excluded from receiving loans from this fund.

Associated General Contractors of America

The Southern California Chapter has made an original grant of \$1,000 for financial assistance to students in order that they might continue their education in preparing for careers in general contracting fields.

Associated Students, Inc.

The student organization established a fund with an original grant of \$500 for short-term loans.

Athletic and Recreation Turfgrass Association

The association has established a \$200 fund for providing short-term assistance to students planning to enter the field of park administration.

California Fertilizer Association

A \$500 fund has been established by the Soil Improvement Committee of the association for small, short-term loans to deserving students, to continue their education.

Cal Poly Alumni Association

The association has established a fund to provide both long- and short-term loans to deserving students.

Cal Poly Student Wives Club

The club has established a loan fund to provide aid primarily to married students.

Cal Poly Women's Club Student Accommodation

The club has established a student accommodation fund to make short-term loans to deserving students.

Don Davis Memorial

The memorial fund was established by the former students, family, and friends of Don Davis to honor his helpfulness to students

as an instructor in Agricultural Business Management and as a member of the Scholarship and Loan Committee.

Dr. C. D. N. Gilfillan Memorial

A fund to honor the memory of Dr. C. D. N. Gilfillan, former medical director of the college's Student Health Center, has been established to assist students in all majors.

Bill Hamilton, Jr. Memorial

The parents and friends of Bill Hamilton, Jr., have established this short- and long-term fund to assist deserving students with preference given to those enrolled in Biological Sciences and other science majors.

Karl Hassler Memorial

This fund was established to provide long- and short-term loans to deserving students with preference given to students preparing for work in the pest control industry.

Phillip H. Henry Memorial

Friends of Phillip H. Henry established a memorial fund with an original grant of \$1200 for short- and long-term loans.

Katherine and Edwin Jobe

Mr. and Mrs. Verne Jobe established this fund with an original grant of \$4000 to make short- and long-term loans available to deserving students.

Dr. John F. Lamiman

The Biological Sciences department established this fund to be in the name of their retired associate, Dr. John F. Lamiman, for the purpose of providing financial assistance to deserving young men and women enrolled at this institution.

Lemon Men's Club

The club established the fund with an original grant of \$500 to make short-term loans available to deserving young men. Although preference is given to Fruit Industries students, loans to other students are not excluded.

Sam B. McMurray Memorial

The purpose of this fund is to make loans available to deserving young men and women.

Loans

William Mowry Memorial

The memorial fund has been established to honor William Mowry's kindness to students and staff, and his unselfish service to the college and to assist qualified students in need of financial assistance to pursue collegiate goals.

Ornamental Horticulture Alumni Association

The association established the fund to make short- and long-term loans available to students majoring in Ornamental Horticulture.

Waid Palmer Memorial

The fund makes loans available to deserving young men and women to continue their education in preparing for careers in fruit industries.

Chet Pencille Memorial

The Pest Control Operators of California established the Chet Pencille Memorial Fund with an original grant of \$2,500 to make short- and long-term loans available to deserving young men enrolled in Agricultural Biology.

Pomona Rotary Club

The club has established a \$500 short- and long-term loan fund to assist students who experience a temporary financial need.

Senior

The fund has been established to provide financial assistance to qualified seniors, who may arrange to repay borrowed funds after graduation.

Laura E. Settle

A fund has been established by the California Retired Teachers Association to make long- or short-term loans available to senior or graduate students preparing for teaching careers.

Southern California Meter Association

A \$750 fund has been established by the members of the association to make short- and long-term loans available to students enrolled in School of Engineering majors.

Southern California Turfgrass Council

A fund established by the council provides short- and long-term loan assistance to students planning to enter Park Administration or related fields in Ornamental Horticulture.

Terminix Educational Foundation

The Terminix Company, Inc. of Los Angeles established the fund with an original grant of \$500 to make short- and long-term loans available to deserving students. Although preference is given to students enrolled in Agricultural Biology, loans to other students are not excluded.

West End Soil Conservation District

The members of the district have made available a \$500 short-term loan fund for students enrolled in the School of Agriculture.

Alex M. Wilson Memorial

The family and friends of Alex M. Wilson established the fund with an original grant of \$500 to make short- and long-term loans.

Jack Woodruff Memorial

The family and friends of Jack Woodruff established a memorial fund for the purpose of making short- and long-term loans available to qualified students.

OTHER LOAN PROGRAMS

State Guaranteed Loan Program

The State of California, in cooperation with the U.S. Office of Education, has established a Guaranteed Loan Program to provide loans to students from middle income families who would not generally qualify for federally-supported National Defense Student Loans.

Full-time students who are residents of California are eligible to apply for maximum loans of \$1,000 per academic year for up to 5 years. Loans must be repaid at 6 percent simple interest, with repayment beginning nine months after the individual ceases to be a full-time student in an institution of higher education.

However, if the adjusted family income is less than \$15,000, students are eligible to apply to have the U.S. Office of Education pay interest up to 6 percent per annum on the unpaid balance while in school and interest of 3 percent per annum on the unpaid balance during the repayment period.

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.

Placement

Entering freshmen as well as students in advanced standing in any field of study are eligible, although the law provides that special consideration shall be given to (a) students with superior academic background who express a desire to teach in elementary or secondary schools, and (b) students whose academic background indicates a superior capacity or preparation in science, mathematics or engineering.

The maximum loan to one individual is \$1,000 in any one year, and no more than \$5,000 total. Loans must be repaid with 3 percent 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 percent of the loan, and the interest thereon, canceled for each full year of full-time public or elementary or secondary school teaching, up to a maximum of 5 years and 50 percent of the loan.

United Student Aid Fund

The United Student Aid Fund is a private non-profit corporation which endorses lowcost loans by participating banks to college students. The college participates in this program by providing a specified amount of matching funds, which allows the college to recommend students for such bank loans. Students may borrow from a bank up to \$1,000 a year at 6 percent simple interest with repayment beginning nine months after graduation or separation from college. Provisions to petition to have the Federal Government pay interest as described in the final paragraph of the State Guaranteed Loan Program description above are also in effect for USAF loans.

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 follow-up 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 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.

SUMMER EMPLOYMENT

Students are encouraged to take summer employment in fields related to their major. 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.

HOUSING

Residence hall facilities for both men and women students are located on campus. Through participation in the co-curricular activities, hall and wing government, social functions and the total living experience, the student increases his or her social awareness and competency.

Each residence hall is under the supervision of a head resident, and is governed by its own student officers. Recreation and lounge areas and coin-operated laundry facilities are available in each of the air-conditioned buildings. Rooms house two students each, and include beds, sheets, pillows, wardrobes, desks, and bookcases. Students are required to furnish blankets, bedspreads, towels, and study lamps.

Dining facilities for resident students are located in the dining hall at the Student Center on the Mall. The board plan includes breakfast, lunch, and dinner Monday through Friday, excluding college holidays. Weekend meals are available on a cash basis.

New students interested in on-campus housing should request a housing application at the time of application for admission to the college. Commuting distance from the campus, date of housing

Services

application, and the student's college admission date determine housing priority. After receiving the housing application, the applicant will be notified of his housing priority status. Housing licenses (contracts), which cover room and board fees, are mailed to eligible applicants prior to the opening of the appropriate quarter. The payment date will appear on the license and will be prior to the start of the quarter.

Current residence hall fees are:

Room and board per quarter (subject to change)	\$268.00
Housing security deposit (payable prior to occupancy) ---	20.00

Room and board is payable in advance. Arrangements to pay in two equal installments may be made upon special application for which a service fee of \$4 per quarter will be charged.

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 Associate Dean, Women, prior to registration. Inquiries about off-campus housing should be made in person at the Housing office.

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 Monday through Friday daily 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

Services of the Counseling center are available to students with problems in personal, social, vocational, or academic areas. The Test office is operated within the center. Problems in reading im-

provement and study skills are handled in group guidance work conducted by the center staff. An occupational literature library is also available.

Each student is assigned a departmental faculty adviser in his major field of study for academic and occupational guidance. This adviser also helps the student in his program planning. Personal and social problems which are identified by the faculty adviser are referred to the professional staff in the Counseling center.

INTERNATIONAL PROGRAMS

The California State Colleges offer academic year programs of study at a number of distinguished universities abroad. For 1967-68 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. 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 achievement;
- c) Proficiency in the language of instruction;
- d) Faculty recommendations.

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 1967-68 these costs are: France, Germany, Spain, \$1,970; Italy, Japan, \$2,070; Sweden, \$2,270; Taiwan, \$1,770. Payments may be scheduled throughout the year.

Programs in 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.

Student Organizations

Application for the 1968-69 academic year should be made early in the fall quarter of 1967. 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.

STUDENT ORGANIZATIONS AND ATHLETICS

Co-curricular activities are considered an integral part of the college's educational program. The Activities office, under the direction of the Associate Dean (Activities), is responsible for studying, encouraging, and developing student participation in leadership and fellowship, sound programming and well-balanced living.

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 organization coordinates all student-sponsored activities with other college programs in order to insure maximum value 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 Activities

CLUBS

Student clubs and organizations cover 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, and students are advised against

participation in unofficial student organizations that are not in keeping with the college's traditions.

PUBLICATIONS

Poly Post is the official publication of the Associated Students, Inc., and 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 AND AGRICULTURAL FIELD DAY

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.

The Agricultural Field Day provides an opportunity for high school and junior college youths to compete in agricultural contests.

MUSIC AND DRAMA

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.

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

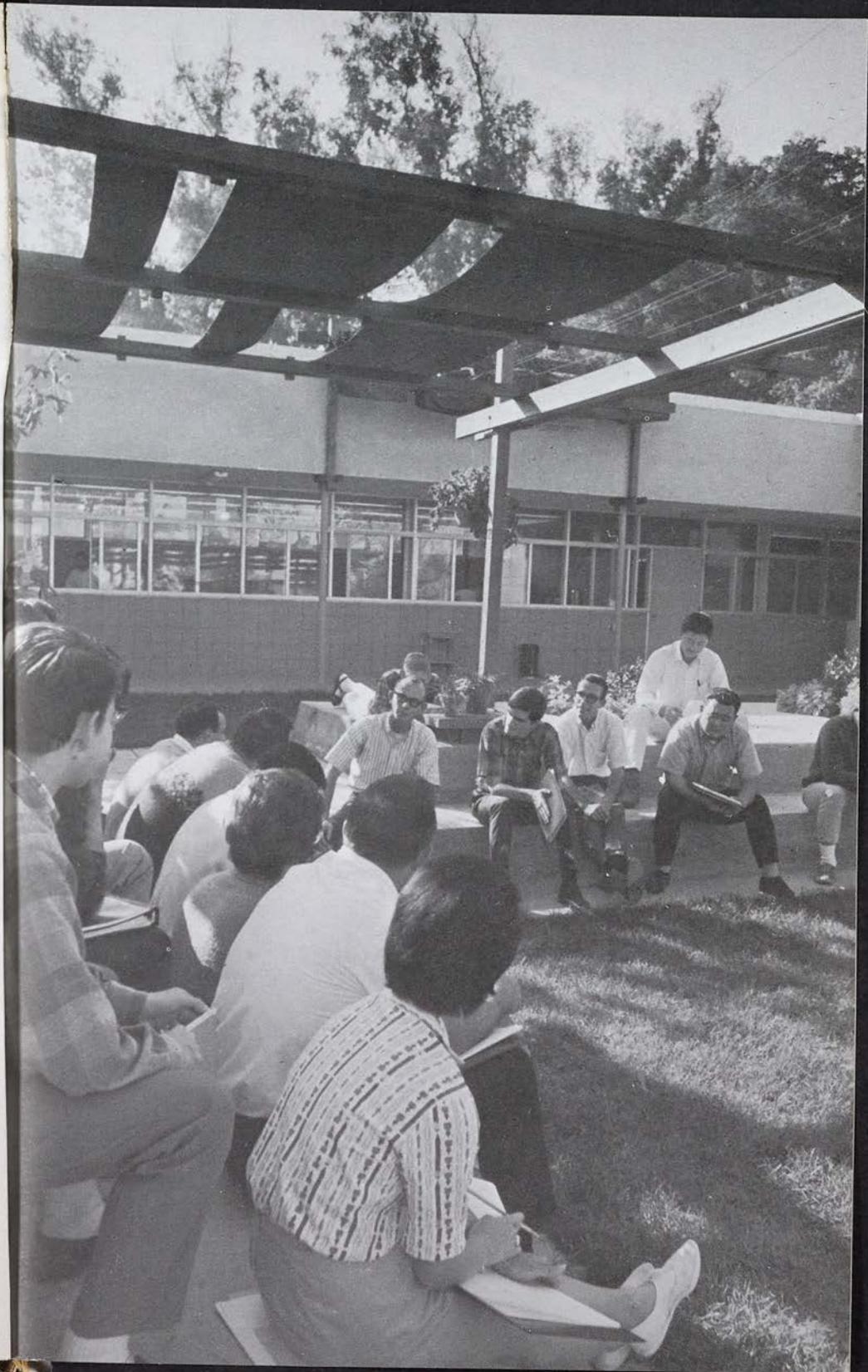
Students with a cumulative grade point average of less than 2.0 may not participate on intercollegiate teams nor may they hold positions of leadership in student organizations or student government groups. However, students on academic probation may participate in such activities as club membership, 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.

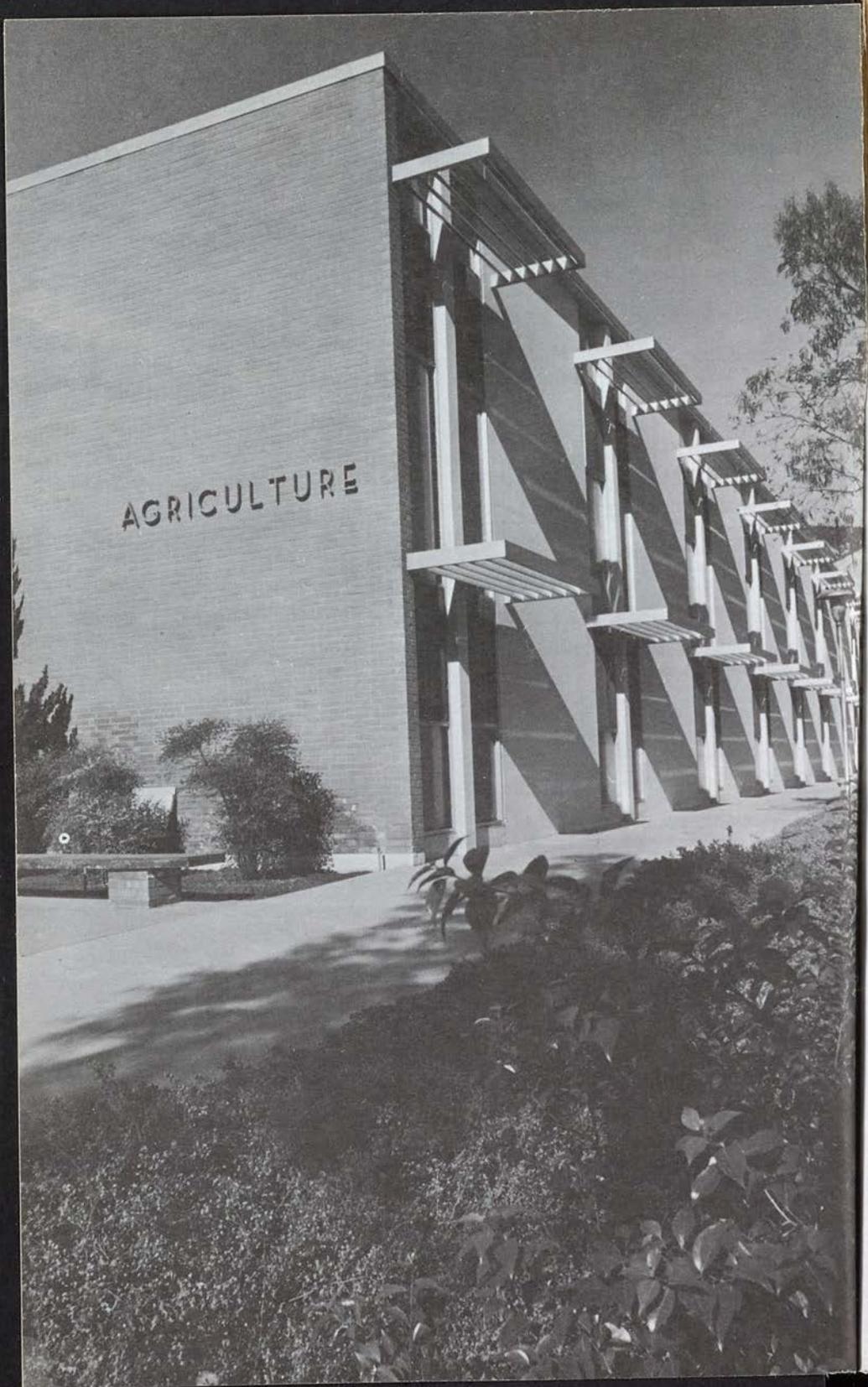
ELIGIBILITY FOR INTERCOLLEGIATE ATHLETICS

Eligibility for competition in intercollegiate athletics is regulated in general by the rules of the National Collegiate Athletic Association and specifically by the following college regulations:

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.



AGRICULTURE



SCHOOL OF AGRICULTURE

AGRICULTURAL BIOLOGY . . .	90
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AGRICULTURAL ENGINEERING . . .	100
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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 nine majors—Agricultural Biology, Agricultural Business Management, Agronomy, Animal Science, Foods and Nutrition, Landscape Architecture, Ornamental Horticulture, and Park Administration—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.

Each curriculum is patterned so that the freshman student may select his major occupational field. Early exposure to major courses makes it possible for the student to determine in a short time whether or not he is fitted for work in the field he has selected. Technical and exploratory courses are stressed early in the program while general education and supporting courses are taken throughout the four-year period. As a result of inter-college agreements, students who transfer from other colleges find it possible to enter the various major programs at Cal Poly with a minimum of difficulty.

Agriculture Options

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 College 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.

Science Curricular Options in Agriculture

Because of advanced technological knowledge needed for employment in many areas of agriculture, the school offers three interdisciplinary programs which provide depth in specific scientific areas. These options are designed to complement agricultural major curricula and to provide an opportunity for the graduate to broaden his possible field of employment into scientific areas related to agriculture. The student may elect one of the science options appropriate for his chosen major. With the approval of the departmental adviser some courses listed for the options may be substituted for requirements in the major curriculum.

Agrophysics

This option combines studies in soils, geology, chemistry, physics, and radio isotope tracer techniques.

PHY 121-2-3—College Physics	(12)
MAT 104, 105—College Algebra and Trigonometry	(6)
MAT 114, 115—Analytic Geometry and Calculus	(6)
PSC 221—Physical Geology	(4)
SS 339—Soil Physics	(2)
CHM 336—Radiochemistry or BIO 431—Radiation Biology	(4)
SS 337—Soil Analysis	(2)

Biochemistry

This option prepares the graduate for the dual role of agricultural scientist and scientific analyst in industry and government where there is a need for knowledge in biology and chemistry.

CHM 328—Biochemistry	(4)
CHM 329—Biochemistry	(4)
BIO 435—Cellular Physiology or VS 205—Physiology of Domestic Animals	(4 or 3)
PSC 102—Fundamentals of Physics	(4)

Agriculture Options

MAT 108, 109—Introduction to Mathematical Analysis	(6)
CHM 336—Radiochemistry	(4)
SS 337—Soil Analysis	(2)
SS 338—Plant Tissue Analysis	(2)
BIO 432—Isotope Tracers	(3)

Biometrics

This option applies mathematical-statistical theory to agriculture, and includes training in the designing of experiments, collating and analyzing results of research and surveys, processing data using modern computers, and arriving at management decisions related to agriculture.

MAT 108, 109—Introduction to Mathematical Analysis	(6)
MAT 204—Introduction to Mathematical Analysis	(3)
MAT 107—Descriptive Statistics	(3)
MAT 113—Automatic Program- ming for Digital Computers	(1)
MAT 311—Mathematical Statistics I	(3)
MAT 322—Mathematical Statistics II	(3)
MAT 421—Design of Experiments	(3)
MAT 422—Design of Surveys	(3)
Selected with approval of ad- viser	(5)

AGRICULTURAL BIOLOGY DEPARTMENT

Edward C. Appel, Jr., *Department Head*
Kenneth R. Hobbs

The Agricultural Biology major offers a broad background in the sciences that serve agriculture. In addition, a special course concentration is available for students who desire greater depth of study in Economic Entomology.

Protecting the interests of the public and aiding in improvement of agricultural enterprises offers a variety of professional occupations.

Careers are available in civil service and other positions with county, state, and federal departments of agriculture and allied agencies which establish quality in fruit and vegetables, seeds, agricultural chemicals, plants, and other products. 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.

Challenging positions in sales, services, and as consulting representatives for agricultural chemical companies are available. These organizations offer employment to graduates with knowledge of scientific pest control and crop production practices.

The expansion of the structural and agricultural pest control industries is providing additional opportunities for owners, supervisors, and entomologists. Many more pest control services are required because of the increase in housing and industrial development and intensification and expansion of new crop lands.

The marketing of agricultural products presents many possibilities for individuals with a knowledge of pest conditions and of quality standards for fruit and vegetables. This knowledge is a requirement in such occupations as produce buying, selling, shipping, and quality control.

Summer appointments with county, state, and federal agencies or private companies provide both valuable experiences and income for students.

Curriculum in Agricultural Biology

<i>Freshman</i>	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)		3	
Basic Mathematics for General Education (MAT 102)			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 Control (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	
†Literature			3
‡Electives and courses to complete major	11	9	6
	17	16	16

Senior

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

†To be selected from General Education List with 3 units to be PHL 202 or PHL 204.

‡Students concentrating in Economic Entomology will select at least 29 units with the approval of the adviser.

Agricultural Biology

	F	W	S
*Biochemistry (CHM 327)	4		
Morphology of Immature Insects (ENT 334)		3	
Plant Production Electives	4		4
†Philosophy, Literature, Art or Music		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 government 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.

Courses in 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.

*Animal Physiology (ZOO 324) or Plant Physiology (BOT 422) may be substituted.

†To be selected from General Education List with 3 units to be PHL 202 or PHL 204.

‡Students concentrating in Economic Entomology will select at least 29 units with the approval of the adviser.

AGB 223 Vertebrate Pest Control (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.

AGB 224 Plant Identification (4)

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

AGB 228 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, 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

Agricultural Biology

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 419 Seed Technology (2)

Identification of agricultural, vegetable, and weed seeds; inspection methods and procedures. Technique of purity and germination tests in accordance with official procedures. California seed law and other pertinent laws and regulations. 2 lectures.

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.

AGRICULTURAL BUSINESS MANAGEMENT DEPARTMENT

William P. Rowley, *Department Head*

David E. Cole
Doyle E. Kauk

Milo G. Lacy

The Agricultural Business Management major is primarily a curriculum of business courses applied to the agricultural industry. Because of the wide selection of course offerings provided, 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 of 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, public relations, and many others. The curriculum has proved stimulating for those students pursuing graduate studies in marketing, business, and economics.

Curriculum in Agricultural Business Management

<i>Freshman</i>	<i>F</i>	<i>W</i>	<i>S</i>
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, 106)	3	3	3
Health Education (PE 107)	2		

Agricultural Business Management

	<i>F</i>	<i>W</i>	<i>S</i>
Basic Mathematics (MAT 101)		3	
Business Mathematics (MAT 103)			3
Physical Education (PE 141)	½	½	½
Fundamentals of Earth Science (PSC 101) or		4	
College Chemistry (CHM 105) and Laboratory (CHM 142)			
Fundamentals of Physics (PHY 102) or			4
Organic Chemistry (CHM 211) and Laboratory (CHM 251)			
Fundamentals of Chemistry (CHM 103) or	4		
College Chemistry (CHM 104) and Laboratory (CHM 141)			
General Psychology I (PSY 202)			3
*Electives	3	2	3
	<hr/> 17½	<hr/> 17½	<hr/> 16½

Sophomore

Wholesaling of Agricultural Products (ABM 206)	3		
Advertising and Promotion of Agricultural Products (ABM 225)		3	
Job Instruction Training (ABM 203)			2
Principles of Accounting (ACC 121, 122, 123) or	3	3	3
Enterprise Accounting (ABM 326) and Management Accounting (ABM 324)			
Principles of Economics (EC 201, 202)		3	3
Basic Biology (BIO 115)	3		
Report Writing (ENG 216)			3
†Literature	3		
Salesmanship (MKT 208)		3	
Physical Education (PE 141)	½	½	½
General Soils (SS 221)		4	
Public Speaking (SP 200)			3
†Philosophy or Literature	3		
*Electives			3
	<hr/> 15½	<hr/> 16½	<hr/> 17½

Junior

Agricultural Sales and Service Management (ABM 302)	3		
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, 302)		3	3
Descriptive Statistics (MAT 107) or		3	
Business Forecasting (BUS 311)			
Introduction to Data Processing (DP 211)	3		
Economic Problems (EC 213)			3
*Electives	4	4	5
	<hr/> 16	<hr/> 16	<hr/> 17

*All students will select twenty additional units in agricultural production courses. Adviser will assist with selection.

†To be selected from the General Education list.

Agricultural Business Management

<i>Senior</i>	<i>F</i>	<i>W</i>	<i>S</i>
Senior Project (ABM 461, 462) —	2	2	
Undergraduate Seminar (ABM 463) —			2
Personnel Management (ABM 402) —	3		
Land Appraisal (ABM 406) —			3
Food Merchandising (ABM 413) —			3
Transportation of Agricultural Commodities (ABM 416) —		3	
Agricultural Labor-Management Relations (ABM 418) —			3
Agricultural Prices and Government Control (ABM 403) —			3
Insurance Principles (FIN 303) —	3		
State and Local Government (PLS 401) —	3		
Human Relations (PSY 314) —		3	
Advanced Public Speaking (SP 300) —		3	
*Electives —	5	5	2
	16	16	16

Courses in Agricultural Business Management

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 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 302 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. Prerequisite: MKT 208

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

*All students will select twenty additional units in agricultural production courses. Adviser will assist with selection.

Agricultural Business Management

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 313 Agricultural Policy (3)

Current agricultural policies and proposals. The consequences of alternative agricultural policies for the farmer and society. 3 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 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 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.

Agricultural Business Management

**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*
Norman S. Illsley
Theodore L. Lieb

Dudley R. Smith

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.

Courses in Agricultural Engineering

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 safely to 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.

AGRONOMY DEPARTMENT

Robert L. Procsal, *Department Head*

Gerald L. Croissant

Theodore L. Lieb

James A. Pomerening

George W. Schmitz

The Agronomy department offers instruction in the science and related studies applicable to the options in crops and soils. The technical knowledge and operational skills acquired qualify the graduate to pursue careers in farm management; with seed, fertilizer and pest-control industries; in the processing and marketing of agricultural products; with agencies of the federal and state governments; and in education. Placement opportunities for graduates are both excellent and rewarding.

Actual experience is combined with classroom instruction in the department's operation of 400 acres of land in the production of cereals, field crops, truck crops, and pastures. Students participate in this program through class laboratories and often through employment in the farming operations. They may also gain production skills through participation in Foundation crops projects wherein they grow crops for experience and profit. A processing building, greenhouse and experimental plant growing area are integral working facilities of the department.

Since courses in agronomy deal with agriculture, biology, chemistry, and mathematics, it is recommended that high school students interested in this major field seek to enroll in these subjects before entering college.

Special science options available to students in this department are described in the school introductory statement.

Curriculum in Agronomy

<i>Freshman</i>	<i>F</i>	<i>W</i>	<i>S</i>
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	
Agricultural Botany (BOT 120) -----			4
Freshman Composition (ENG 104, 105) -----	3	3	
Basic Mathematics (MAT 101) -----	3		

Agronomy

	F	W	S
Basic Mathematics for General Education (MAT 102)			3
Physical Education (PE 141)	½	½	½
Fundamentals of Chemistry (CHM 103)	4		
Electives and courses to complete major		2	3
	<hr/>	<hr/>	<hr/>
	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
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	4	5	2
	<hr/>	<hr/>	<hr/>
	16½	16½	16½

Junior

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		
†Literature			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	3	11	6
	<hr/>	<hr/>	<hr/>
	16	17	17

Senior

Senior Project (AGR 461, 462)	2	2	
Undergraduate Seminar (AGR 463)			2
Crop Farm Operation (AGR 437)		3	
American Civilization (AMC 301, 302, 303)	3	3	3
Biochemistry (CHM 327)	4		
†Literature or Philosophy			3
Electives and courses to complete major	8	9	8
	<hr/>	<hr/>	<hr/>
	17	17	16

Curricular Options**Crops**

The Crops option emphasizes preparation for the plant science field including culture, management, marketing, and related services.

Courses to complete major
Sophomore

AGR 224—Harvesting and Marketing	(4)
AGR 221—Field Crops	(4)

†To be selected from the General Education list.

Agronomy

Junior

- BIO 303—Genetics (3)
AGR 322—Crop Technology (4)
AGB 228—Economic Insect Pests (3)
AE 221—Machinery Applications (2)
AE 227—Tractor Power (2)

Senior

- AGR 331—Seed Production (4)
AGR 421—Crop Diseases (4)
AGR 404—Plant Breeding (3)
AGB 231—Pest Control
Materials (4)

Soils

The Soils option is concerned with studies in scientific soils, soils management, and plant and soil analysis.

Courses to complete major

Sophomore

- MAT 107—Descriptive Statistics.. (3)
AE 132—Surveying Applications.. (2)
BAC 221—General Bacteriology.. (4)

Junior

- SS 333—Soil Conservation (3)
SS 339—Soil Physics (2)
PSC 221—Physical Geology (4)

Senior

- SS 433—Soil Classification..... (4)
SS 431—Advanced Soil
Management (3)
SS 336—Range Management (4)
BOT 322—Plant Physiology (4)

Courses in 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 (3)

Principles and techniques of improving ornamental and agronomic

plants. 2 lectures, 1 three-hour laboratory. Prerequisite: BIO 303

AGR 421 Crop Diseases (4)

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

AGR 437 Crop 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.

Courses in 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.

Soil Science

SS 232 Soil Management (4)

Effect of tillage, drainage, and irrigation practices on soil productivity. 3 lectures, 1 three-hour laboratory. Prerequisite: SS 231

SS 233 Soil Fertility and Fertilizers (4)

Soil fertility and its relation to plant nutrition. Fertilizer materials, production, application and usage. 3 lectures, 1 three-hour laboratory. Prerequisite: SS 221 or 231

SS 333 Soil Conservation (3)

The nature, extent, and causes of soil erosion by wind and water; its effect on civilization; and aims, principles and methods of soil conservation. 2 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 as a means of diagnosing problems related to western

soils. 1 lecture, 1 three-hour laboratory. Prerequisite: CHM 105, 142 or 112, 152

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 339 Soil Physics (2)

Fundamental aspects of soil physics and its application. 1 lecture, 1 three-hour laboratory. Prerequisite: SS 121

SS 431 Advanced Soil Management (3)

Soil and water problems affecting the production of crops. Methods of studying these problems and recent advances in soil and water management. 2 lectures, 1 three-hour laboratory. Prerequisite: SS 232, 233

SS 433 Soil Classification (4)

Genesis, classification, and geographic distribution of soils. Relationship of soils to their physical environment and practical use interpretations of soil surveys. 3 lectures, 1 three-hour laboratory. Prerequisite: SS 221 or 231

ANIMAL SCIENCE DEPARTMENT

Harry B. McLachlin, *Department Head*

Allen C. Christensen

Norman K. Dunn

Homer D. Fausch

Jack T. Gesler

Eugene K. Keating

Mack H. Kennington

Edward A. Lugo, Jr.

Edward A. Nelson

The courses in Animal Science are designed to prepare men and women for careers in the commercial and scientific phases of the animal industry. Emphasis may be placed on business, education, preparation for graduate study, or pre-venterinary medicine. Special science options available to students in this department are described in the school introductory statement.

Location of the college facilities in the middle of California's expansive commercial livestock feeding area provides opportunities for students to obtain specialized and practical training in the animal industry in production, management, feeding, marketing, and processing.

The department maintains over 330 acres of range land and 100 acres of irrigated pasture for livestock care. Livestock includes a purebred herd of Aberdeen-Angus, and commercial feeder herds of Hereford, Aberdeen-Angus, and Shorthorn cattle; the Kellogg herd of registered Arabian horses; purebred Shetland ponies; flocks of purebred Rambouillet, Southdown and Suffolk sheep; a herd of Minnesota No. 1, 2, 3 and crossbred swine; fryer projects and a poultry laying flock. Prominent local breeders, commercial feeders, auctions and commission firms offer opportunities for additional field study.

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

Curriculum in Animal Science

<i>Freshman</i>	<i>F</i>	<i>W</i>	<i>S</i>
Elements of Market Beef (AS 131)	4		
Elements of Swine Production (AS 122)		4	
Elements of Sheep Production (AS 123)			4
Feeds and Feeding (AS 101, 102)	2	3	
Agricultural Engineering (select 2 courses from AE 121, 122, 131)	2		2
Tractors (AE 241)		2	
Basic Biology (BIO 115)			3

Animal Science

	F	W	S
Basic Biology Laboratory (BIO 145)			2
Freshman Composition (ENG 104, 105, 106)	3	3	3
Basic Mathematics (MAT 101)	3		
Basic Mathematics for General Education (MAT 102)		3	
Health Education (PE 107)	2		
Physical Education (PE 141)	½	½	½
*Electives			4
	16½	15½	18½

Sophomore

†Meat Animal Slaughter and Cutting (AS 227)			3
Approved Animal Science Courses	4	4	
Plant Science (Select 1 course from AGR 122, 123, 333)	4		
General Bacteriology (BAC 221)		4	
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
Physiology of Domestic Animals (VS 205)	3		
General Zoology (ZOO 134, 135)	4	4	
Electives	2		
	17½	19½	13½

Junior

Approved Animal Science Courses	4		4
Advanced Livestock Feeding (AS 303)	2		
Animal Breeding (AS 304)	3		
Animal Parasitology and Disease Control (VS 302)		3	
Management Accounting (ABM 324)	4		
American Civilization (AMC 301)			3
Soil Science (SS 221 or 231)		4	
Organic Chemistry (CHM 211)	3		
Organic Chemistry Laboratory (CHM 251)	1		
Biochemistry (CHM 327)			4
Public Speaking (SP 200)			3
General Psychology I (PSY 202)		3	
Electives		5	3
	17	15	17

Senior

Senior Project (AS 461, 462)	2	2	
Undergraduate Seminar (AS 463)			2
Approved Animal Science Courses	4	4	
Animal Nutrition (AS 402)		3	
Economics (Select 1 course from ABM 103, 304, 311)		3	
†Literature		3	
†Literature or Philosophy			3
Agricultural Enterprise Management (ABM 328)	4		
American Civilization (AMC 302, 303)	3		3
Electives	3	2	7
	16	17	15

*CHM 103 is recommended.

†To be selected from the General Education list.

‡Women Animal Science majors will substitute AS 325.

Courses in 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)

Designed for those interested in training to ride and handle horses. Includes grooming, saddling, bridling,

parts of and care of the equipment of horses, riding techniques. 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)

An introductory course to acquaint the student with the field of horse production, breeds and types of horses, feeding, judging, unsoundnesses, diseases. 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.

Animal Science

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 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)

An advanced and detailed course in breeding, mare and stallion selection, conformation and bloodlines, fertility and sterility diagnosis, pregnancy, gestation and foaling management, feeding techniques for stallions and mares, breeding hygiene, breeding problems, records and office procedures. 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)

For students interested in training, principles, and procedures. Includes descriptions and practical experience in basic training procedures, driving on long lines, breaking foals to lead, working on long line, grooming, fitting and teaching horses to show in breeding classes. 2 three-hour laboratories. Prerequisite: AS 329

AS 402 Animal Nutrition (3)

Metabolism of proteins, carbohydrates, fats, minerals, and vitamins. Relationship of proper nutrition to livestock production. 3 lectures. Prerequisite: AS 102, CHM 327

AS 403 Ruminant Nutrition (3)

Implications of recent findings in ruminant nutrition. The physiochemical processes of digestion and absorption. Metabolism and the importance of rumen microflora. Normal metabol-

ism and abnormal metabolic disorders. Modes of action of feed additives. 3 lectures. Prerequisite: AS 402

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.

Animal Science

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.

Course in 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 laboratory.

Courses in 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.

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 231 Poultry Production (4)

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

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

Courses in 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

anatomy of the skeleton, musculature and digestive systems of the horse, cow, sheep, and pig. 1 lecture, 1 three-hour laboratory. Prerequisite: BIO 115

VS 206 Anatomy of Domestic Animals (2)

Laboratory demonstrations and discussions involving the comparative

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

FOODS AND NUTRITION DEPARTMENT

Ramiro C. Dutra, *Department Head*
Cheryl L. Loggins

Margaret Ritchie

The primary objective of the Foods and Nutrition department is to prepare graduates for challenging and rewarding careers as professional dietitians, nutritionists, and food administrators in hospitals, teaching 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 occasional appearance of 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.

Special science options available to students in this department are described in the school introductory statement.

Curriculum in Foods and Nutrition

<i>Freshman</i>	<i>F</i>	<i>W</i>	<i>S</i>
Introduction to Foods (FN 121)	3		
Principles of Accounting (ACC 121, 122, 123)	3	3	3
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 for General Education (MAT 102)			3
Health Education (PE 107)			2

Foods and Nutrition	F	W	S
Physical Education (PE 141)	½	½	½
Fundamentals of Physics (PHY 102)		4	
Electives			4
	16½	17½	17½

Sophomore

Meals (FN 221)	4		
Nutrition (FN 235)		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
General Psychology I (PSY 202)		3	
Public Speaking (SP 200)			3
†Literature			3
Human Anatomy (ZOO 234)		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
†Literature, Philosophy			3
Art		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)			3
Food Equipment and Layout (FN 427)	4		
Food Analysis (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	7
	16	17	17

†To be selected from the General Education list.

Courses in Foods and Nutrition

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.

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 235 Nutrition (3)

Chemical composition of foods and their utilization by living organisms. Fundamental principles and problems of human nutrition. 2 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: FN 121, CHM 327

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 (3)

Relationship between diet and health with particular emphasis on specific dietary requirements associated with certain diseases and conditions. 2 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

Foods and Nutrition

FN 432 Food Analysis (4)

Commercial techniques in chemical analysis of seed and cereal crops, fruit and vegetable crops, meat and meat products, milk and dairy products, egg and poultry products. Chemical and biological deterioration. Detection of adulterants. Legal specifications, packaging, grading and labeling. 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 pre-determined 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)

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

FRUIT INDUSTRIES DEPARTMENT

Albert E. Canham, *Department Head*

Lloyd A. Newell

The instructional program of the Fruit Industries department 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. General education and science courses provide a broad program of liberal and applied education.

Facilities, including 70 acres of commercially-operated orchards, provide students with opportunities to perform and become familiar with cultural practices and procedures.

The citrus and avocado industries in California represent an aggregate of over 300,000 acres with an annual production value exceeding \$300,000,000. Citrus ranks second in the state in tree crop production value, which is approximately 30 per cent of the citrus consumed in the United States.

Employment opportunities for graduates of the Fruit Industries department 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 serving the fruit industries. The demand for graduates far exceeds the supply.

Special science options available to students in this department are described in the school introductory statement.

Curriculum in Fruit Industries

<i>Freshman</i>	<i>F</i>	<i>W</i>	<i>S</i>
Citrus Production (FI 121, 122)	4	4	
Avocado Production (FI 123)			4
Agricultural Engineering (Select 2 courses from AE 121, 122, 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, 106)	3	~ 3	3
General Entomology (ENT 126)	4		
Basic Mathematics (MAT 101)	3		

Fruit Industries

	F	W	S
Basic Mathematics for General Education (MAT 102)		3	
Physical Education (PE 141)	½	½	½
Electives			4
	<hr/>	<hr/>	<hr/>
	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		
Welding (AE 123)			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
	<hr/>	<hr/>	<hr/>
	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
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	5
	<hr/>	<hr/>	<hr/>
	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		
†Literature		3	
†Literature, Philosophy			3
Electives	4	3	4
	<hr/>	<hr/>	<hr/>
	16	17	16

†To be selected from the General Education list.

Courses in 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 (4)

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, 1 three-hour laboratory.

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 private 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

Fruit Industries

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.

INTERNATIONAL AGRICULTURE DEPARTMENT

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.

Each student will specialize by taking 19-21 units in a concentration of Animal Science, Agronomy, Fruit Industries, or Marketing.

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 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.

Students in this program will be encouraged and assisted in seeking summer employment in a foreign agricultural endeavor at the conclusion of the junior year.

Curriculum in International Agriculture

<i>Freshman</i>	F	W	S
World Agricultural Resources (IA 101)	3		
Machinery Applications (AE 221)			2
Tractors (AE 241) —		2	
Basic Biology (BIO 115)	3		
Basic Biology Laboratory (BIO 145)	2		
Freshman Composition (ENG 104, 105) —	3	3	
General Entomology (ENT 126) or			
General Zoology (ZOO 134)			4
Basic Mathematics (MAT 101)		3	
Basic Mathematics for General Education (MAT 102)			3
Health Education (PE 107)	2		
Physical Education (PE 141)	½	½	½
Elementary Spanish (SPN 101, 102, 103)	4	4	4
*Electives and courses to complete major		4	4
	17½	16½	17½

Sophomore

Agrarian Ecology (IA 201)	3		
Agrarian Ecology (IA 202)		3	
Construction Fundamentals (AE 121) or			
Utility Systems (AE 122)	2		
Surveying Fundamentals (AE 131)	2		
Tractor Power (AE 227)		2	
Principles of Economics (EC 201, 202)		3	3
Western Literary Heritage (ENG 111)	3		
Physical Education (PE 141)	½	½	½
General Psychology I (PSY 202)			3
Second-Year Spanish (SPN 201, 202, 203)	3	3	3
Basic Soil Science (SS 231)	4		
*Electives and courses to complete major		3	5
	17½	14½	14½

Junior

International Agencies and Programs (IA 301)	3		
Foreign Agricultural Production Methods (IA 302)		3	
Foreign Agricultural Marketing (IA 303)			3
Foreign Production and Marketing Seminar (IA 371, 372, 373)	1	1	1
American Civilization (AMC 301, 302, 303)	3	3	3
College Chemistry (CHM 104, 105)	3	3	
College Chemistry Laboratory (CHM 141, 142)	1	1	
Management Accounting (ABM 324)			4
History of Latin America (HST 304, 305)		3	3
Public Speaking (SP 200)	3		
*Electives and courses to complete major	4	4	4
	18	18	18

*Students concentrating in Animal Science and Marketing will select at least 21 units with the approval of the adviser. Students concentrating in Agronomy and Fruit Industries will select at least 19 units with the approval of the adviser.

International Agriculture

<i>Senior</i>	<i>F</i>	<i>W</i>	<i>S</i>
Senior Project (IA 461, 462)	2	2	
Undergraduate Seminar (IA 463)			2
Personnel Management (ABM 402)			3
Irrigation (AE 240)	4		
International Trade and Finance (EC 401)	3		
Report Writing (ENG 216) or Technical Writing (ENG 219)	3		
Economic Development (EC 402)		3	
Nutrition (FN 235)		3	
Logic and Semantics (PHL 202)		3	
Inter-American Relations (PLS 411)			3
*Electives and courses to complete major	3	6	6
	15	17	14

Curricular Concentrations

Agronomy

Specialized study is provided in cereal crops, vegetable crops, fertilizers, and pest control.

Animal Science

Specialized study is provided in beef cattle, swine, sheep, poultry, meats, and nutrition.

Fruit Industries

Specialized study is provided in citrus fruit, deciduous fruit, fertilizers, and pest control.

Marketing

Specialized study is provided in credit, storage, transportation, sales, and marketing.

Courses in International Agriculture

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 International Agencies and Programs (3)

Existing international agencies and programs, both governmental and private, as they influence agricultural production or consumption throughout the world. 3 lectures.

*Students concentrating in Animal Science and Marketing will select at least 21 units with the approval of the adviser. Students concentrating in Agronomy and Fruit Industries will select at least 19 units with the approval of the adviser.

International Agriculture

IA 302 Foreign Agricultural Production Methods (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 303 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 critique and defense of senior project research problems. Discussion of trends in foreign agricultural production and marketing. 2 lectures. Prerequisite: Completion of senior project or permission of instructor.

LANDSCAPE ARCHITECTURE DEPARTMENT

Howard O. Boltz, *Department Head*

Richard J. Chylinski
Gerhardt H. Felgemaker
Jere S. French
Sherman W. Griselle
Henry Kordus

David W. Purciel
D. Rodney Tapp
Chester A. Volski
H. Thomas Wilson

The Landscape Architecture curriculum with options in Landscape Architecture and Urban Planning provides a broad range of occupational choices, from positions with the many offices engaged in private practice, to civil service opportunities with city, county, state, and federal governments.

The campus provides a valuable outdoor laboratory for the study of plant material, and design and construction problems. Field trips to the works and offices of landscape architects and planners in the Southern California area provide a wealth of instructional experience.

The curriculum leads to a Bachelor of Science degree in Landscape Architecture, and is accredited by the American Society of Landscape Architects and approved by the California Board of Landscape Architects.

Curriculum in Landscape Architecture

<i>Freshman</i>	<i>F</i>	<i>W</i>	<i>S</i>
Landscape Drafting (LA 144) -----	2		
Theory of Design (LA 121, 142, 143) -----	2	2	2
Fundamentals of Drawing (ART 244) -----			2
Life Science (BIO 110) -----		3	
Fundamentals of Chemistry (CHM 103) -----	4		
Freshman Composition (ENG 104, 105) -----	3	3	
Basic Mathematics (MAT 101) -----	3		
Basic Mathematics for General Education (MAT 102) -----			3
†Literature -----			3
Physical Education (PE 141) -----	½	½	½
Health Education (PE 107) -----		2	
Electives and courses to complete major -----	2	7	7
	<hr/> 16½	<hr/> 17½	<hr/> 17½
 <i>Sophomore</i>			
Basic Landscape Design (LA 227, 228, 229) -----	3	3	3
Perspective (LA 241, 242) -----	2	1	
Delineation (LA 243) -----			2

†To be selected from the General Education list.

Landscape Architecture

	F	W	S
Surveying Fundamentals (AE 131)		2	
Surveying Applications (AE 132)			2
Principles of Economics (EC 201, 202)	3	3	
Physical Education (PE 141)	½	½	½
Fundamentals of Physics (PHY 102)			4
Physical Geology (PSC 221)	4		
Land Planning (UP 222)			3
†Literature or Philosophy			3
Electives and courses to complete major	6	8	
	18½	17½	17½

Junior

Intermediate Landscape Design (LA 324)	4	4	
Landscape Construction Drawing (LA 337)	3		
American Civilization (AMC 301)	3		
Management Accounting (ABM 324)		4	
General Psychology I (PSY 202)		3	
Public Speaking (SP 200)			3
General Soils (SS 221)	4		
Electives and courses to complete major	3	6	12
	17	17	15

Senior

Senior Project (LA 461, 462)	2	2	
Undergraduate Seminar (LA 463)			2
Advanced Landscape Design (LA 434)	4	2	4
History and Literature of Landscape Architecture (LA 424, 425)	3	3	
American Civilization (AMC 302, 303)	3	3	
Electives and courses to complete major	4	5	7
	16	15	13

Curricular Options

Landscape Architecture

The first two years of the curriculum in Landscape Architecture emphasize construction, elementary design, technical and drawing skills, plant materials and science. This background of working with materials, design fundamentals, and art forms a broad base on which the advanced courses build. The curriculum of the last two years enters into progressively more difficult areas of landscape design, construction and planning.

†To be selected from the General Education list.

Courses to complete major

Freshman

LA 145—Landscape Drafting	(2)
OH 131—Basic Horticulture	(4)
OH 233—Plant Materials III	(4)
AE 122—Utility Systems	(2)
BOT 116—Basic Concepts of Taxonomy	(1)

Sophomore

AE 231—Materials and Creative Construction	(3)
OH 231, 232—Plant Materials I, II	(8)

Landscape Architecture

Junior

- LA 324—Intermediate Landscape Design (4)
LA 338, 339—Landscape Construction Drawing (6)
LA 327, 359—Planting Design (5)
LA 348, 349—Mechanics and Strength of Materials (2)

Senior

- OH 336—Native Plant Materials- (3)
PA 333, 334 Turf Management and laboratory (4)
PA 431, 415—Contracts, Specifications and Estimating — (7)

Urban Planning

The student specializing in Urban Planning is provided a program of study and experiences in the many fields of knowledge 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 the needs of people, and the economic, political, and social forces into a satisfactory, effective urban form.

Courses to complete major

Freshman

- UP 155—Urban Planning Graphics (2)

Courses in Landscape Architecture

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

Studies in form, space, color, and materials, and their relation to three-dimensional problems. LA 121: 1 lecture, 1 three-hour laboratory. LA 142, 143: 2 three-hour laboratories.

LA 144, 145 Landscape Drafting (2) (2)

Drafting techniques and standards, progressing from tracings to light-construction working drawings. 2 three-hour laboratories.

- UP 126—Introduction to Urban Planning (3)
ENG 216—Report Writing (3)

Sophomore

- UP 201—Law and Administration (2)
UP 202—Theory and Methodology (2)
UP 224—Presentation Techniques (2)
UP 205, 223—Research and Analysis I, II (5)
UP 221—Municipal Engineering- (3)

Junior

- UP 321—Land Use and Transportation (2)
UP 322—Comprehensive Plan..... (2)
UP 323—Urban Redevelopment - (2)
PLS 401—State and Local Government (3)
EC 301—Public Finance (4)
EC 319—Land Economics (3)
GEO 312—Economic Geography and World Resources (3)

Senior

- UP 465, 466—Professional Practice (4)
PSY 314—Human Relations (3)
SOC 401—Urban Sociology (3)
PLS 314—Public Administration. (3)
SP 230—Forensics Workshop — (1)

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

Landscape Architecture

LA 227, 228, 229 Basic Landscape Design (3) (3) (3)

Fundamental concepts in the analysis and solution of site problems. 1 lecture, 2 three-hour laboratories. Prerequisite: LA 143, 145

LA 241, 242 Perspective (2) (1)

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

LA 243 Delineation (2)

Two-dimensional representation of three-dimensional subject using different media which enable a student to express his ideas visually. 2 three-hour laboratories. Prerequisite: LA 241, ART 244

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: LA 229, 243. Limited to 4 units per quarter.

LA 327, 359 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; LA 229 or 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, LA 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

LA 424, 425 History and Literature of Landscape Architecture (3) (3)

The relationship of religious, economic, and social conditions, topography and climate to the landscape architecture of the major nations at various times and places. The contributions of the literature and landscape designers of note to the field of landscape architecture. 2 lectures, 1 three-hour laboratory.

LA 434 Advanced Landscape Design (10)

The relationship of buildings and building groups to irregular topography and the further long-range growth and development of the land and elements thereon. 1 lecture, 3 three-hour laboratories or 2 three-hour laboratories. Prerequisite: LA 324. Limited to 2 or 4 units per quarter.

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

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

LA 463 Undergraduate Seminar (2)

Methods and developments, ethics, office practices and procedures in the profession. 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.

Courses in Urban Planning

UP 126 Introduction to Urban Planning (3)

A review of the historical determinants of urban growth. Evolution of the modern city. Significant contributions by leading planners, architects, landscape architects. 2 lectures, 1 three-hour laboratory.

UP 154, 155 Urban Planning Graphics I, II (2) (2)

Techniques of graphic presentation in the practice of Urban Planning. Laboratory exercises include the preparation of models, charts and graphs, land use and zoning maps, duplicating techniques, and audio-visual aids. Development of skills in choice and use of particular media. 2 three-hour laboratories.

UP 201 Law and Administration (2)

Review of the historical bases for the control of land development. The modern planning agency. The legal significance of the comprehensive plan. The relationship between public policy, urban planning goals, and legal devices for implementation. 2 lectures.

UP 202 Theory and Methodology (2)

The historical development of urban planning. Review of the utopian concepts in urban development. The logic of the planning process, goal formulation, evaluation of alternatives, cost-benefit analysis. Decision-making theory. Introduction to the urban theorists and the evolving tools, operations research, systems analysis. 2 lectures. Prerequisite: UP 126

UP 205, 223 Research and Analysis I, II (2) (3)

Problems and methods of urban planning research and analysis. Types of data required in planning analysis: information sources, survey techniques, etc. Problems in the selection, collection, validation, projection, and analysis of basic planning data. Review of important social science research studies. 1 lecture, 1 three-hour laboratory; and 1 lecture, 2 three-hour laboratories. Prerequisite: MAT 107 or 204

UP 221 Municipal Engineering (3)

Municipal engineering as related to the planning of the urban community. The historical advances in the supply of services to the urban area. Discussion of the planning, execution, and operation of municipal public works. 2 lectures, 1 three-hour laboratory.

UP 222 Land Planning (3)

Design of subdivisions and the development of urban land. Design of residential, commercial, industrial, and recreational areas of the urban community. Review of historical and recent trends in land planning, and the contributions of leading planners, architects, landscape architects, engineers. 1 lecture, 2 three-hour laboratories.

UP 224 Presentation Techniques (2)

Techniques of oral and graphic presentation of planning information: research data, surveys, analyses, etc. Problems of presentation to public bodies and citizen organizations. Discussion of budget and time limitations and the selection of the appropriate media for presentation. 2 three-hour laboratories. Prerequisite: UP 155

UP 321 Land Use and Transportation (2)

Relationship and interaction between transportation planning and land use planning. Land use analysis and classification systems. Changes in land use patterns generated by transportation facilities, public policies, market forces, alternative plans and programs. Laboratory preparation of a land use plan. 1 lecture, 1 three-hour laboratory. Prerequisite: UP 202

UP 322 Comprehensive Plan (2)

Review of master planning in the United States. The techniques of research, analysis, plan-making effectuation, and maintenance of the comprehensive plan as a part of the concept of the planning process. Formulation of goals and objectives. Design elements of the plan. 1 lecture, 1 three-hour laboratory. Prerequisite: UP 202

Urban Planning

UP 323 Urban Redevelopment (2)

The historical and legal background of urban renewal and redevelopment. The workable program for community development. Problems involved in federal and local, public and private, renewal efforts. Review of a proposal for urban renewal/redevelopment. Discussion of the politics of urban renewal. 1 lecture, 1 three-hour laboratory. Prerequisite: UP 201

UP 431, 432, 433 Urban Planning Laboratory I, II, III (4) (4) (4)

Problems in planning the physical environment of urban areas. The development of precise plans for urban areas. Emphasis on conceptualization,

synthesis and execution through individual creative efforts and group collaboration. Current regional problems utilized in the laboratory. 1 lecture, 3 three-hour laboratories. Prerequisite: Senior standing or permission of instructor.

UP 465, 466 Professional Practice I, II (2) (2)

Review of urban planning office practice of individual students. Discussion of the responsibility of the planner in varying levels of public agency and private consultant employment. To be arranged on an individual basis. Prerequisite: six months of experience (or equivalent) in an approved professional urban planning agency.

ORNAMENTAL HORTICULTURE DEPARTMENT

Oliver A. Batcheller, *Department Head*

Dorval D. Banks

James L. Degen

James M. Griffin

Kenneth K. Kammeyer

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.

Special science options available to students in the department are described in the school introductory statement.

Ornamental Horticulture

Curriculum in Ornamental Horticulture

	F	W	S
<i>Freshman</i>			
Basic Horticultural Skills (OH 131) -----	4		
Plant Materials II (OH 232) -----		4	
Nursery Operations (OH 121) -----			4
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 for General Education (MAT 102) -----			3
Physical Education (PE 141) -----	½	½	½
Health Education (PE 107) -----	2		
Electives -----	1		
	17½	16½	16½
<i>Sophomore</i>			
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) -----			3
Public Speaking (SP 200) -----	3		
Physical Education (PE 141) -----	½	½	½
†Literature -----			3
Basic Soil Science (SS 231) -----		4	
	15½	17½	16½
<i>Junior</i>			
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	
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
General Psychology I (PSY 202) -----		3	
Soil Fertility and Fertilizers (SS 233) -----			4
Electives -----	4		1
	16	17	16

†To be selected from the General Education list.

Ornamental Horticulture

<i>Senior</i>	<i>F</i>	<i>W</i>	<i>S</i>
Senior Project (OH 461, 462)	2	2	
Undergraduate Seminar (OH 463)			2
Advertising and Promotion of Agricultural Products (ABM 225)		3	
American Civilization (AMC 301, 302, 303)	3	3	3
Genetics (BIO 303)			3
Biochemistry (CHM 327)		4	
Planting Design (LA 327)	3		
Turf Management (PA 333)			3
Turf Management Laboratory (PA 334)			1
Ethics (PHL 204)	3		
Electives	6	4	4
	<hr/>	<hr/>	<hr/>
	17	16	16

Curriculum in Park Administration

<i>Freshman</i>	<i>F</i>	<i>W</i>	<i>S</i>
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)	3		
Basic Mathematics for General Education (MAT 102)		3	
Landscape Drafting (LA 144)	2		
Health Education (PE 107)			2
Physical Education (PE 141)	½	½	½
Ethics (PHL 204)		3	
Electives	2		2
	<hr/>	<hr/>	<hr/>
	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	
Public Speaking (SP 200)			3
Basic Soil Science (SS 231)		4	
Electives	-2		3
	<hr/>	<hr/>	<hr/>
	16½	16½	16½

†To be selected from the General Education list.

Park Administration

<i>Junior</i>	F	W	S
Aboriculture (PA 328)		3	
Management Accounting (ABM 324)		4	
Automatic Irrigation Systems (AE 321)			4
Business Law (BUS 301)		3	
College Chemistry (CHM 104, 105)	3	3	
College Chemistry Laboratory (CHM 141, 142)	1	1	
American Civilization (AMC 301, 302, 303)	3	3	3
Planting Design (LA 327)	3		
Public Administration (PLS 314)			3
Plant Pathology (PTH 223)	4		
Native Plant Materials (OH 336)			3
Soil Fertility and Fertilizers (SS 233)			4
†Literature	3		
	17	17	17
<i>Senior</i>			
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

Courses in 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. 3 lectures, 1 three-hour laboratory. 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

†To be selected from the General Education list.

OH 323 Greenhouse Operation (4)

The operation and management of forcing structures. Growing of commercial 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.

Courses in 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 admin-

Related Agriculture

istrator 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.

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)

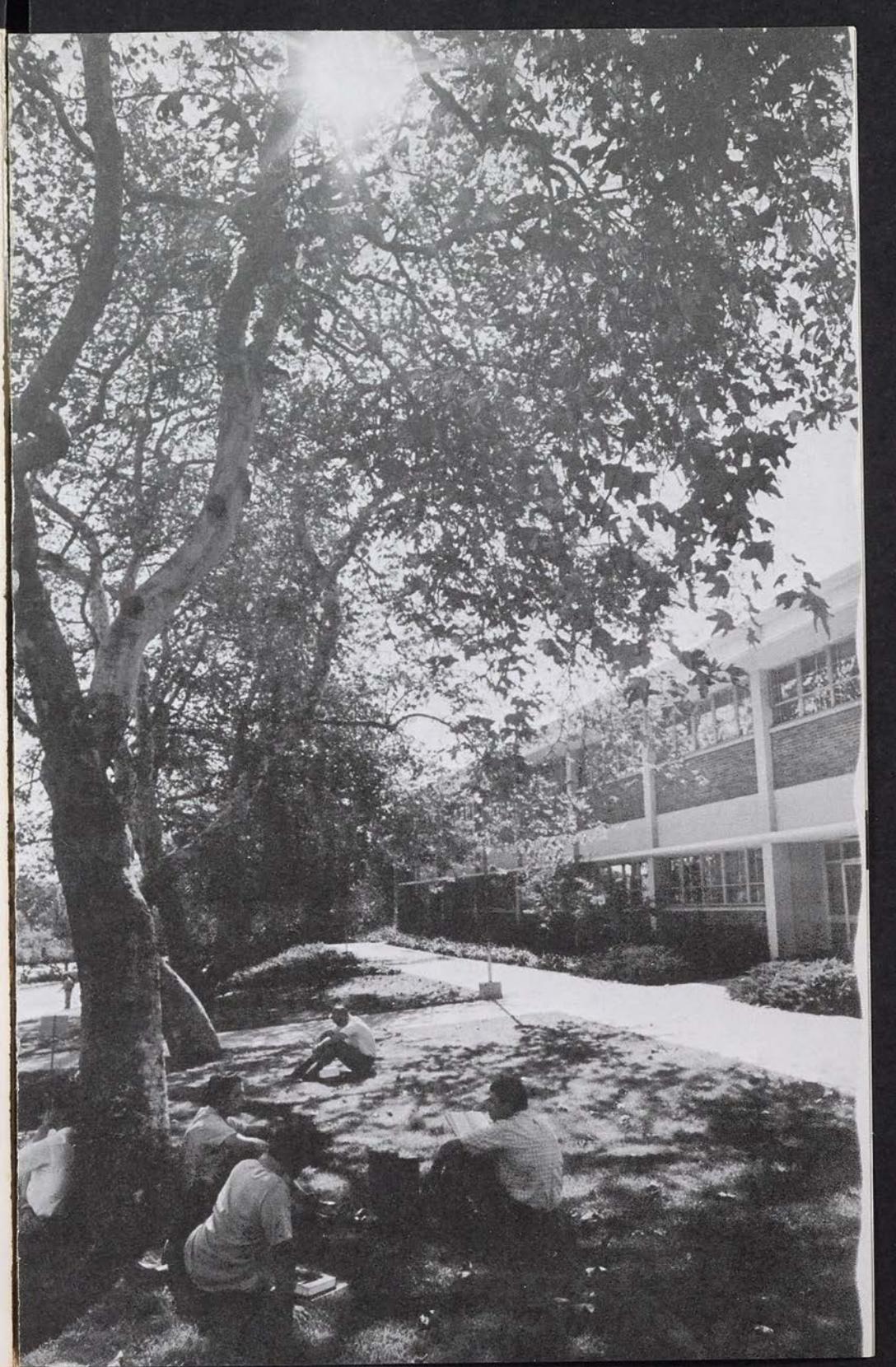
Individual or group investigation, research, studies, or surveys of selected problems. Total credit limited to 4 units, with a maximum of 2 units per quarter.

AG 521 Curriculum and Methods in Agriculture (3)

Survey methods, principles and practices in determining course objectives, content and teaching calendar. Methods, devices and materials particularly adapted for use by the beginning teacher in general agriculture classes on secondary level. 3 lectures.

AG 590 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.



SPEECH-DRAMA

STUDENT UNION



SCHOOL OF ARTS

ECONOMICS . . . 143

LANGUAGE ARTS . . . 147

MUSIC AND ART . . . 157

PHYSICAL EDUCATION . . . 162

SOCIAL SCIENCES . . . 169

CURRICULA IN BUSINESS ADMINISTRATION . . . 179

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ATS

SCHOOL OF ARTS

ECONOMICS . . . 143
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MUSIC AND ART . . . 157
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SOCIAL STUDIES . . . 169

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ATS

SCHOOL OF ARTS

Albert J. Aschenbrenner, *Dean*

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

Bachelor of Science degree programs are offered in a wide range of liberal arts and social science areas, including majors in Economics, Language Arts, Physical Education, and Social Sciences. In addition to these traditional curricula, a strong program leading to the Bachelor of Science in Business Administration is offered with majors in Accountancy; Business Management; Data Processing; Finance, Insurance, and Real Estate; and Marketing.

An important 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.

Still another function of this school is to offer a broad and varied program of teacher preparation. Teacher credential programs are available with both elementary and secondary specializations. Majors and minors for credentials are offered in Business Management, Language Arts, Physical Education, and Social Sciences.

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.

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 in addition to offering teaching credential minors. The Language Arts department, moreover, fosters college-wide student participation in several areas. The program of courses in journalism and speech-drama offers enrichment in breadth to the Language Arts major; student publications advised by the journalism faculty currently include a newspaper, *Poly Post*, a magazine, *Opus*, and a yearbook, *Madre Tierra*; dramatic productions in the campus theater and competition in well organized programs of speech and forensics pro-

School of Arts

vide for student participation beyond classroom instruction. Within the Physical Education department intramural and intercollegiate athletics for both men and women include football, basketball, baseball, soccer, track and field, tennis, wrestling, swimming, and other sports.

Active student organizations with faculty advisers in each major area further provide films, visiting speakers and other professional activities which complement the instructional program.

These co-curricular organizations include: California Association for Health, Physical Education and Recreation; Cal Poly Accountants; Economics Club; Marketing Club; Pi Gamma Mu social science honorary society; Press Club; Social Workers Club; Sociant (for sociology and anthropology students); Society for the Advancement of Management; Women's Recreation Association; and other organizations.

ECONOMICS DEPARTMENT

George T. Galbreath, *Department Head*

Gertrude C. Boland
Robert T. Bray
Franklin Y. H. Ho
Ralph B. Hutchinson
David J. Park

Milton M. Shapiro
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, develop vocational proficiencies, and 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.

Economics

Curriculum in Economics

<i>Freshman</i>	<i>F</i>	<i>W</i>	<i>S</i>
Principles of Economics (EC 201, 202, 203)	3	3	3
Principles of Accounting (ACC 121, 122, 123)	3	3	3
Introduction to Mathematical Analysis (MAT 108, 109)	3	3	3
Freshman Composition (ENG 104, 105, 106)	3	3	3
†Natural Sciences	4	3	4
Health Education (PE 107)	2		
Physical Education (PE 141)	½	½	½
Electives	1	1	1
	16½	16½	17½
<i>Sophomore</i>			
Price and Income Analysis (EC 311)	5		
Money and Banking (EC 308)		3	
Economics of Capital Markets (EC 309)			3
Introduction to Mathematical Analysis (MAT 204)	3		
Introduction to Probability (MAT 123)	3		
Automatic Programming for Digital Computers (MAT 113)		1	
Mathematical Statistics I, II (MAT 311, 322)		3	3
Report Writing (ENG 216)		3	
General Psychology I (PSY 202)			3
Physical Education (PE 141)	½	½	½
†Social Sciences	3	3	3
Electives	2	3	4
	16½	16½	16½
<i>Junior</i>			
Quantitative Economic Methods (EC 321)	5		
Economic Programming (EC 322)		5	
Economic Conditions Analysis (EC 323)			3
Public Finance (EC 301)		4	
Business and Government (EC 302)			3
American Civilization (AMC 301, 302, 303)	3	3	3
†Natural Sciences			4
Public Speaking (SP 200)	3		
Electives	5	5	4
	16	17	17
<i>Senior</i>			
Senior Project (EC 461, 462)	2	2	
Undergraduate Seminar (EC 463)			2
International Trade and Finance (EC 401)	3		
Economic Development (EC 402)		3	
Comparative Economic Systems (EC 403)			3
Labor Economics (EC 414)	3		
Managerial Economics (EC 413)		3	
†Literature	3		
†Literature, Philosophy, Art or Music		3	3
Electives	5	5	8
	16	16	16

†To be selected from the General Education list.

Courses in Economics

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. 3 lectures.

EC 205 Consumer Economics (3)

Principles of personal finance. The basic economics of personal money management; including budgeting, borrowing, spending, saving, investing, and insuring. 3 lectures. Prerequisite: EC 202

EC 213 Economic Problems (3)

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

EC 231 Development of Economic Doctrine (3)

The development of economic ideas or doctrines from the early Greek writers through the Classical and Neo-Classical schools to the present. 3 lectures. 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 lectures. Prerequisite: EC 202

EC 302 Business and Government (3)

Economic significance of controls placed by government upon business; divergent issues arising from present relations of government to business. 3 lectures. Prerequisite: EC 202

EC 303 American Industry (3)

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. 3 lectures. Prerequisite: EC 201

EC 308 Money and Banking (3)

Relation of money and banking to the general economy; interrelationships between money and banking and production and distribution. 3 lectures. Prerequisite: EC 202

EC 309 Economics of Capital Markets (3)

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. 3 lectures. Prerequisite: EC 202, 308

EC 311 Price and Income Analysis (5)

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. 5 lectures. Prerequisite: EC 203

EC 319 Land Economics (3)

Economic principles underlying utilization and conservation of land and natural resources. Economics of urbanization; forces of demand for urban land; factors of supply; factors affecting the location of industries and other enterprises; city growth and structure. Problems of rural and urban land-use and development. 3 lectures. Prerequisite: EC 202

EC 321 Quantitative Economic Methods (5)

Introduction to quantitative model building, estimation, verification, and prediction of economic variables. 5 lectures. Prerequisite: EC 311, MAT 204 or equivalent.

Economics

EC 322 Economic Programming (5)

Optimization analysis and programming techniques, including various methods of linear programming, integer programming, quadratic programming, and dynamic programming. 5 lectures. Prerequisite: EC 202, MAT 204 or equivalent, or permission of instructor.

EC 323 Economic Conditions Analysis (3)

Techniques and procedures of statistical analysis of macroeconomic and microeconomic conditions. 3 lectures. Prerequisite: EC 321 or equivalent.

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 (3)

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. 3 lectures. Prerequisite: EC 202

EC 402 Economic Development (3)

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. 3 lectures. Prerequisite: EC 203 or 401, or permission of instructor.

EC 403 Comparative Economic Systems (3)

Examination of alternative economic organizations, ranging from free enterprise to fully planned economies. 3 lectures. Prerequisite: EC 202

EC 413 Managerial Economics (3)

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. 3 lectures. Prerequisite: EC 202

EC 414 Labor Economics (3)

Economic analysis of the facts and forces in wage determination. Economic importance of access to jobs, unemployment insurance, governmental policy, and union functions, such as health, housing and education. 3 lectures. Prerequisite: EC 202

EC 415 Labor Problems and Practices (3)

Nature, instrumentalities and structure of collective bargaining emphasizing three critical areas: labor management laws, grievance and arbitration procedures, and trends in collective bargaining. 3 lectures. Prerequisite: EC 414

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 590 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.

LANGUAGE ARTS DEPARTMENT

C. Edwin Harwood, *Department Head*

Virginia H. Adair
 Samuel I. Bellman
 Sydney R. Bobb
 John R. Butterworth
 Alexander H. Chorney
 David A. Church
 Leonore H. Ewert
 Ross F. Figgins
 Milton L. French
 John F. Fulbeck
 Ruth M. Harmer
 Russell V. Lapp
 Jacqueline S. Lindauer
 Ralph C. McCormic
 Lachlan P. MacDonald

Paul M. Newman
 Neal J. Osborn
 Frances H. Pollock
 William D. Schenck
 Alfred E. Sheldon, Jr.
 Sidney Shrager
 Ben Siegel
 J. Robert Stahley
 Halsey P. Taylor
 Frank A. Tennant
 Benjamin F. Thompson
 Ingeborg O. Urcia
 Theodore N. Weissbuch
 Walter R. Whitney

The Language Arts department offers a major with three options—Journalism, Literature-Language, and Speech. Also, a variety of courses in English, speech, journalism, drama, and foreign languages are available to all students, as well as appropriate courses to meet the general education requirements.

The score on the ACT entrance examination is used in the assignment of students to the appropriate class in freshman composition. Students who have a deficiency will be assigned to English 4, a preparatory course without credit toward a degree. A passing grade in this course entitles the student to advance to Freshman Composition.

The English 104-105 course sequence is required of all students except those who enter with credit in freshman composition. In addition, one of the following is required: English 106, 216, 218, 219, or Speech 200 or 300.

Curriculum in Language Arts

<i>Freshman</i>	<i>F</i>	<i>W</i>	<i>S</i>
Freshman Composition (ENG 104, 105)	3	3	
Language Communication (ENG 107)			3
†Natural Sciences	3	6	6
Physical Education (PE 141)	½	½	½
†Mathematics	3		
Fundamentals of Journalism (JOU 101)	3		
Western Literary Heritage (ENG 111)			3

†To be selected from the General Education list.

Language Arts

	F	W	S
Health Education (PE 107)			2
History of Civilization (HST 101 or 102 or 103)	5		
The Visual Arts or Foundations of Modern Art (ART 110 or 312)		3	
Electives and courses to complete major		3	2
	17½	15½	16½
<i>Sophomore</i>			
Physical Education (PE 141)	½	½	½
Survey of American Literature (ENG 213)			3
History and Principles of Journalism (JOU 203)	3		
Survey of British Literature (ENG 209)			3
Public Speaking (SP 200)		3	
Modern Theater Practice (DR 203)	3		
General Psychology I (PSY 202)			3
†Philosophy			3
Principles of Economics (EC 201, 202)	3	3	
†Music			1
Electives and courses to complete major	7	10	4
	16½	16½	17½
<i>Junior</i>			
Advanced Composition (ENG 302 or 303)	3		
American Civilization (AMC 301, 302, 303)	3	3	3
Speech Composition (SP 311)	3		
Semantics (ENG 420)	3		
Electives and courses to complete major	5	14	13
	17	17	16
<i>Senior</i>			
Senior Project (LAN 461, 462)	2	2	
Undergraduate Seminar (LAN 463)			2
Shakespeare I (ENG 403)		3	
Electives and courses to complete major	14	11	14
	16	16	16

Curricular Options

Journalism

The Journalism option is designed to prepare students for employment in such areas of journalism as newspapers, technical publications and house organs, magazines, and public relations.

Courses to complete major

Freshman

JOU 131—Elementary
Photography (3)

Sophomore

JOU 202—Reporting (3)
JOU 206—Techniques of Printing (3)
JOU 251—Practice Journalism (2)

Junior

JOU 304—Law of the Press (3)
JOU 305—Editing (3)
JOU 306—Sports Reporting (2)
JOU 308—Business and Labor
Reporting (2)
JOU 309—Government, Courts,
and Law Reporting (2)
JOU 310—Editorial Writing (2)

†To be selected from the General Education list.

Senior

- JOU 311—Business and Industrial Journalism (3)
 JOU 401—Ethics (3)
 JOU 403—Community Newspaper Management (3)
 JOU 312—Publicity and News Bureau Operations (3)

Literature-Language

The Literature-Language option is designed to prepare students for elementary and secondary school teaching, and provides training for a career in technical writing.

Courses to complete major**Freshman**

- ENG 110—The Bible as Literature (3)

Sophomore

- ENG 207, 208—Survey of British Literature (6)
 ENG 211, 212—Survey of American Literature (6)

Junior

- ENG 305—British Novel (3)
 ENG 306—Modern Novel (3)
 ENG 307—English Drama to 1890 (3)
 ENG 308—Modern Drama (3)
 ENG 309—The English Poem (3)
 ENG 310—Modern British and American Poetry (3)

Senior

- ENG 401—Chaucer (3)
 ENG 408—Development of Modern English (3)

Courses in 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 104 Freshman Composition (3)

The fundamentals of English usage. Frequent writing of short papers, chiefly expository. Readings. 3 lectures. Prerequisite: Satisfactory score in placement examination or ENG 4

Speech

The Speech option prepares students to teach speech and drama at the secondary level and includes (1) a teaching option in speech within the Language Arts major and (2) a teaching minor in drama. The student is trained in the methods and techniques of oral interpretation, forensics, and the organization, direction, and staging of theatrical performances.

Courses to complete major**Sophomore**

- SP 102—Voice and Diction (3)
 SP 203—Oral Interpretation (3)
 DR 231—Action Theory and Technique (3)
 SP 230—Forensics Workshop (2)

Junior

- SP 300—Advanced Public Speaking (3)
 SP 304—Argumentation (3)
 SP 307—Conference Techniques and Group Discussion (3)
 SP 302—Advanced Voice and Diction (3)

Senior

- SP 403—Speech Techniques in Society (3)
 SP 443—Advanced Projects in Oral Interpretation (3)
 SP 444—Advanced Projects in Forensics (3)
 SP 416—Rhetorical Theory (3)

ENG 105 Freshman Composition (3)

Frequent expository writing, with stress on organization. Technique of the term paper. Readings in mass media. 3 lectures. Prerequisite: ENG 104

ENG 106 Freshman Composition (3)

Frequent papers, primarily critical and evaluative. Readings in four literary types. 3 lectures. Prerequisite: ENG 105

English

ENG 107 Language Communication (3)

For Language Arts majors and other recommended students in place of ENG 106. Readings in contemporary fiction, drama, and poetry. 3 lectures. Prerequisite: ENG 105

ENG 110 The Bible as Literature (3)

Old and New Testament narrative, poetry, and wisdom literature in the Revised Standard Version. 3 lectures. Prerequisite: ENG 104

ENG 111 Western Literary Heritage I (3)

Readings in classical, medieval, and Renaissance literature to the rise of science, with emphasis on the history of ideas. 3 lectures. Prerequisite: ENG 105

ENG 112 Western Literary Heritage II (3)

Readings in significant world literature from Dante to modern times, 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 207, 208, 209 Survey of British Literature (3) (3) (3)

British literature, as exemplifying 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 resumes. 3 lectures. Prerequisite: ENG 105

ENG 219 Technical Writing (2)

Principles and practices of technical writing. Preparation, organization, and communication of technical data; preparation of training materials. 2 lectures. Prerequisite: ENG 105

ENG 302 Advanced Composition—Fiction (3)

Analysis of the short-story form. Practice in applying the techniques of the short narrative. 3 lectures. Prerequisite: 3 units of sophomore 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: 3 units of sophomore literature.

ENG 304 The Development of the Short-Story (3)

Critical analysis; history and evaluation of form. 3 lectures. Prerequisite: 3 units of sophomore literature.

ENG 305 British Novel (3)

Development of the novel in England from 1740-1900 with emphasis on its relationship to literary, social, and political backgrounds. Richardson to Conrad. 3 lectures. Prerequisite: 3 units of sophomore literature.

ENG 306 Modern Novel (3)

Development of the novel since 1880, with emphasis on the novel in America and on the continent. 3 lectures. Prerequisite: 3 units of sophomore 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 sophomore literature.

ENG 308 Modern Drama (3)

Continental, British, and American dramatic trends from the rise of Naturalism. 3 lectures. Prerequisite: 3 units of sophomore literature.

ENG 309 The English Poem (3)

Critical analysis and evaluation of genres and single works, other than dramatic. 3 lectures. Prerequisite: 3 units of sophomore literature.

ENG 310 Modern British and American Poetry (3)

Advanced analysis of language and forms of poetry; application of poetic techniques in original works. 3 lectures. Prerequisite: 3 units of sophomore literature.

ENG 401 Chaucer (3)

Study of Chaucer's principal works, with special emphasis on *The Canterbury Tales* and *Troilus and Criseyde*. Consideration of historical influence and major contemporaries. 3 lectures. Prerequisite: 3 units of sophomore literature.

ENG 403 Shakespeare I (3)

Introduction to the plays from *Henry VI* through *Hamlet*. 3 lectures. Prerequisite: 3 units of sophomore literature.

ENG 404 Shakespeare II (3)

Intensive reading of plays. Study of Shakespeare's plays in the school curriculum and methods of presenting them to young people for enjoyment and appreciation. 3 lectures. Prerequisite: 3 units of sophomore 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 sophomore 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 sophomore literature.

ENG 408 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. Required of departmental teaching candidates. 3 lectures. Prerequisite: 3 units of sophomore literature.

ENG 409 Grammars of English (3)

The various systems of describing the English language. Not designed for those wishing to correct their deficiencies in usage. 3 lectures. Prerequisite: 3 units of sophomore literature.

ENG 420 Semantics (3)

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 sophomore literature.

Language Arts/Languages

Courses in Language Arts

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 sophomore 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 three-hour laboratory.

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.

Courses in French

FR 101, 102, 103 First-year French (4) (4) (4)

Designed to familiarize the beginner with the essentials of the spoken and written language. Fundamentals of grammar; reading of easy texts. 4 lectures.

Courses in Spanish

SPN 101, 102, 103 First-year Spanish (4) (4) (4)

Designed to familiarize the beginner with the essentials of the spoken and written language. Fundamentals of grammar; reading of easy texts. 4 lectures.

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 521 Curriculum and Methods in Language Arts (3)

Secondary school curriculum, methods, and materials in language-literature, speech-drama, and journalism. Separate classes in each sub-area if enrollments warrant. Includes school observation. 3 lecture-discussions. Prerequisite: Graduate standing and admission to teacher preparation program.

LAN 590 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 according to the nature of its content. 1, 2, or 3 lecture-discussions. Prerequisite: Graduate standing and instructor's approval. May be repeated for a total of 9 units.

FR 201, 202, 203 Second-year French (3) (3) (3)

Review of grammar; readings of moderate difficulty; conversation. 3 lectures. Prerequisite: FR 103 or 2 years of high school French.

SPN 201, 202, 203 Second-year Spanish (3) (3) (3)

Review of grammar; readings of moderate difficulty; conversation. 3 lectures. Prerequisite: SPN 103 or 2 years of high school Spanish.

Courses in Journalism

JOU 101 Fundamentals of Journalism (3)

Introduction to basic news sources and documents; preliminary study of news writing techniques; journalism basics. 2 lectures, 1 two-hour activity period. Prerequisite: Satisfactory score on placement examination or ENG 4

JOU 131 Elementary 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.

JOU 202 Reporting (3)

Covering and writing the news story; study of journalistic style. 3 lectures. Prerequisite: JOU 101

JOU 203 History and Principles of Journalism (3)

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

JOU 206 Techniques of Printing (3)

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

JOU 231 Advanced Photography (3)

Advanced work in photographic techniques, including color photography and portrait work. 1 lecture, 2 three-hour laboratories. Prerequisite: JOU 131 or demonstrated knowledge of basic photography.

JOU 251 Practice Journalism (1-2)

Production course for beginning staff members of college publications and student news bureau. 1 or 2 laboratories. Prerequisite: Permission of the instructor and satisfactory score in placement examination or ENG 4. Total credit limited to 6 units.

JOU 303 Radio and Television News Writing (2)

Techniques of preparing news for radio and television; news gathering, writing and editing; operation of radio and television newsrooms; script format, sound and film reporting, interviewing. 2 lectures. Prerequisite: JOU 131, 202, 305

JOU 304 Law of the Press (3)

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

JOU 305 Editing (3)

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

JOU 306 Sports Reporting (2)

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

JOU 307 Specialized Reporting (2)

Study and training in gathering and writing specialized stories such as entertainment, books, travel, home, and food. 2 lectures. Prerequisite: JOU 202

JOU 308 Business and Labor Reporting (2)

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

JOU 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: JOU 202

JOU 310 Editorial Writing (2)

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

Speech

JOU 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: JOU 206

JOU 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: JOU 202

JOU 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

JOU 351 Advanced Journalism Practice (1-2)

Production course for experienced staff members of college publications or student news bureau. 1 or 2 laboratories. Prerequisite: Permission of the instructor. Total credit limited to 6 units.

JOU 401 Ethics (3)

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

JOU 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: JOU 101

JOU 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.

JOU 451 Editorial Practice (1-2)

Production course for students holding editorial or equivalent positions on college publications or student news bureau. 1 or 2 laboratories. Prerequisite: Permission of instructor. Total credit limited to 6 units.

Courses in 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 writ-

ten materials. Analysis of literary style as applied to oral communication. Exercises in microphone technique and public performance. 3 lectures.

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 professional 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. Prerequisite: SP 102

SP 304 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 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 311 Speech Composition (3)

Stylistic and organizational skills of public address, written speeches, speech vocabulary, organization, analysis of current public addresses, and speeches

Courses in Drama

DR 131 Technical Production I (3)

Principles of backstage organization, scenery construction, and property construction. Crew work on current productions. 1 lecture, 2 laboratories.

DR 132 Technical Production II (3)

Principles and technique of stage lighting, elementary scene design, scenery painting, and sound. Crew work

for special occasions. 3 lectures. Prerequisite: SP 200

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.

on current productions. 1 lecture, 2 laboratories.

DR 143 Makeup (1)

Theory and practice in theatrical makeup, including materials, base and lining techniques, chiaroscuro, old age and character makeup, construction of life masks, construction and application of appliances. 1 three-hour laboratory.

Drama

DR 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.

DR 231 Acting Theory and Technique (3)

Theory and practice of acting with special attention to body movement, pantomime, improvisation, characterization. 2 lectures, 1 laboratory.

DR 244 Rehearsal and Performance (1-2)

Practical experience by participation in theatrical production. Technical crews, theater management, and acting. 1 or 2 laboratories. May be repeated for not more than 6 units.

DR 301 Playwriting and Dramatic Structure (3)

Intensive study of dramatic structure as applied to theater practice. Theory and practice in playwriting, and criticism. 3 lectures.

DR 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 laboratory. Prerequisite: DR 231

DR 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 laboratory. Prerequisite: DR 132 or permission of instructor.

DR 334 Technique of Directing (3)

Theory and practice in play selection, analysis and direction; emphasis on composition, movement, coaching, ground plans, style. 2 lectures, 1 laboratory. Prerequisite: DR 231

DR 335 Play Production (1-3)

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 laboratory.

DR 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 laboratory.

DR 411 History of the Theater (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.

DR 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 laboratories. May be repeated for not more than 6 units.

MUSIC AND ART DEPARTMENT

Lowell K. Weeks, *Chairman*

Philip R. Browne
Charles A. Coulter

Diane Divelbess
Walter W. Glaser

Courses in the Music and Art department are designed to give students the opportunity to participate in college musical organizations, to further their proficiency in vocal and instrumental performance, and to provide instruction in art and audio-visual techniques.

Students interested in music are given a broad insight into the general field through courses in basic skills, theory, appreciation, and history. Elementary and secondary teacher credential candidates may select a music minor. Department advisers must be consulted before the student is officially enrolled in the music minor.

Courses in art are provided for teacher preparation and to provide all students an opportunity to develop their talents and aesthetic appreciation.

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.

Courses in Music

MU 101 Basic Music Skills (3)

Introduction of music skills basic to the comfortable participation in any music activity. Subject matter includes singing, elementary theory, playing keyboard and chording instruments, listening, and creating music. 3 lectures.

MU 111, 112, 113 Class

Piano (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 147 Brass Choir (1)

Open to qualified brass players capable of advanced performance. Rehearsal and performance of small brass ensemble groups for public performance. Literature includes brass sextets, etc. 1 activity period. Total credit limited to 4 units.

MU 148 Woodwind Choir (1)

Open to qualified players of woodwind instruments capable of advanced performance. Rehearsal and preparation of woodwind ensemble groups for public performance. Literature in-

Music

cludes woodwind quintets, etc. 1 activity period. Total credit limited to 4 units.

MU 149 String Choir (1)

Open to qualified string players capable of advanced performance. Rehearsal and preparation of small string ensemble groups for public performance. Literature includes string quartets, etc. 1 activity period. Total credit limited to 4 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 162 Men's Glee Club (1)

Choral vocal training, study and performance of concert literature.

Membership open to all men students. Quartets and soloists selected from this group. 1 activity period. Total credit limited to 6 units.

MU 163 Women's Glee Club (1)

Choral vocal training, study and performance of concert literature. Membership open to all women students. Small groups and soloists selected from this group. 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 101 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 Music Appreciation (2)

Introduction to the appreciation of music. Physical aspects of musical instruments and ensembles. The aesthetic aspects of basic forms and styles. Lectures, recordings, films and demonstrations. 2 lectures.

MU 205 Music Appreciation (2)

An appreciation of music through the study of great composers and their music: baroque, classical and romantic periods. Lectures, recordings, and films. 2 lectures. Prerequisite: MU 204

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.

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 Class Voice (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 306 Music Appreciation (2)

A study in the appreciation of 20th century music. Famous composers and styles of contemporary music. Recordings, films and lectures. 2 lectures. Prerequisite: MU 204

MU 307 Conducting (2)

Elements of baton technique and development of basic skills in conducting with instrumental and vocal groups. 2 lectures. May be repeated for a maximum of 4 units.

MU 310 History of Jazz (2)

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. 2 lectures.

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 205 or 306

MU 431 Theory of Instrumental Instruction (1)

Class instruction in technique and repertoire for advanced students of orchestral and band instruments. 1 activity period. Prerequisite: Consent of instructor.

MU 437 Theory of Voice Instruction (1)

Class instruction in advanced techniques and materials. 1 activity period. Prerequisite: Consent of instructor.

Courses in 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. Materials involved in elementary expression in art media, emphasizing drawing and graphic work. Selecting, organizing, guiding, and evaluating individual and group activities. 1 lecture, 2 two-hour laboratories.

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 laboratories.

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 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 240 Lettering and Layout (2)

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. 2 two-hour laboratories.

ART 241 Graphic Design (3)

Methods and techniques of graphic design in two-dimensional media. Projects in design. 1 lecture, 2 two-hour laboratories.

ART 244 Fundamentals of Drawing (1-2)

Analysis and practice in functional drawing, basic design, and study of form. Development of individual techniques. Pursuit of individual projects to suit abilities and interests of students. 1 or 2 two-hour laboratories. May be repeated for a total of 3 units.

ART 249 Watercolor Painting (2)

Methods and techniques with watercolor. Outdoor sketching and studio projects. 2 two-hour laboratories.

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 339 Advanced Design (3)

Theory and application of aesthetic elements and principles and their relationships to human needs. Projects involving two and three dimensional design for specific functions. 3 two-hour laboratories. Prerequisite: ART 134 or 135 or LA 143 or permission of instructor.

ART 345 Intermediate Drawing (1-2)

The development of method and technique in figurative and perspective drawing. Emphasis on the individual solution of problems in compositions. 1 or 2 two-hour laboratories. 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 Watercolor Painting (3)

Group and individual projects requiring solution in terms of estab-

lished art principles and applied art theory. Traditional and experimental approach with the emphasis on individual development. 3 two-hour laboratories. Prerequisite: ART 134, 345 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 laboratories. Prerequisite: ART 345. May be repeated for a total of 3 units.

Courses in 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 (3)

Theory and practice of educational television with emphasis on practical experience in the various aspects of

production; planning, writing, graphics, directing, and studio operations. 1 lecture, 2 two-hour laboratories. May be repeated for a total of 9 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 laboratories.

PHYSICAL EDUCATION DEPARTMENT

Frank D. Lansford, *Department Head*

V. Barney Anooshian
 Gail A. Bleiweiss
 Kenneth H. Cochran
 Raymond C. Daugherty
 Annemarie J. Davis
 Otto F. Gasser
 Donald L. Halderman
 Robert F. Hand
 Leon S. Jackson

John L. Johnson
 Dorothy L. Kiefer
 John H. Scolinos
 Robert B. Stull
 Magnus Syverson
 Jessie I. Totten
 Donald E. Warhurst
 Charles D. Wilkinson

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 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

<i>Freshman</i>	<i>F</i>	<i>W</i>	<i>S</i>
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
Electives and courses to complete major	4	3	3
	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	

†To be selected from the General Education list.

Physical Education

	F	W	S
Human Physiology (ZOO 235)			4
Physical Education (PE 141)	½	½	½
General Psychology I (PSY 202)			3
Intramural Sports (PE 232)		3	
Electives and courses to complete major	4	3	6
	16½	16½	16½
<i>Junior</i>			
American Civilization (AMC 301, 302, 303)	3	3	3
Introduction to Dance (PE 334)	3		
Health Science (PE 313)			3
Direction of Physical Education Activity (PE 341)	1		
*Individual Sports Analysis (PE 324) (W)	3		
*Basketball and Volleyball Theory (PE 325) (W)		3	
*Turf Management (PA 333) (M)	3		
*Officiating (PE 337 or 338 or 339) (M)		2	
Electives and courses to complete major (M)	7	12	11
Electives and courses to complete major (W)	7	11	11
	17	17	17
<i>Senior</i>			
Senior Project (PE 461, 462)	2	2	
Undergraduate Seminar (PE 463)			2
Adaptive Physical Education (PE 406)			4
*Minor Sports Theory (PE 441, 442, 443) (M)	1	1	1
*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)	13	10	9
Electives and courses to complete major (W)	12	12	8
	16	16	16

Curricular Options

Physical Education

This option emphasizes the skills and knowledge required for the Standard Teaching Credential with Secondary Specialization.

- PE 342, 343—Direction of Physical Education Activity (2)
 *PE 326—Field Sports Theory (W) (3)
 *PE 321—Analysis of Football (M) (3)

Courses to complete major

Freshman

MAT 102—Basic Mathematics for General Education (3)

Sophomore

FN 205—Nutrition and Physical Activity (3)

Junior

PE 302—Kinesiology (4)
 PE 303—Physiology of Exercise (4)

Senior

- PE 425—Tests and Measurements in Physical Education (3)
 PE 432—Athletic Training and Massage (3)
 PE 333—Analysis of Track and Field (3)
 PE 225—Analysis of Gymnastics (2)
 *PE 323—Analysis of Baseball (M) (3)
 *PE 422—Analysis of Basketball (M) (3)

*Alternative requirements for men and women.

Physical Education

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)
MU 101—Basic Music 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 ----- (3)

Senior

- PE 400—Special Problems for
Advanced Undergraduates ----- (2)
PE 423—Field Work in
Recreation ----- (4)

Courses in Physical Education

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 laboratory.

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 laboratory. Prerequisite: Demonstrated swimming ability.

PE 126 Introduction to Recreation (3)

Games and activities suitable for a community recreation program. 1 lecture, 2 two-hour laboratories.

PE 141 Physical Education (1/2)

Enrollment in activity classes limited as follows:

Men only: Physical fitness (prerequisite to all activities), apparatus and tumbling, basketball, flag football, handball, soccer, softball, track and field, volleyball, wrestling.

Women only: fundamentals of movement (prerequisite to all activities), modern dance, field hockey, softball, basketball.

Coeducational: archery, badminton, dance, golf, swimming, tennis, fencing, volleyball. 2 activity periods. Total credit limited to 3 units.

PE 142 Adaptive Activities (1/2)

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 144 Beginning Swimming (1/2)

Beginning swimming for all who do not pass college swimming test. 2 activity periods. Total credit limited to 1 unit.

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 201 Principles of Physical Education (3)

Orientation, history and concept of physical education as a profession. 3 lectures.

PE 221 Analysis of Wrestling (2)

Analysis of strategy and skill of wrestling with application of principles. 1 lecture, 1 two-hour laboratory.

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 laboratory.

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 laboratory. Prerequisite: PE 126

PE 225 Analysis of Gymnastics (2)

Analysis of strategy and skill of gymnastics with application of principles. 1 lecture, 1 two-hour laboratory. Prerequisite: PE 141 (Gymnastics)

PE 232 Intramural Sports (3)

Principles and policies underlying programs of intramural sports in schools and community centers. 2 lectures, 1 two-hour laboratory.

PE 235 Analysis of Water Polo (2) (M)

Analysis of strategy and skill of water polo with application of principles. 1 lecture, 1 two-hour laboratory.

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 laboratory.

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.

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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 laboratory. 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 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 laboratory. 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 Analysis of Football (3) (M)

Analysis of strategy and skill in football with application of principles. 2 lectures, 1 two-hour laboratory.

PE 323 Analysis of Baseball (3) (M)

Analysis of strategy and skill in baseball with application of principles. 2 lectures, 1 two-hour laboratory.

PE 324 Individual Sports Analysis (3) (W)

The advanced analysis of golf, tennis, badminton and archery with an emphasis on the application to patterns of motor learning and officiating. 2 lectures, 1 two-hour laboratory.

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 and officiating. 2 lectures, 1 two-hour laboratory.

PE 326 Field Sports Theory (3) (W)

The advanced analysis of field sports with an emphasis on the application to patterns of motor learning and officiating. 2 lectures, 1 two-hour laboratory.

PE 328 Pre-Adolescent Movement Patterns (3)

Analysis and practice of basic skill movements used in rhythms, sports, and gymnastics. 2 lectures, 1 two-hour laboratory.

PE 333 Analysis of Track and Field (3)

Analysis of strategy and skill in track and field with application of principles. 2 lectures, 1 two-hour laboratory.

PE 334 Introduction to Dance (3)

Fundamental knowledge and skills in dance, including rhythm analysis and social recreation dance. 1 lecture, 2 two-hour laboratories.

PE 337 Officiating (2) (M)

Analysis of principles and techniques of officiating men's sports in season

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(football, soccer, water polo). 1 lecture, 1 two-hour laboratory.

PE 338 Officiating (2) (M)

Analysis of principles and techniques of officiating men's sports in season (basketball, gymnastics, swimming). 1 lecture, 1 two-hour laboratory.

PE 339 Officiating (2) (M)

Analysis of principles and techniques of officiating men's sports in season (baseball, track and field, wrestling). 1 lecture, 1 two-hour laboratory.

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 laboratory.

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 laboratory.

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.

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 laboratory.

PE 422 Analysis of Basketball (3) (M)

Analysis of strategy and skill in basketball with application of principles. 2 lectures, 1 two-hour laboratory.

PE 423 Field Work in Recreation (4)

Observation and participation in a community or industrial recreation program. 1 lecture, 3 two-hour laboratories. Prerequisite: Senior standing, PE 224 or departmental approval.

PE 425 Tests and Measurements in Physical Education (3)

Physical tests and measurements of skill, strength, speed, agility, and endurance as a basis for grading and evaluating the program and as a measure of progress in activities. 2 lectures, 1 two-hour laboratory.

PE 427 Advanced Analysis and Theory of Sports (2)

Advanced analysis of strategy and skills in basketball, football, baseball, or track and field. 1 lecture, 1 two-hour laboratory. 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,

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bandaging, and therapeutic exercises applied to athletic injuries, diets, training room equipment, protective devices, and supplies. 2 lectures, 1 two-hour laboratory.

PE 441, 442, 443 Minor Sports Theory and Practice (1) (1) (1) (M)

Fundamentals and techniques of the following minor sports: soccer, tennis, golf, volleyball, trampoline, and handball. 1 two-hour laboratory.

PE 446 Social Dance Theory (2)

The advanced analysis of social dance with an emphasis on the application to the patterns of motor learning. 2 two-hour laboratories. 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. 2 two-hour laboratories. 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. 2 two-hour laboratories. 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 521 Curriculum and Methods in Health and Physical Education (3)

Methods, curricular materials, and evaluation procedures in elementary and secondary school health and physical education. Directed observations, field experience; class organization, management of games and relays. 3 lectures. Prerequisite: Graduate standing and admission to teacher education program.

PE 590 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.

SOCIAL SCIENCES DEPARTMENT

Rodman F. Garrity, *Department Head*

Charles W. Ackley
 Kenneth L. Beauchamp
 Thomas C. Blackburn
 Gary A. Cretser
 John F. Freeman
 Ben S. Gantz
 Kenneth A. Green
 Frederick B. Heath
 John Kershaw
 Louis J. King
 Richard G. Kohlan
 Marcia E. Lasswell
 David L. Levering

Barbara H. Lingenfelter
 Werner H. Marti
 Robert L. Maurer
 Donald H. Pflueger
 Joseph L. Philbrick
 Richard C. Richards
 Robert M. Schwieder
 Ralph E. Shaffer
 William A. Smith
 Dorothy M. Tucker
 Bruce E. Wilson
 Thomas C. Wilson

Three options, Social Services, Social Sciences, and Economics are available to students majoring in the Social Sciences department. The choice of the option will depend upon the student's occupational objective in civil service, business, industry, social services, or teaching.

The variety of courses offered by the department is important in the general education of all students, helping them to grasp the significance of the major social and philosophical problems of mankind. These courses include anthropology, education, geography, history, philosophy, political science, psychology and sociology. Many of the courses are valuable in preparing for civil service positions and examinations.

Since courses in the social sciences generally have heavy reading requirements, high school students intending to major in this field should seek to develop reading skills before entering college.

Curriculum in Social Sciences

<i>Freshman</i>	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) -----	5	5	5
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 -----	3	2	5
	<hr/> 16½	<hr/> 16½	<hr/> 16½

†To be selected from the General Education list.

Social Sciences

Sophomore

	<i>F</i>	<i>W</i>	<i>S</i>
General Psychology I (PSY 202)	3		
Principles of Economics (EC 201, 202, 203)	3	3	3
Principles of Political Science (PLS 201, 202)	3	3	
Physical Education (PE 141)	½	½	½
†Natural Sciences		3	3
United States History (HST 201, 202, 203)	3	3	3
Electives and courses to complete major	4	4	7
	16½	16½	16½

Junior

†Natural Sciences	3	3	3
†Literature	3	3	3
Introduction to Philosophy (PHL 201)	3		
Electives and courses to complete major	8	11	11
	17	17	17

Senior

Senior Project (SSC 461, 462)	2	2	
Undergraduate Seminar (SSC 463)			2
Social Psychology (PSY 401) or Contemporary Social Problems (SOC 301)			3
Public Speaking (SP 200)		3	
Electives and courses to complete major	14	11	11
	16	16	16

Curricular Options

Economics

The option stresses economic analysis and the applied aspects of economics related to business and government.

Courses to complete major

Sophomore

EC 231—Development of Economic Doctrine	(3)
MAT 107—Descriptive Statistics	(3)
ACC 121—Principles of Accounting	(3)

Junior

EC 311—Price and Income Analysis	(5)
EC 301—Public Finance	(4)
EC 302—Business and Government	(3)
EC 308—Money and Banking	(3)

†To be selected from the General Education list.

Senior

EC 401—International Trade and Finance	(3)
EC 402—Economic Development	(3)
EC 403—Comparative Economic Systems	(3)
EC 413—Managerial Economics	(3)
EC 414—Labor Economics	(3)

Social Sciences

The option offers a broad background leading to positions such as management trainee in business and government. By proper selection of electives, this option meets credential requirements for elementary or secondary teaching upon completion of the fifth year.

Anthropology

Courses to complete major

Sophomore

PSY 203, 204—General
Psychology II, III (6)

Junior

GEO 201, 202, 203—Principles
of Geography (9)

HST 321—History of California (3)

HST 415—Europe in the
20th Century (3)

HST 304—History of
Latin America (3)

Senior

PLS 310—Recent and
Contemporary Ideologies (3)

PLS 401—State and Local
Government (3)

PLS 415—American Political
and Social Thought (3)

SOC 401—Urban Sociology (3)

HST 417—History of the
Soviet Area (3)

Social Services

The option provides basic instruction and actual experience in social

services and the case-study method, preparing the students for work in many types of social service agencies.

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)

SOC 211, 212, 213—Introduction
to Social Services (3)

SOC 241, 242, 243—Social
Service Experience (6)

Senior

SOC 311, 312, 313—Philosophy
and Techniques of Social
Service (3)

SOC 341, 342, 343—Advanced
Social Service Experience (6)

PSY 314—Human Relations (3)

SOC 206—Family Relations (3)

PSY 306—Adolescent
Psychology (3)

Courses in 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.

Courses in 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 311 Culture and Personality (3)

Relations of variations in culture to

personality development in different societies, both primitive and modern. Comparative study of the interrelationships of cultural milieu, child training and education. 3 lectures. Prerequisite: ANT 203 or SOC 201

ANT 312 Applied Anthropology (3)

The application of anthropological knowledge to the solution of practical problems in social work, education, race relations, public administration, international relations, and economic development. 3 lectures. Prerequisite: ANT 203

Courses for Credential Programs

ED 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.

ED 200 School Observation (1/2)

Supervised observation of children in the classroom and on the college campus. May be repeated for total of one unit of credit.

ED 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.

ED 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 audiovisual 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.

ED 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.

ED 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.

ED 503 Secondary School Teaching Plans and Techniques (3)

Planning lessons, unit development, specific skills, class management, and utilization of community resources and relationships. Demonstrations and observation in secondary schools. Classroom planning co-ordinated with public school practice. Visual and auditory methods and materials of value in classroom teaching. 3 lectures. Prerequisite: PSY 312 and admission to teacher education program.

Courses in Geography

GEO 201, 202, 203 Principles of Geography (3) (3) (3)

Basic principles of physical, cultural and political geography. Significance of distribution patterns with reference to their effect on man's activities. 3 lectures.

GEO 301 Regional World Geography (3)

Major geographic regions of the world: their climates, landforms, soils,

flora, fauna, agricultural systems, industries. Intensive study of selected regions. 3 lectures.

GEO 311 Geography of California (3)

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. 3 lectures.

GEO 312 Economic Geography and World Resources (3)

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. 3 lecture-discussions. Prerequisite: EC 201, 202

Courses in History

HST 101, 102, 103 History of Civilization (5) (5) (5)

Development of civilization from earliest times to the present. Political, economic, social, intellectual, and religious contributions of the various peoples to contemporary life. 5 lectures.

HST 201, 202, 203 United States History (3) (3) (3)

A comprehensive survey of the development of the United States from the 15th century to the present. 3 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, 306 History of Latin America (3) (3) (3)

Latin America from the 15th century to the present. Emphasis on the economic, cultural, and historical development of the area. 3 lectures. Prerequisite: Junior standing or permission of instructor.

HST 312 History of Africa (3)

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. 3 lectures. Prerequisite: Junior standing or permission of instructor.

HST 314 History of the American West (3)

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. 3 lectures. Prerequisite: Junior standing or permission of instructor.

HST 315 History of Great Britain (3)

History of Britain and the British Empire from the Roman occupation. Social, economic, and constitutional development. Comparisons with the experience of other nations and peoples. 3 lectures.

HST 316 Diplomatic History of the United States (3)

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. 3 lectures. Prerequisite: Junior standing or permission of instructor.

HST 321 History of California (3)

Development of California; early explorations, colonizations; organization, government, and economy from beginnings to the present; development of culture, industry, agriculture, government, and population. 3 lectures.

HST 403 United States Since World War II (3)

National developments in the critical years since 1945. Major social, intellectual, and economic forces as they shape the contemporary American scene. 3 lectures. Prerequisite: Senior standing or permission of instructor.

Library/Philosophy

HST 404 Rise of the City in American Life (3)

Major facets of American life emerging in the city; urban thought from the 17th century to the present. 3 lectures. Prerequisite: Junior standing or permission of the instructor.

HST 410 American Colonial History (3)

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. 3 lectures.

HST 414 Social and Agrarian Reform (3)

American social and agrarian reform movements. Penal reform, land reform, women's rights, and peace movements;

economic reforms in the 20th century. 3 lectures. Prerequisite: Junior standing or permission of instructor.

HST 415 Europe in the 20th Century (3)

The political, economic, and social forces which have influenced the great powers of Europe in the 20th century. The development of 20th century ideologies. 3 lectures. Prerequisite: Junior standing or permission of instructor.

HST 417 History of the Soviet Area (3)

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. 3 lectures. Prerequisite: Junior standing or permission of instructor.

Courses in 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.

Courses in 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 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 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 205 Symbolic Logic and Set Theory (3)

Logic of propositions and sets including sentential calculus, set operations, metamathematics, quantifications, structure of an axiomatic system, functions and relations. 3 lectures. Prerequisite: MAT 108 or 114

PHL 501 Philosophy of Education (3)

The function of philosophy; the meaning of education; significance of present philosophical points of view; educational aims and values; democ-

racy and education; the relationship of various philosophical outlooks to educational methods and subject matter. 3 lectures. Prerequisite: Graduate standing, PHL 201 or equivalent, and permission of instructor.

Courses in Political Science**PLS 201, 202, 203 Principles of Political Science (3) (3) (3)**

Introduction to the principal methods and concepts used to analyze, explain and justify governmental institutions and political behavior. Emphasis on national government and federal system, distribution of powers and intergovernmental relations. Comparisons will be made showing the effect of historical, cultural, ideological, institutional, and personal factors in political problem-solving. 3 lectures. PLS 201 meets the state requirement in U.S. Constitution and state and local government.

PLS 310 Recent and Contemporary Ideologies (3)

Analysis of the historical, cultural, and institutional roots of the various democratic, marxist, socialist, communist, liberal, conservative, and pluralist orientations toward social organization, human behavior, and governmental authority, in order better to understand the nature and function of constitutional, democratic, and republican government. 3 lectures. Prerequisite: Junior standing or permission of instructor.

PLS 314, 315, 316 Public Administration (3) (3) (3)

Principles of organization, management, authority, and administrative action from the point of view of government and public service. Executive functions of government, responsibility, community welfare, and concrete problem solving. Public law affecting municipal and county government. 3 lectures. Prerequisite: Junior standing or permission of instructor.

PLS 401 State and Local Government (3)

The structure, function and problems of state, county, municipal, and district governments. 3 lectures. Prerequisite: Junior standing or permission of instructor.

PLS 402 Political Parties and Pressure Groups (3)

Dynamics of contemporary political parties and pressure groups in the United States. Analysis of the aspirations, organization, and techniques employed by agriculture, business, and labor as well as other special interest groups. 3 lectures. Prerequisite: Junior standing or permission of instructor.

PLS 411 Inter-American Relations (3)

Inter-American affairs. Political, economic, and social problems; forces motivating cultural behavior, industrial development, trade techniques, agricultural methods. Opportunities for employment in agriculture, engineering, and business. Finding and evaluating authoritative source materials on Latin American affairs. 3 lectures. Prerequisite: Junior standing or permission of instructor.

PLS 412 International Relations (3)

Analysis of international organizations, including political and economic types. Problems of security, the League of Nations, the United Nations and its special agencies. 3 lectures. Prerequisite: Junior standing or permission of instructor.

Psychology

PLS 413 Comparative Government (3)

Contemporary political situation in Britain, France, Soviet Union, Germany, Italy, and Japan. Policies and problems; forces making for conflict and adjustment. Constitutional, economic, communal, and sovereignty bases. 3 lectures. Prerequisite: Junior standing or permission of instructor.

PLS 414 Regional and International Organizations (3)

Administration, functioning, and organization of various transnational organizations. Emphasis on practical

operations of agencies such as United Nations, International Monetary Fund, World Health Organization, Food and Agriculture Organization, Committee on Economic Development, International Labor Office. Emphasis on United States support and participation in such groups. 3 lectures.

PLS 415 American Political and Social Thought (3)

American political and social thought and the philosophies of those individuals who have influenced it. 3 lectures. Prerequisite: Junior standing or permission of instructor.

Courses in 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 laboratory. 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 ado-

lescence. 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 203

PSY 314 Human Relations (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 laboratory. Prerequisite: PSY 202

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

PSY 503 Counseling and Guidance (3)

Philosophy, techniques, and administration of individual and group guid-

ance programs. Assessment of students' interests, abilities, and achievement with respect to educational and vocational choice, and school and life orientation. 3 lectures. Prerequisite: Graduate standing and permission of instructor.

PSY 504 Evaluation in Education (3)

Preparation and use of tests; new objective tests; check lists and rating scales. Supplementary observational techniques. The use of all such devices in evaluation. Assigning grades and reporting results. 3 lectures. Prerequisite: Graduate standing, PSY 312 or equivalent, and permission of instructor.

Courses in Social Science

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 laboratory.

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 521 Curriculum and Methods in Secondary Social Studies (3)

Content, organization, and scope of social science curriculum in secondary schools. Methods of teaching. Evaluation of procedures. Observation of classroom practices in local schools. 3 meetings. Prerequisite: Admission to teacher education program and graduate standing.

SSC 590 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.

Courses in 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, religion and social, marital and legal factors relating to marriage and early adjustment. Preparation for marriage. 3 lectures.

SOC 211, 212, 213 Introduction to Social Services (1) (1) (1)

Modern social service agency and worker purposes, objectives, obligations, responsibilities, and relationships. Social service as a career. SOC 241, 242, 243 taken concurrently. 1 lecture. Prerequisite: Approval of interdepartmental committee.

SOC 241, 242, 243 Social Service Experience (2) (2) (2)

Agency placement, experience in agency procedures, casework, case history recording, social evaluations. Requires a minimum of 10 hours each week devoted to agency participation. Concurrent registration in SOC 211, 212, 213

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 311, 312, 313 Philosophy and Techniques of Social Service (1) (1) (1)

Socio-cultural and psychological backgrounds of social and personal disorganization. Counseling techniques and philosophy, case recording techniques; elements of self analysis, group therapy experience. SOC 341, 342, 343 taken concurrently. 1 lecture. Prerequisite: SOC 213, 243 and approval of interdepartmental committee.

SOC 341, 342, 343 Advanced Social Service Experience (2) (2) (2)

Agency placement, case work experiences, case recording, worker-client relationships. Requires a minimum of 10 hours each week devoted to agency participation. Concurrent registration in SOC 311, 312, 313

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.

SOC 508 Educational Sociology (3)

Sociological backgrounds of school children; effects of social, economic, and political trends and issues on education; problems of leisure, recreation, and occupations; modern interpretations of democratic ideology. Sociological problems are utilized to define the social objectives of the school. 3 lectures. Prerequisite: Graduate standing and permission of instructor.

CURRICULA IN BUSINESS ADMINISTRATION

The degree of Bachelor of Science in Business Administration may be earned by students enrolled in majors in Accountancy; 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, the Society for the Advancement of Management (SAM) Club.

BUS

ACCOUNTANCY DEPARTMENT

George E. Carlberg, *Department Head*

Martin K. Barrett

George R. Bovec

Barry A. Knight

Sherrel L. Moore

Frank Paul

Jewel M. Riddle

The Accountancy 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 Accountancy may select courses which will prepare him specifically for one of these fields.

The accountancy 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 Accountancy

*Freshman**

	F	W	S
Freshman Composition (ENG 104, 105, 106)	3	3	3
Principles of Accounting (ACC 121, 122, 123)	3	3	3
Physical Education (PE 141)	½	½	½
Business Computations (BUS 151)		1	
Introduction to Business (BUS 102)	3		
Business Mathematics (MAT 103)			3
Health Education (PE 107)		2	
Basic Mathematics (MAT 101)	3		
Marketing Principles (MKT 201)		3	
Public Speaking (SP 200)			3
†Natural Sciences	4	4	4
	16½	16½	16½

Sophomore

Job and Process Cost Accounting (ACC 221)	3		
Standard Costs and Analyses (ACC 222)		3	
Introduction to Data Processing (DP 211)			3
Intermediate Accounting (ACC 321, 322, 323)	3	3	3
Business Communication (ENG 218)		3	
†Literature	3		
Principles of Economics (EC 201, 202, 203)	3	3	3
General Psychology I (PSY 202)			3
Report Writing (ENG 216)			3

*Unless already acceptable typists, students will be required to take BUS 141 and/or BUS 142.

†To be selected from the General Education list.

	Accountancy		
	F	W	S
Physical Education (PE 141)	½	½	½
†Natural Sciences	3		
Electives		3	
	15½	15½	15½
<i>Junior</i>			
Credit Management (FIN 301)	3		
Business Law (BUS 301, 302)	3	3	
American Civilization (AMC 301, 302, 303)	3	3	3
Money and Banking (EC 308)			3
Insurance Principles (FIN 303)		3	
Budgetary Control (ACC 427)			3
†Literature, Art, Philosophy or Music	3	3	
Business Forecasting (BUS 311) or Descriptive Statistics (MAT 107)			3
Electives	5	5	5
	17	17	17
<i>Senior</i>			
Senior Project (ACC 461, 462)	2	2	
Undergraduate Seminar (ACC 463)			2
Business Finance (FIN 314)			3
Federal Tax I (ACC 421)	3		
Auditing Principles, Practices and Procedures (ACC 325, 326)	3	3	
†Directed electives	3	3	6
Electives	6	9	6
	17	17	17

Courses in Accountancy

ACC 121, 122, 123 Principles of Accounting (3) (3) (3)

Principles and practices of fundamental double-entry accounting. Problems approach to the subject with illustrations taken from real business situations. Provides information for analysis and allocation purposes. 2 lectures, 1 two-hour activity period.

ACC 221 Job and Process Cost Accounting (3)

The cost accounting cycle; elements of cost of making a product; assignment of manufacturing costs to a product through job order and process cost systems. 2 lectures, 1 two-hour activity period. Prerequisite: ACC 123

ACC 222 Standard Costs and Analyses (3)

Standard and estimated cost accounting systems; analysis and control of distribution costs; differential cost analysis. 2 lectures, 1 two-hour activity period. Prerequisite: ACC 123

ACC 223 Advanced Problems in Cost Accounting (3)

Advanced problems in cost finding and cost control. 2 lectures, 1 two-hour activity period. Prerequisite: ACC 222

ACC 226 Budgeting Principles (3)

Principles and methods of preparing budgets, estimating income, and controlling expenditures of a manufactur-

†To be selected from the General Education list.

‡Selected with the approval of the adviser.

Accountancy

ing 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 123

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 accountancy.)

ACC 306 Accounting Systems (2)

The installation and operation of accounting systems in business, with special attention to internal control. 2 lectures. Prerequisite: ACC 221, 322

ACC 321, 322, 323 Intermediate Accounting (3) (3) (3)

Introduction to advanced theory of accounts and its application. Standards of practice and recent opinions of the American Institute of Certified Public Accountants. Modern financial statement terminology. 2 lectures, 1 two-hour activity period. Prerequisite: ACC 123 and permission of instructor.

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 323

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 222, 323, 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 411, 412 Case Studies in Controllorship (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 321

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 423 Governmental and Institutional Accounting (3)

Accounting for nonprofit institutions and governmental organizations. 2 lectures, 1 two-hour activity period. Prerequisite: ACC 323

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 222, 322

ACC 431, 432, 433 Advanced Accounting (3) (3) (3)

Partnerships, joint ventures, home office and branch, consolidated financial statements, statement of affairs, receiverships, realization and liquidation statements, estates and trusts, and actuarial problems. 2 lectures, 1 two-hour activity period. Prerequisite: ACC 323

ACC 441, 442 Internship in Accounting (2) (2)

On-the-job training with a business in the field of accounting. The experience must be new to the student so that learning takes place. Reports on various phases of the internship submitted as required by the faculty coordinator. Prerequisite: Permission of the instructor.

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 student's 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 433, 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 433 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 433 or consent of instructor.

BUSINESS MANAGEMENT DEPARTMENT

Richard H. Schoning, *Department Head*

Jack R. Dustman
Robert J. Healey
Clarence H. Jackman
Louis Kaufman
Bernard Leebhoff
Richard T. Nelson
Raymond C. Rauch

Alvin C. Ruppert
Katherine B. Seibert
Richard H. Smith
Gerald E. Wagner
Mary E. Whitley
G. Dow Worley

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

<i>Freshman*</i>	<i>F</i>	<i>W</i>	<i>S</i>
Freshman Composition (ENG 104, 105)	3	3	
Business Communication (ENG 218)			3
Health Education (PE 107)			2
Physical Education (PE 141)	½	½	½
Introduction to Business (BUS 102)	3		
Office Management (BUS 127)	4		
Basic Mathematics (MAT 101)		3	
Business Mathematics (MAT 103)			3
Principles of Accounting (ACC 121, 122, 123)	3	3	3
Principles of Economics (EC 201, 202, 203)	3	3	3
†Electives and courses to complete major		3	3
	16½	15½	17½
<i>Sophomore</i>			
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 201)	3		
Marketing Principles and Consumer Behavior (MKT 202)		3	
Introduction to Data Processing (DP 211)	3		
Public Speaking (SP 200)			3
General Psychology I (PSY 202)			3
†Natural Sciences	4	4	3
†Electives and courses to complete major		3	4
	16½	16½	16½
<i>Junior</i>			
Management Principles (BUS 304)	3		
Management Processes (BUS 305)		3	
Managerial Accounting (BUS 306)		3	
Business Forecasting (BUS 311, 312)	3	3	
Industrial Supervision (BUS 313)			3
Business Finance (FIN 314)	3		
Human Relations (PSY 314)			3
†Electives and courses to complete major	7	7	10
	16	16	16
<i>Senior</i>			
Senior Project (BUS 461, 462)	2	2	
Undergraduate Seminar (BUS 463)			2
†Literature	3		
†Literature, Philosophy, and Arts		3	3
†Natural Sciences			4
†Electives and courses to complete major	12	12	8
	17	17	17

*Unless already acceptable typists, students will be required to take BUS 141 and/or BUS 142.

†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.

Business Management

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 122—Motion and Time Study (3)

Sophomore

- IE 123—Motion and Time Study (3)
IE 236—Production Planning and Control (4)

Junior

- DP 222—Systems Analysis = (3)
ACC 221—Job and Process Cost Accounting (3)
MKT 302—Industrial Marketing (3)
MKT 304—Traffic Management (3)

- BUS 315—Quantitative Analysis In Business (3)
FIN 315—Corporation Finance= (3)

Senior

- BUS 401—Business Policies and Management (3)
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

<i>Freshman*</i>	F	W	S
Freshman Composition (ENG 104, 105)	3	3	
Business Communication (ENG 218)			3
Health Education (PE 107)			2
Physical Education (PE 141)	½	½	½
Introduction to Business (BUS 102)	3		
Office Management (BUS 127)	4		
Business Computations (BUS 151)			1
Basic Mathematics (MAT 101)	3		
Introduction to Mathematical Analysis (MAT 108, 109)		3	3
Principles of Accounting (ACC 121, 122, 123)	3	3	3
†Natural Sciences		4	
Electives		3	4
	16½	16½	16½
<i>Sophomore</i>			
Introduction to Data Processing (DP 211)	3		
Systems Analysis (DP 222)		3	
Electronic Data Processing Systems (DP 223)			3
Principles of Economics (EC 201, 202, 203)	3	3	3
Physical Education (PE 141)	½	½	½

*Unless already acceptable typists, students will be required to take BUS 141 and/or BUS 142.

†To be selected from the General Education list.

Finance

	F	W	S
Business Law (BUS 301, 302)	3	3	
Marketing Principles (MKT 201)	3		
Marketing Principles and Consumer Behavior (MKT 202)		3	
General Psychology I (PSY 202)	3		
Logic and Semantics (PHL 202)		3	
Symbolic Logic and Set Theory (PHL 205)			3
Public Speaking (SP 200)			3
†Natural Sciences			4
Electives	1	1	
	16½	16½	16½

Junior

Computer Programming for Business (DP 311)	3		
COBOL Programming (DP 312)		3	
Critical Path Scheduling Methods (DP 313)			3
Intermediate Accounting (ACC 321, 322, 323)	3	3	3
Business Forecasting (BUS 311, 312)		3	3
Human Relations (PSY 314)	3		
American Civilization (AMC 301, 302, 303)	3	3	3
Management Principles (BUS 304)	3		
Business Finance (FIN 314)		3	
Corporation Finance (FIN 315)			3
Electives	2	1	2
	17	16	17

Senior

Senior Project (BUS 461, 462)	2	2	
Undergraduate Seminar (BUS 463)			2
Management Processes (BUS 305)		3	
Managerial Accounting (BUS 306)	3		
Industrial Supervision (BUS 313)		3	
Quantitative Analysis in Business (BUS 315)			3
Business Policies and Management (BUS 401)	3		
†Literature			3
†Natural Sciences	4	3	
Electives	5	5	8
	17	16	16

Curriculum in Finance, Insurance, and Real Estate

Freshman*

	F	W	S
Freshman Composition (ENG 104, 105)	3	3	
Business Communication (ENG 218)			3
Health Education (PE 107)			2
Physical Education (PE 141)	½	½	½
Introduction to Business (BUS 102)	3		

†To be selected from the General Education list.

*Unless already acceptable typists, students will be required to take BUS 141 and/or BUS 142.

Finance

	<i>F</i>	<i>W</i>	<i>S</i>
Office Management (BUS 127)	4		
Business Computations (BUS 151)		1	
Basic Mathematics (MAT 101)		3	
Business Mathematics (MAT 103)			3
Principles of Accounting (ACC 121, 122, 123)	3	3	3
Principles of Economics (EC 201, 202, 203)	3	3	3
†Electives		3	2
	<hr/> 16½	<hr/> 16½	<hr/> 16½

Sophomore

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 201)	3		
Marketing Principles and Consumer Behavior (MKT 202)		3	
Introduction to Data Processing (DP 211)	3		
Public Speaking (SP 200)			3
General Psychology I (PSY 202)			3
†Natural Sciences	4	4	4
‡Electives		3	3
	<hr/> 16½	<hr/> 16½	<hr/> 16½

Junior

Management Principles (BUS 304)	3		
Management Processes (BUS 305)		3	
Managerial Accounting (BUS 306)		3	
Business Forecasting (BUS 311, 312)	3	3	
Industrial Supervision (BUS 313)			3
Credit Management (FIN 301)		3	
Real Estate (FIN 302)	3		
Insurance Principles (FIN 303)			3
Business Finance (FIN 314)	3		
Corporation Finance (FIN 315)		3	
Money and Banking (EC 308)			3
Human Relations (PSY 314)			3
†Natural Sciences			3
‡Electives	5	2	2
	<hr/> 17	<hr/> 17	<hr/> 17

Senior

Senior Project (BUS 461, 462)	2	2	
Undergraduate Seminar (BUS 463)			2
Investments (FIN 404)	3		
Security Analysis (FIN 405)		3	
Comparative Financial Institutions (FIN 416)	3		
Business Policies and Management (BUS 401)	3		
†Literature		3	
†Philosophy and Arts			6
‡Electives	5	8	8
	<hr/> 16	<hr/> 16	<hr/> 16

†To be selected from the General Education list.

‡At least 12 units of the electives must be selected with the approval of the adviser.

Courses in Business Management

BUS 102 Introduction to Business (3)

Survey of the American business system in its economic and social environment, including the basic forms of business enterprises and familiarization with the appropriate programs of the college. 3 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.

BUS 141, 142, 143 Typewriting (1) (1) (1)

Fundamentals of the touch system. Training in preparing business forms and business letters. 2 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 122

BUS 304 Management Principles (3)

Significance and responsibilities of business. Management functions and principles as applied to all areas of the business enterprise. Analysis and discussion of introductory cases illustrating management principles and problems. 3 lectures.

BUS 305 Management Processes (3)

Organization and organizational theory of a commercial or industrial enterprise; advanced planning; methods of management control; business decisions. Interdepartmental coordination and communication. Case studies. 3 lectures. Prerequisite: BUS 304

BUS 306 Managerial Accounting (3)

Accounting as a managerial tool, including budget, cost, and profit interpretation. 3 lectures. Prerequisite: ACC 123

BUS 308 Problems of Small Business (3)

Small business hazards and factors in business success. Adequate protection and financing for the small business. Analysis and discussion of typical situation-problems. 3 lectures.

BUS 311, 312 Business Forecasting (3) (3)

Application of frequency distributions, construction and use of index numbers, relationships between time series, sampling, reliability, significance, budgeting, and forecasting from a practical business point of view. Methods of presentation of business data. 3 lectures. Prerequisite: BUS 311

Business Management

BUS 313 Industrial Supervision (3)

A study of the concepts, techniques, and theories of supervision of personnel. The role of staff departments in assisting line managers in the personnel functions of employment, training, wage administration, and other activities pertaining to employer-employee relations. 3 lectures. Prerequisite: BUS 304

BUS 315 Quantitative Analysis in Business (3)

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. 3 lectures. Prerequisite: DP 211, BUS 312

BUS 321, 322, 323 Advanced Secretarial Practice (4) (4) (4)

Individual activities similar to those of an actual office. Practical application of the secretarial skills, including use of typewriter, adding machines or calculators, filing, duplicating machines, shorthand, machine dictation, shorthand transcription and machine transcription. 2 lectures and 2 laboratories. 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 401 Business Policies and Management (3)

A case study approach to current administrative and management problems and policies. Involves all phases of business—marketing, sales, finance, personnel organization, procurement, facilities and budgetary control. 3 lectures. Prerequisite: Senior standing.

BUS 402 Inventory Control (2)

Management problems of production, maintaining proper control records, financing, and materials handling and storage. Analysis and discussion of typical situation-problems. 2 lectures.

BUS 441, 442 Internship in Business Management (2) (2)

On-the-job training with a business in some phase of business management. The experience must be new to the student. Analytical reports of work accomplished by each student are made periodically to the faculty coordinator. Prerequisite: Permission of the instructor.

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 student's major fields. 2 lectures. Prerequisite: Senior standing or permission of instructor.

BUS 521 Curriculum and Methods in Secondary Business Subjects (3)

Objectives, organization, and content of business curriculum in secondary schools. Methods of teaching, materials, and evaluation of procedures. 3 lectures. Prerequisite: Admission to teacher education program and graduate standing.

BUS 590 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. Prerequisite: BUS 521. May be repeated for maximum credit of 6 units.

Courses in Data Processing

DP 211 Introduction to Data Processing (3)

The functions and application of data processing equipment in modern business. Understanding punched card machines and computers as management tools for high speed processing of accounting, marketing, and other information. Analysis and discussion of typical situation-problems. 3 lectures.

DP 222 Systems Analysis (3)

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. 3 lectures. Prerequisite: DP 211

DP 223 Electronic Data Processing Systems (3)

Study of applications of computers to complex systems and large clerical operations. Equipment evaluation, feasibility studies, and conversion problems. 3 lectures. Prerequisite: DP 222

DP 311 Computer Programming for Business (3)

Applications of the IBM 1620 to business data processing problems. Use of Symbolic Programming System (SPS) as a business oriented programming language. Block diagramming and programming representative business problems for solution on a 1620 computer. 3 lectures. Prerequisite: DP 211

DP 312 COBOL Programming (3)

Structure of the Common Business Oriented Language (COBOL). How compiler works. COBOL data and procedure divisions. Typical business data processing problems, and programming in COBOL to solve problems. Discussion of alternate solutions. Field trips. 3 lectures.

DP 313 Critical Path Scheduling Methods (3)

Representation of inter-related activities as a network of events. Network construction, analysis, and maintenance. Use of the computer to determine the critical path and provide management reports. Latest CPM techniques as evolved from PERT and PERT-COST. 3 lectures. Prerequisite: DP 223, 311

Courses in Finance, Insurance, and Real Estate

FIN 301 Credit Management (3)

Problems of the credit manager in reducing credit risks, determining sources of credit information, application of credit terms, laws relating to credit instruments, and collection problems. Analysis and discussion of typical situation-problems. 3 lectures. Prerequisite: ACC 123

FIN 302 Real Estate (3)

The nature and classification of property rights. Property ownership. Financing real estate. How to operate a real estate business. Analysis and discussion of typical situation-problems. 3 lectures.

FIN 303 Insurance Principles (3)

Principles of insurance as they affect the conduct of a business. Coverage of risks on materials and merchandise, transportation and business interruption. Analysis and discussion of typical situation-problems. 3 lectures.

FIN 314 Business Finance (3)

Monetary and banking principles as they apply to the problems of financing business, including promotion, types of organization, long and short-term capital, dividends, involvements, and expansion. Analysis and discussion of typical situation-problems. 3 lectures. Prerequisite: ACC 123

Finance

FIN 315 Corporation Finance (3)

Principles of determining most desirable channels for the management and investment of business funds. Analysis and evaluation of corporate securities and their price fluctuation. 3 lectures. Prerequisite: FIN 314 or consent of instructor.

FIN 404 Investments (3)

Mechanics of investment in insurance, real estate, industrials, railroad, public utilities, and financial institutions. Selection methods, fundamentals, and principles of investment analysis illustrated by case work. 3 lectures. Prerequisite: FIN 315

FIN 405 Security Analysis (3)

Analysis and evaluation of corporate securities and their price fluctuation. 3 lectures. Prerequisite: FIN 404

FIN 406 Law of Trusts and Estates (3)

Legal problems concerning the disposal of estates of deceased persons by will and under statutes of descent and distribution, probating estates of deceased persons, creation of trusts, both inter vivos and testamentary, duties and liabilities of trustees, rights of beneficiaries of trust. 3 lectures. Prerequisite: BUS 302

FIN 407 Real Estate Law (3)

Rights and liabilities surrounding the acquisition, possession and transfer of real property. Definition and description of land including easements, deeds, recording, covenants in deeds, zoning ordinances, contracts for sales of land, evidence of title, escrow transactions, mortgages, foreclosure and redemption, liens, community property, descent, landlord and tenant. Emphasis on California law. 3 lectures. Prerequisite: FIN 302

FIN 408 Real Estate Appraisal (3)

Application of the market data, replacement cost, and income capitalization appraisal techniques through the use of field study projects. Emphasis is placed upon real estate valuation problems. Prerequisite: FIN 302

FIN 409 Property and Liability Insurance (3)

Personal and business applications of the various types of property and liability insurance. Emphasis on surveying procedures and integrated insurance planning. Analysis and discussion of typical situation-problems. 3 lectures. Prerequisite: FIN 303

FIN 410 Real Estate Finance (3)

Techniques of mortgaging, the nature of mortgage and equity capital. Primary and secondary financing, financing long-term leases, monetary policy affecting real estate transactions, appraising for mortgage lending. Procedures in financing real estate sales and exchanges developed by discussion and case studies. 3 lectures. Prerequisite: FIN 407

FIN 413 Life Insurance (3)

Personal and business applications of the various types of life insurance. Emphasis on estate and family planning. Provides background for CLU examinations. Analysis and discussion of typical situation-problems. 3 lectures. Prerequisite: FIN 303

FIN 415 Risk Management (3)

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. 3 lectures. Prerequisite: FIN 303, 409

FIN 416 Comparative Financial Institutions (3)

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. 3 lectures. Prerequisite: EC 308

MARKETING DEPARTMENT

William E. Fox
Robert D. McWilliams

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**

	<i>F</i>	<i>W</i>	<i>S</i>
Freshman Composition (ENG 104, 105)	3	3	
Business Communication (ENG 218)			3
Physical Education (PE 141)	½	½	½
Principles of Accounting (ACC 121, 122, 123)	3	3	3
Principles of Economics (EC 201, 202, 203)	3	3	3
Health Education (PE 107)			2
Basic Mathematics (MAT 101)		3	
Business Mathematics (MAT 103)			3
Office Management (BUS 127)	4		
Introduction to Business (BUS 102)	3		
Business Computations (BUS 151)		1	
Electives		3	2
	16½	16½	16½

Sophomore

Physical Education (PE 141)	½	½	½
Report Writing (ENG 216)			3
Marketing Principles (MKT 201)	3		
Marketing Principles and Consumer Behavior (MKT 202)		3	
Business Law (BUS 301, 302)	3	3	
Sales Promotion (MKT 206)			3
Salesmanship (MKT 208)		3	
Public Speaking (SP 200)			3

*Unless already acceptable typists, students will be required to take BUS 141 and/or BUS 142.

Marketing

	F	W	S
General Psychology I (PSY 202)		3	
Human Relations (PSY 314)			3
†Natural Sciences	4	4	4
Advertising Principles (MKT 204)	3		
Data Processing (DP 211)	3		
	16½	16½	16½
<i>Junior</i>			
Sales Management (MKT 301)	3		
Industrial Marketing (MKT 302)	3		
Retail Store Management (MKT 303)			3
Traffic Management (MKT 304)		3	
Management Principles (BUS 304)	3		
Management Processes (BUS 305)		3	
Business Forecasting (BUS 311, 312)	3	3	
Quantitative Analysis in Business (BUS 315)			3
Managerial Accounting (BUS 306)			3
Business Finance (FIN 314)		3	
Corporation Finance (FIN 315)			3
American Civilization (AMC 301, 302, 303)	3	3	3
Electives	2	2	2
	17	17	17
<i>Senior</i>			
Senior Project (MKT 461, 462)	2	2	
Undergraduate Seminar (MKT 463)			2
Marketing Research (MKT 401, 402)	3	3	
Marketing Management (MKT 403)			3
International Marketing (MKT 414)	3		
†Natural Sciences	3		
†Literature			3
†Literature, Philosophy, Art or Music		6	
Electives	5	5	8
	16	16	16

Courses in Marketing

MKT 201 Marketing Principles (3)

A survey of the problems concerned with the marketing of goods and services with emphasis on sound principles and practices. 3 lectures.

MKT 202 Marketing Principles and Consumer Behavior (3)

A survey of the problems concerned with the marketing of goods and services, with emphasis on consumer behavior in the marketplace. 3 lectures. Prerequisite: MKT 201

†To be selected from the General Education list.

MKT 204 Advertising Principles (3)

Technical, economic, and professional aspects of advertising. Campaign organization for effective advertising. Analysis and discussion of typical situation-problems. 3 lectures. Prerequisite: MKT 202 or permission of instructor.

MKT 205 Advertising Practices (3)

Considerations involved in production and placing of advertising. Copy, layout, production and reproduction processes, media selection and research.

Analysis and discussion of typical situation-problems. 3 lectures. Prerequisite: MKT 204

MKT 206 Sales Promotion (3)

Methods of marketing merchandise, channels of distribution, co-ordination of sales and advertising effort, special inducements, and point-of-purchase displays. Analysis and discussion of typical situation-problems. 3 lectures. Prerequisite: MKT 204

MKT 208 Salesmanship (3)

Salesmanship and the role of the salesman in retail and wholesale selling. Sales techniques. Salesmanship and product service. Analysis and discussion of typical situation-problems. 3 lectures.

MKT 301 Sales Management (3)

Organization and operation of sales forces. Determination of market potentials. Methods of remuneration. Analysis and discussion of typical situation-problems. 3 lectures. Prerequisite: MKT 202

MKT 302 Industrial Marketing (3)

Marketing of products for resale or further manufacture. Analysis and discussion of typical situation-problems. 3 lectures. Prerequisite: MKT 202

MKT 303 Retail Store Management (3)

Problems of merchandising, location, layout, display, advertising, records, purchasing, personnel relations, and other considerations of retail operations. Analysis and discussion of typical situation-problems. 3 lectures. Prerequisite: MKT 202

MKT 304 Traffic Management (3)

Purchase and sale of transportation. Rate structures and controls. Rate claims and Interstate Commerce Commission proceedings. Study of uses of bills of lading and claims. Storage locations, and routing considerations. Analysis and discussion of typical situation-problems. 3 lectures.

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 401 Marketing Research (3)

Determination of market potentials, sales areas, and sales quotas. Sources of market data. Techniques of quantitative and qualitative market analysis. Analysis and discussion of typical situation-problems. 3 lectures. Prerequisite: MKT 202; BUS 312 or MAT 107

MKT 402 Marketing Research (3)

The application of quantitative and qualitative market analysis techniques to specific marketing problems. 3 lectures. Prerequisite: MKT 401

MKT 403 Marketing Management (3)

Analysis of problems confronting the marketing executive and the development of decision-making techniques used in solving them. 3 lectures. Prerequisite: Senior standing or permission of instructor.

MKT 414 International Marketing (3)

Analysis and description of marketing problems. Techniques and institutions available for the distribution of goods and services in international markets. 3 lectures. Prerequisite: MKT 202 or permission of instructor.

MKT 441, 442 Internship in Marketing (2) (2)

On-the-job training with a business in some phase of marketing, selling, or advertising. The experience must be new to the student so that learning takes place. Analytical reports of work accomplished by each student are made periodically to the faculty co-ordinator. Prerequisite: Permission of instructor.

Marketing

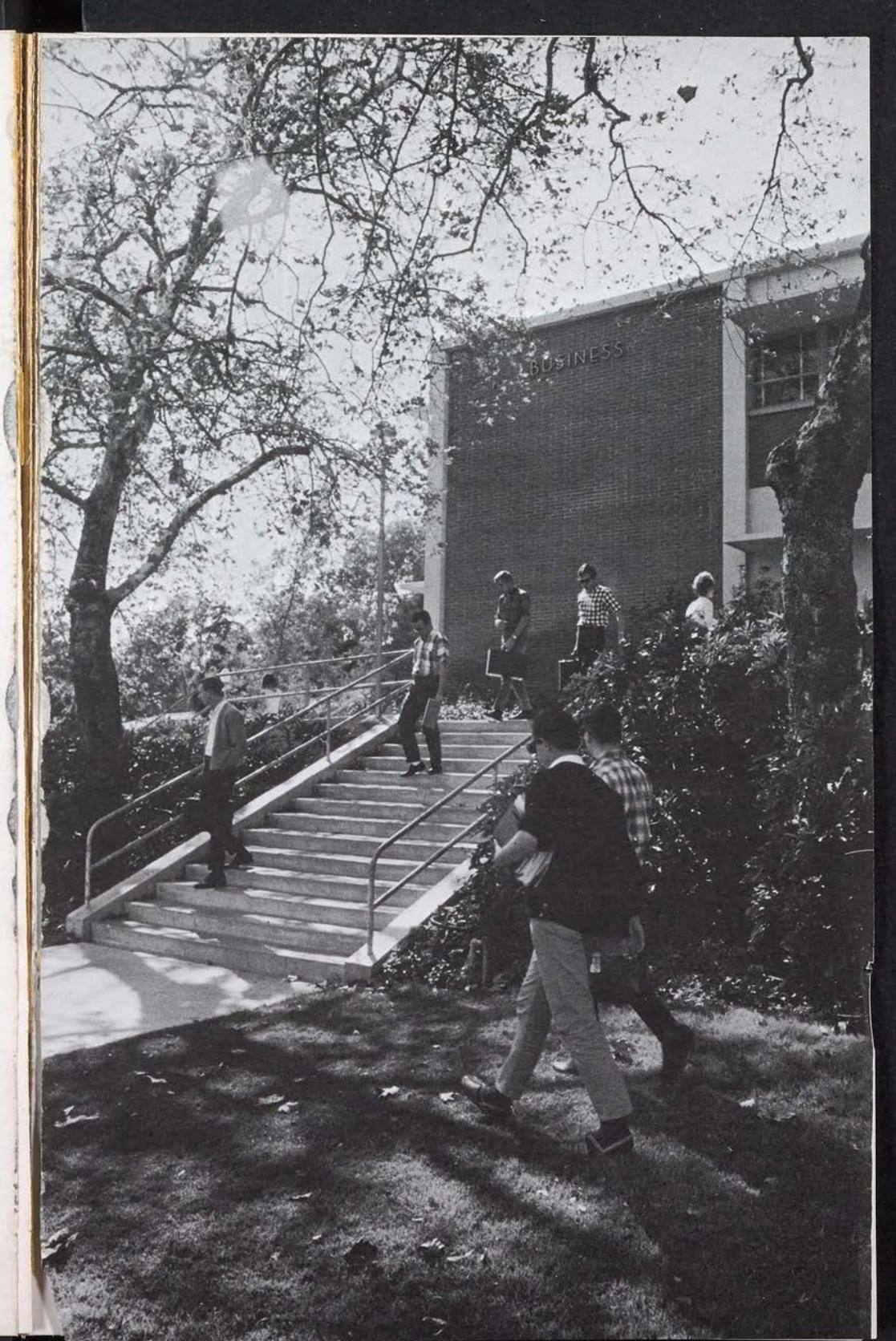
MKT 461, 462 Senior Project (2) (2)

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 field. 2 meetings. Prerequisite: Senior standing or permission of instructor.





SCHOOL OF ENGINEERING

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ENG

SCHOOL OF ENGINEERING

ADVANCE ENGINEERING

TECHNICAL ENGINEERING

CIVIL ENGINEERING

MECHANICAL ENGINEERING

INDUSTRIAL ENGINEERING

MECHANICAL ENGINEERING

TECHNICAL ENGINEERING

ADVANCE ENGINEERING

ENG

SCHOOL OF ENGINEERING

Harold P. Skamsner, *Dean*

Engineering involves the application of science and mathematics in the solution of technical and economic problems. Typically, an engineer utilizes discoveries of the scientist to produce something beneficial to mankind. Four of five positions in the scientific-technical fields in the United States are in either engineering or technical administration.

The School of Engineering emphasizes laboratory and field work with constant interplay between general principles and practical applications. This is often called the "learn by doing" philosophy. The whole plan adds "know-how" to "know-why." An extra dimension is added to the more typical engineering programs through learning to apply the theory acquired in basic core courses.

Emphasis is placed on the student's technical preparation as a member of the engineering profession. Basic fundamentals and principles are taught and used in the solution of industrial problems.

Six majors: Aerospace, Chemical, Civil, Electronics, Industrial, and Mechanical, lead to the Bachelor of Science Degree in Engineering.

The requirement of engineering courses in the freshman year and throughout the four years provides students with a longer period of maturation, and the advantage of early motivation, more complete orientation, greater understanding, and familiarization with the field. It also provides for early employability in technical work in industry. A student learns at an early stage if the particular field he has chosen is one for which he is fitted. The early emphasis on manufacturing laboratories and shop operations develops an engineer capable of practical design.

Engineering curricula involve relatively equal amounts of basic mathematics and science, engineering core courses, and general education. The student is prepared to meet the demands of the nation's changing industries by applying fundamentals of the profession to the engineering techniques of the present and future.

The program is one of analysis and design, instrumentation and synthesis. Graduates work in design, development, supervision, systems, applied research, test engineering, production and manufacturing, methods engineering, sales and field engineering. The courses

School of Engineering

in manufacturing processes enable students to learn the capabilities and limitations of these processes, so that they, as engineers, make the best use of this knowledge in their work and planning.

A distinguishing feature of the Cal Poly graduate is his readiness to take his place in industry and begin producing for his employer in his initial period of employment, and yet be well prepared for future growth and development. Cal Poly graduates have been accepted at leading graduate schools across the country.

There are cooperative work-study programs for senior students with leading local industries. Many of the 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, shop, mechanical drawing, and related courses.

AEROSPACE ENGINEERING DEPARTMENT

Rodney D. Sutherland, *Department Head*

Donald C. Curran
George R. Graves
Horatio O. Morgan

Conrad F. Newberry
Albert D. Sanford

The Aerospace Engineering curriculum is devoted to study of basic engineering theory in mathematics, physics, mechanics, fluids, thermodynamics and design. As theory is studied, it is applied in the laboratory through experiments, demonstrations, and testing.

Applied technology courses insure that the student not only understands the basic fundamentals of engineering, but can also put them to work in the shop. Mathematics and physics courses are correlated with engineering courses so that they can be readily understood as well as applied.

Graduates are employed by aerospace vehicle and component manufacturers, airlines, government test bases, research laboratories, and propulsion unit manufacturers in such fields as aerodynamics, propulsion systems, aerospace testing and research, stress analysis, flight test engineering, and design groups.

The high school student planning a career in aerospace engineering should take a balanced program including mathematics, physical science, mechanical drawing, and shops. 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

	<i>F</i>	<i>W</i>	<i>S</i>
Aerospace Engineering Fundamentals (ARO 124, 125, 126)	3	3	2
Automatic Programming for Digital Computers (MAT 113)			1

Aerospace Engineering

	F	W	S
*Engineering Drafting (ME 120 or 121, 122)	2	2	
Descriptive Geometry (ME 125)			2
Metal Processes (MPE 142, 144)	1	1	
Welding Survey (WE 144)			1
†Analytic Geometry and Calculus (MAT 114, 115, 116) ...	3	3	3
General Physics (PHY 131, 132)		4	4
Freshman Composition (ENG 104, 105, 106)	3	3	3
Health Education (PE 107)	2		
Physical Education (PE 141)	$\frac{1}{2}$	$\frac{1}{2}$	$\frac{1}{2}$
Electives	3		
	<hr/>	<hr/>	<hr/>
	17½	16½	16½

Sophomore

Introduction to Aerospace Structures (ARO 205)			3
Aircraft Flight Performance (ARO 247)	3		
Aircraft Preliminary Design (ARO 248)		2	
Aerospace Construction Laboratory (ARO 251, 252)		1	1
Production Welding Processes (WE 145)	1		
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
†Literature		3	
Life Science (BIO 110)	3		
General Psychology I (PSY 202)			3
Physical Education (PE 141)	$\frac{1}{2}$	$\frac{1}{2}$	$\frac{1}{2}$
	<hr/>	<hr/>	<hr/>
	18½	17½	18½

Junior

Introduction to Aerospace Structures (ARO 206)	4		
Aerodynamics (ARO 301, 302)		3	4
Aerodynamic Heating (ARO 304)		3	
Flight Vibrations (ARO 309)		3	
Aerospace Structures (ARO 327, 328)		3	3
Experimental Analysis (ARO 347)			2
Gas Dynamics (ARO 401)			3
Principles and Practices of Electrical Engineering (EE 231, 232)	3	3	
Electronic Engineering (EL 322)			3
Thermodynamics (ME 301)	3		
American Civilization (AMC 301, 302, 303)	3	3	3
Mathematical Analysis of Engineering Problems (MAT 318)	3		
Electives	2		
	<hr/>	<hr/>	<hr/>
	18	18	18

*ME 120 or ME 121 to be determined by the Mechanical Engineering department.

†To be selected from the General Education list.

‡Students not prepared to take MAT 114 will take MAT 104 and/or MAT 105 as determined by the Mathematics department.

Aerospace Engineering

	F	W	S
<i>Senior</i>			
Senior Project (ARO 461, 462)	2	2	
Undergraduate Seminar (ARO 463)			2
Propulsions Systems (ARO 402)	3		
Supersonic Aerodynamics and Wind Tunnel Testing (ARO 404)	3		
Aerospace Flight Stability (ARO 405)		3	
Astrodynamics (ARO 406)			2
Advanced Aerospace Analysis (ARO 444, 445)	3	3	
Advanced Aerospace Design Project (ARO 446)			2
Aerospace Measurements Laboratory (ARO 457, 458)		2	2
Electronic Engineering (EL 323)	3		
Differential Equations (MAT 317)	3		
Principles of Economics (EC 201, 202)		3	3
†Literature or Philosophy		3	
Electives		2	5
	17	18	16

Courses in Aerospace Engineering

ARO 124 Aerospace Engineering Fundamentals (3)

Application of basic engineering fundamentals to aircraft and missile systems. Basic theory of flight. Dimensional analysis and scientific notation. Slide rule and graphing techniques. Report writing fundamentals. Pressure, temperature and basic aerospace experiments. Wind tunnel familiarization. 1 lecture, 2 three-hour laboratories.

ARO 125 Aerospace Engineering Fundamentals (3)

The atmosphere, Archimedes' principle, properties of real fluids, viscosity, Reynolds' number, Stokes' law, laminar and turbulent boundary layers, effect of streamlining. 1 lecture, 2 three-hour laboratories. Prerequisite: ARO 124.

ARO 126 Aerospace Engineering Fundamentals (2)

Basic theory of rockets and introduction to space flight. Angular velocity experiments, aircraft engine testing. Environmental testing procedures. 1 lecture, 1 three-hour laboratory. Prerequisite: ARO 125

ARO 205 Introduction to Aerospace Structures (3)

Aircraft materials properties. Tension, compression, bending, torsion and shear flow in statically determinate structures. Relationship of shear, moment, slope and deflection of beams. Bending and shear stresses in simple beams. Thermal stresses. 3 lectures. Prerequisite: ME 214

ARO 206 Introduction to Aerospace Structures (4)

Beam deflections. Restrained, continuous and curved beams. Columns. Failure under combined and fluctuating stresses. Fatigue and stress concentrations. Determination and testing of the physical properties of materials used in aircraft. Effect of heat treatment on material properties. Use of the SR-4 rosette for determining principal strains. 3 lectures, 1 three-hour laboratory. Prerequisite: ARO 205. Concurrent: MAT 215

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.

†To be selected from the General Education list.

Aerospace Engineering

ARO 247 Aircraft Flight Performance (3)

Airfoil section and wing planform characteristics. Aerodynamic lift and drag analysis. Flight performance parameters. Flight mechanics. Static stability. Powerplant performance. Weight analysis. 1 lecture, 2 three-hour laboratories. Prerequisite: PHY 131, MAT 115

ARO 248 Aircraft Preliminary Design (2)

Preliminary design of an aircraft in response to request for proposal issued by the staff. Includes effects of configuration on aerodynamic characteristics, performance, and stability. 2 three-hour laboratories. Prerequisite: ARO 247

ARO 251 Aerospace Construction Laboratory (1)

Fundamentals of sheet metal fabrication of aircraft structures and components. Principles of riveting, fastening and joining aircraft structures. 1 three-hour laboratory. Prerequisite: MPE 142, 144, WE 144, 145

ARO 252 Aerospace Construction Laboratory (1)

Assembly of sheet metal components. Corrosion protection; coatings, plating, painting. Special fastening and joining techniques. Resistance welding techniques. Plastics and reinforced fiberglass. 1 three-hour laboratory. Prerequisite: ARO 251

ARO 301 Aerodynamics (3)

Introduction to incompressible flow aerodynamics. Equations of continuity, momentum and energy. Introduction to viscous flow. Navier-Stokes equations. 3 lectures. Prerequisite: MAT 318

ARO 302 Aerodynamics (4)

Potential flow, vorticity, circulation, sources and sinks, two-dimensional wing theory, effect of flaps, three-dimensional wing theory, finite span wing, vortex systems. 3 lectures, 1 three-hour laboratory. Prerequisite: ARO 301

ARO 304 Aerodynamic Heating (3)

Heating of aerodynamic surfaces due to supersonic and hypersonic velocities. Application of analog and digital computer techniques to transient heat conduction problems. Investigation of radiative cooling. Re-entry heating. 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

ARO 327 Aerospace Structures (3)

Aircraft and missile structural components. Virtual work methods. Deflections in statically determinate means, frames, and rings. Single cell box beams. Column analysis. Combined stresses. Stress analysis of mechanism. 2 lectures, 1 three-hour laboratory. Prerequisite: ARO 206, MAT 216

ARO 328 Aerospace Structures and Structural Testing (3)

Statically indeterminate beams, frames, and rings. Virtual force and virtual displacement methods. Beam column theory. Multicell box beams. Experimental methods of stress analysis. Testing of typical aircraft and missile structural components. 2 lectures, 1 three-hour laboratory. Prerequisite: ARO 327

ARO 347 Experimental Analysis (2)

Introduction to practical methods of experimental design based on fundamental laws of engineering. Design decisions verified by written analysis. Methods of handling multi-variable problems. Mechanical simulation of electrical systems and electrical simulation of mechanical systems. Error analysis. Applications to fluid flow systems, dynamic systems and structures. 2 three-hour laboratories. Prerequisite: ARO 301, 304, 309

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 401 Gas Dynamics (3)

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. 3 lectures. Prerequisite: ARO 304, ME 301

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 401

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 and Wind Tunnel Testing (3)

Compressible flow about bodies and wings. Solution of wave equations; oblique shock; Prandtl-Meyer expansion. Small-perturbation, shock-expansion, and slender body theory. Finite span wings. Three-dimensional flow approximations. Operation of the supersonic wind tunnel. Methods of instrumentation. Testing of high speed models. 2 lectures, 1 three-hour laboratory. Prerequisite: ARO 302

ARO 405 Aerospace Flight Stability (3)

Three-dimensional rigid body motion by methods of Newton and Lagrange. Euler transformations. Appli-

cations to aircraft, missiles, and spacecraft. Stability analysis by root locus and the methods of Routh. Linearization techniques. 3 lectures. Prerequisite: ARO 404, MAT 317, 318

ARO 406 Astrodynamics (2)

Kepler's laws of motion and satellite orbits, orbital transfers. Space vehicle motion, despinning of satellites. Performance and optimization of single and multistage rockets. 2 lectures. Prerequisite: ARO 405

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 412 Missiles (3)

Extension of aeronautical engineering principles to rockets and missiles; theory of design; propulsion systems and controls; flight characteristics and guidance. 3 lectures. Prerequisite: ARO 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: Senior standing.

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, MAT 317

Aerospace Engineering

ARO 446 Advanced Aerospace Design Project (2)

Preliminary design of aerospace systems. System analysis. Design optimization. Design compromise in multidisciplinary systems. Verbal and written presentation of system design. 2 three-hour laboratories. Prerequisite: ARO 445

ARO 457, 458 Aerospace Measurements Laboratory (2) (2)

Use of laboratory instruments to develop the technique of obtaining engineering measurements. Special assigned problems in the field of aerospace engineering. 2 three-hour laboratories. Prerequisite: EL 322, ARO 347

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: Senior standing, EL 322, ARO 252, 437

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, *Department Head*

Robert G. Feeney

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, giving the student skills which are readily applied in industry. The primary objective is employment upon graduation rather than preparation for graduate work.

The Chemical Engineering curriculum includes laboratory and application courses to prepare the student to plan, design, develop, construct, test, and operate process equipment and plants for rocket fuels, plastics, rubber products, nuclear materials, petroleum, petrochemicals, heavy chemicals, industrial gases, paint, pharmaceuticals, agrochemicals, foods, etc.

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

<i>Freshman</i>	<i>F</i>	<i>W</i>	<i>S</i>
Introduction to Chemical Engineering Design (CHE 123)			3
Chemical Engineering Fundamentals (CHE 131, 132)	3	3	
*Engineering Drafting (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

*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.

Chemical Engineering

	F	W	S
Welding Survey (WE 144)	1		
Production Welding Processes II (WE 146)		1	
Life Science (BIO 110)			3
Freshman Composition (ENG 104, 105)	3	3	
Technical Writing (ENG 219)			2
Metal Processes (MPE 142, 144)	1	1	
Health Education (PE 107)			2
Physical Education (PE 141)	½	½	½
	<hr/> 17½	<hr/> 17½	<hr/> 17½

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 211)			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
General Psychology I (PSY 202)	3		
Physical Education (PE 141)	½	½	½
	<hr/> 17½	<hr/> 17½	<hr/> 18½

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		
	<hr/> 17	<hr/> 16	<hr/> 18

Senior

Senior Project (CHE 461, 462)	2	2	
Undergraduate Seminar (CHE 463)			2
Unit Operations (CHE 421, 422, 423)	3	3	3
Plastics Manufacturing (MPE 438)		2	
Electronic Engineering (EL 322, 323)		3	3
Metallurgy Laboratory (WE 343)		1	
American Civilization (AMC 301, 302, 303)	3	3	3
†Literature	3		
†Literature or Philosophy		3	
§Chemistry Electives	3		3
Electives	4		4
	<hr/> 18	<hr/> 17	<hr/> 18

†To be selected from the General Education list.

§To be selected with the approval of the student's adviser.

Courses in 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 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

Chemical Engineering

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.

CIVIL ENGINEERING DEPARTMENT

John W. Comer, *Department Head*

Gaylon R. Claiborne
Clarence L. Hall
Fenton Harding
Donald W. King
Harry J. Krueper

Ray Morales
Claude B. Ogle, Jr.
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.

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

<i>Freshman</i>	<i>F</i>	<i>W</i>	<i>S</i>
Introduction to Civil Engineering (CE 121)	2		
Civil Engineering Computations (CE 122)		2	
Elementary Surveying (CE 134)	3		
Advanced Surveying (CE 135)		4	
Route Surveying (CE 136)			3
*Engineering Drafting (ME 120 or 121, 122)	2	2	
Descriptive Geometry (ME 125)			2
Metal Processes (MPE 142, 144)	1	1	
Principles of Fabrication (MPE 155)		1	
Welding Survey (WE 144)	1		
†Analytic Geometry and Calculus (MAT 114, 115)		3	3
General Physics (PHY 131)			4
Freshman Composition (ENG 104, 105, 106)	3	3	3
Health Education (PE 107)			2
Physical Education (PE 141)	½	½	½
Electives	5		
	<hr/>	<hr/>	<hr/>
	17½	16½	17½

*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.

Civil Engineering

Sophomore

	F	W	S
Highway Engineering: Planning (CE 221)	2		
Highway Engineering: Traffic (CE 222)		2	
Highway Engineering: Structural (CE 226)			2
Civil Engineering Drafting (CE 224)	3		
Engineering Statics and Dynamics (ME 211, 212)	3		3
Strength of Materials (ME 218, 219)		3	3
Materials Test Laboratory (ME 249)			1
Production Welding Processes II (WE 146)		1	
General Physics (PHY 132, 133)	4	4	
Life Science (BIO 110)			3
Technical Writing (ENG 219)			2
Analytic Geometry and Calculus (MAT 116)	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
	18½	17½	18½

Junior

Economics of Engineering Decisions (CE 302)			3
Elementary Structural Analysis (CE 304)	3		
Statically Indeterminate Structures (CE 305)		3	
Steel Structures Design (CE 306)			3
Engineering Soil Mechanics (CE 323)			3
Hydraulic Engineering (CE 332)		4	
Hydrology (CE 333)			2
Concrete Mixture Design (CE 342)		2	
Thermodynamics (ME 301)	3		
Fluid Mechanics (ME 311)	3		
Principles and Practices of Electrical Engineering (EE 231, 232)	3	3	
Electronic Engineering (EL 322)			3
General Chemistry (CHM 111, 112)		3	3
General Chemistry Laboratory (CHM 151, 152)		1	1
Engineering Geology (PSC 321)	4		
Electives		2	
	16	18	18

Senior

Senior Project (CE 461, 462)	2	2	
Undergraduate Seminar (CE 463)			2
Engineering Law, Contracts & Specifications (CE 403)			3
Reinforced Concrete Design (CE 421)	3		
Water Supply Engineering (CE 431)	3		
Water Quality Engineering (CE 432)		3	
Timber Structures Design (CE 433)		3	
Metallurgy (WE 304)	2		
Metallurgy Laboratory (WE 343)		1	
American Civilization (AMC 301, 302, 303)	3	3	3
General Psychology I (PSY 202)		3	
†Literature		3	
†Literature or Philosophy			3
Public Speaking (SP 200)	3		
Electives			7
	16	18	18

†To be selected from the General Education list.

Courses in Civil Engineering

CE 121 Introduction to Civil Engineering (2)

Introduction to the scope and diversity of civil engineering educational and professional activities, including the functions of civil engineering design and construction groups; technical and social responsibilities of the civil engineer; oral and written engineering reports. 1 lecture, 1 three-hour laboratory.

CE 122 Civil Engineering Computations (2)

Introduction to the use of the slide rule, calculators and the digital computer in the solution of civil engineering problems. 1 lecture, 1 three-hour laboratory.

CE 134 Elementary Surveying (3)

Use and care of surveying instruments, fundamental surveying methods, traverse measurements, and area computations. 1 lecture, 2 three-hour laboratories. Prerequisite: MAT 104 or equivalent.

CE 135 Advanced Surveying (4)

Adjustments. Elements of topographic, hydrographic, geodetic surveying. Precise equipment and control surveys, city and land surveys. Astronomical observations. State plane coordinates. 2 lectures, 2 three-hour laboratories. Prerequisite: CE 134

CE 136 Route Surveying (3)

Route location and layout. Simple, transition and vertical curves. Earthwork computation. Introduction to electronic and photogrammetric methods. 1 lecture, 2 three-hour laboratories. Prerequisite: CE 135

CE 221 Highway Engineering: Planning (2)

Highway administration, finance and planning. Geometric design, drainage, location. 1 lecture, 1 three-hour laboratory. Prerequisite: CE 136

CE 222 Highway Engineering: Traffic (2)

Traffic surveys and routing studies. Parking and public transit planning. Driver and vehicular characteristics. Traffic control and accident prevention. 1 lecture, 1 three-hour laboratory. Prerequisite: CE 221

CE 224 Civil Engineering Drafting (3)

Structural, topographic, plan and profile and survey drawing practices. Line and lettering work, use of drafting machines and office practices are stressed. 1 lecture, 2 three-hour laboratories. Prerequisite: ME 122

CE 226 Highway Engineering: Structural (2)

Design of rigid and flexible pavements. Soil stabilization. Highway construction and maintenance. 1 lecture, 1 three-hour laboratory. Prerequisite: CE 222

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 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 Elementary Structural Analysis (3)

Analysis of statically determinate beams, trusses and three-hinged arches. Graphical and analytical methods of solution. Influence lines. 3 lectures. Prerequisite: CE 224, ME 219

Civil Engineering

CE 305 Statically Indeterminate Structures (3)

Analysis of statically indeterminate structures by analytical and graphical methods. 3 lectures. Prerequisite: CE 304

CE 306 Steel Structures Design (3)

Analysis and design of steel members and their connections. Study of applicable steel design codes and specifications. 3 lectures. Prerequisite: CE 305

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: CE 342, ME 249

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 333 Hydrology (2)

Introduction to the hydrologic cycle. Measurement of precipitation, statistical methods for analysis of data, ground water, flood mitigation, state-discharge relations, stream flow and runoff computations, reservoir management. 1 lecture, 1 three-hour laboratory. Prerequisite: CE 332

CE 342 Concrete Mixture Design (2)

Study of concrete materials. Methods of design and control of concrete mixtures. Tests for acceptability of materials. Responsibilities and position of the inspector. 2 three-hour laboratories. Prerequisite: ME 249

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 402 Civil Engineering Computer Applications (1)**

Application of digital computer techniques to the solution of civil engineering problems. 1 lecture. Prerequisite: MAT 104, 105 or equivalent.

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 Reinforced Concrete Design (3)

Analysis and design of reinforced concrete structures. 2 lectures, 1 three-hour laboratory. 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 136

CE 431 Water Supply Engineering (3)

Economic design of a water supply system. Statistics for determination of demand, collection, storage, water treatment and quality control, the physical characteristics of water, and distribution. 2 lectures, 1 three-hour laboratory. Prerequisite: CE 333, CHM 112, BIO 110

*To be offered when course enrollment justifies.

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 Timber Structures Design (3)

Analysis and design of timber members and their connections. 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 from the viewpoint of the construction engineer. Estimating procedures considering labor, material, equipment and overhead. 2 lectures, 1 three-hour laboratory.

CE 436 Construction Equipment and Methods (3)

Application and maintenance of construction equipment, construction planning, scheduling methods and procedures. 2 lectures, 1 three-hour laboratory.

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 (2)**

Asphalt materials: design, control and testing of flexible pavement asphaltic mixtures. 2 three-hour laboratories. Prerequisite: CE 323

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. 2 lectures. Prerequisite: Senior standing.

*To be offered when course enrollment justifies.

ELECTRONICS ENGINEERING DEPARTMENT

Richard T. Black, *Department Head*

Melvin B. Belcher
Robert A. Bruns
Henry M. Clanton
David L. Clark
Alben C. Johnson
Howard K. Klebsch
A. Russell Knudsen
Verne L. LeCocq
James A. McAllister
John C. McMillan

George A. Mellard
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

The Electronics Engineering major prepares students for the application of science in that branch of engineering concerned with communications, electronic control of mechanical and electrical operations, computer design and application, microwave theory and techniques, and electrical metrology.

Graduates of this department are employed by a cross section of industry, utilities, governmental agencies, sales organizations, and educational institutions and work in design and development, test and evaluation, technical operations, and engineering sales. The broad use of electronic devices by state and federal agencies, business offices, military installations, and the home is increasing the employment opportunities in technical services.

In his freshman year, the student takes a series of courses in electronic technology, mathematics, physics, and chemistry, providing an opportunity to explore the field, and to develop skills and techniques for early employment as a technician.

Laboratory work during the four years is organized to parallel closely the type of work to which the young engineer is usually assigned during his first few years of employment.

Starting in the freshman year, the student works on closely-supervised jobs, then proceeds from directed experiments in analysis to senior year projects involving engineering synthesis.

The high school student planning a career in electronic engineering should take a balanced program including mathematics, physical science, drawing, and shops. The junior college student planning to transfer into this department should, insofar as possible, take courses which fulfill requirements of this curriculum.

Membership is available in a student branch of the Institute of Electrical and Electronic Engineers and an amateur radio group.

Curriculum in Electronics Engineering

<i>Freshman</i>	<i>F</i>	<i>W</i>	<i>S</i>
Basic Electronics (EL 107, 108, 109)	2	2	2
Basic Electronics Laboratory (EL 147, 148, 149)	1	1	1
*Engineering Drafting (ME 120 or 121, 122)		2	2
Metal Processes (MPE 142, 144)	1	1	
Welding Survey (WE 144)			1
†Analytic Geometry and Calculus (MAT 114, 115, 116)	3	3	3
Automatic Programming for Digital Computers (MAT 113)	1		
General Chemistry (CHM 111, 112)	3	3	
General Chemistry Laboratory (CHM 151, 152)	1	1	
Organic Chemistry (CHM 211)			3
Organic Chemistry Laboratory (CHM 251)			1
Freshman Composition (ENG 104, 105, 106)	3	3	3
Health Education (PE 107)	2		
Physical Education (PE 141)	½	½	½
Electives		1	1
	17½	17½	17½

Sophomore

Electronics (EL 201, 202, 203)	2	2	2
Electronics Laboratory (EL 241, 242)	1	1	
Fundamentals of Electrical Engineering (EE 211, 212, 213)	3	3	3
Electrical Engineering Laboratory (EE 252, 253)		1	1
Drafting for Electronics (EL 246)	2		
Engineering Materials (ME 314)			3
Principles of Fabrication (MPE 155)		1	
Production Welding Processes (WE 145)	1		
Calculus and Differential Equations (MAT 214, 215, 216)	4	4	4
General Physics (PHY 131, 132)	4	4	
Physics of Electricity and Magnetism (PHY 204)			4
Physical Education (PE 141)	½	½	½
	17½	16½	17½

Junior

Networks (EL 301, 302)	3	3	
Networks Laboratory (EL 341, 342)	1	1	
Electronic Circuits (EL 304, 305, 306)	3	3	3
Electronic Circuits Laboratory (EL 344, 345, 346)	1	1	1
Electric Machines (EE 313)			3
Differential Equations (MAT 317)	3		
Engineering Statics and Dynamics (ME 211, 212)	3	3	
Thermodynamics (ME 301)			3
General Psychology I (PSY 202)			3
Life Science (BIO 110)			3
†Principles of Economics (EC 201, 202)	3	3	
Electives		4	
	17	18	16

*ME 120 or ME 121 to be determined by the Mechanical Engineering department.

†To be selected from the General Education list.

‡Students not prepared to take MAT 114 will take MAT 104 and/or MAT 105 as determined by the Mathematics department.

Electronics Engineering

<i>Senior</i>	F	W	S
Senior Project (EL 461, 462)	2	2	
Undergraduate Seminar (EL 463)			2
Electromagnetic Fields (EL 402)		3	
Microwave Engineering (EL 403)			3
Microwave Laboratory (EL 443)			1
Networks (EL 303)	3		
Networks Laboratory (EL 343)	1		
Digital Circuits Design (EL 404)		3	
Digital Circuits Laboratory (EL 444)		1	
Communications Engineering (EL 405)			3
Communications Laboratory (EL 445)			1
Control Systems Engineering (EL 413)	3		
Systems Laboratory (EL 442)	1		
American Civilization (AMC 301, 302, 303)	3	3	3
†Literature		3	
†Literature or Philosophy	3		
§Restricted Electives			4
Electives	2	3	2
	18	18	19

Courses in Electronics Engineering

EL 107, 108, 109 Basic Electronics (2) (2) (2)

Fundamentals of DC circuits and networks, inductance, capacitance, magnetism and meters. Fundamentals of AC circuits, reactance, impedance, resonance, and transformers. Problem solving and applications of basic electronic concepts which provide a fundamental background for the beginning student. 2 lectures.

EL 147, 148, 149 Basic Electronics Laboratory (1) (1) (1)

Directed assignments facilitating an understanding of the operation and construction of electrical instruments, electronic equipment, basic electronic devices and basic circuits. Emphasis on use of test equipment. 1 three-hour laboratory. Concurrent: EL 107, 108, 109

EL 201, 202, 203 Electronics (2) (2) (2)

Internal behavior of vacuum, gaseous and semiconductor devices.

†To be selected from the General Education list.

§To be selected with the approval of the student's adviser.

Mathematical and graphical analysis, equivalent circuits. 2 lectures. Prerequisite: MAT 116, CHM 111, PHY 132. Concurrent: EL 241, 242. Concurrent or Prerequisite: MAT 216

EL 240 Additional Engineering Laboratory (1-2)

Total credit limited to 4 units, with not more than 2 units in any one quarter.

EL 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: EL 203

EL 246 Drafting for Electronics (2)

Schematic drafting. Electronic and industrial symbols. Symmetry and balance. Schematic delineation, projection. Graphic integration. 1 lecture, 1 three-hour laboratory. Prerequisite: ME 122

EL 301, 302, 303 Networks

(3) (3) (3)

Formulation and solution of network equations by classical and Laplace transform methods. Complex frequency, poles and zeros, reactive networks, filters. Transmission line equations and their solution. Smith charts, matching lines with loss. 3 lectures. Prerequisite: EE 213, 252; EL 203, 242. Concurrent or prerequisite: MAT 317

EL 304, 305, 306 Electronic Circuits

(3) (3) (3)

Semiconductors and tubes as circuit elements. Amplification, feedback and stabilization. Oscillators and frequency stability. Wave shaping and pulse techniques. RF amplifiers, modulation, detection and frequency conversion. 3 lectures. Prerequisite: EE 213, 252; EL 203, 242

EL 322 Electronic Engineering (3)

Theory of operation and application of electronic devices. 2 lectures, 1 three-hour laboratory. Prerequisite: MAT 116, EE 231

EL 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, EL 322

EL 341, 342, 343 Networks

Laboratory (1) (1) (1)

Experimental consideration of the characteristics and behavior of selected networks. Transmission line measurements, stub matching, transmission line charts. 1 three-hour laboratory. Prerequisite: EE 213, 252; EL 203, 242

EL 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, RF oscillators, modulators, detectors, discriminators, and frequency converters. Standard performance testing. 1 three-hour laboratory. Prerequisite: EE 213, 252; EL 203, 242

EL 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.

EL 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 213, MAT 317

EL 403 Microwave Engineering (3)

Microwave generation and energy propagation with emphasis on physical concepts and application to guided waves. 3 lectures.

EL 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: Senior standing, EL 303, 306

EL 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: Senior standing, EL 303, 306

Electronics Engineering

EL 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.

EL 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: Senior standing, EL 303, 306; EE 313

EL 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: EL 413, 442

EL 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: EL 203, 246, 306

EL 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: Senior standing.

EL 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.

EL 442 Systems Laboratory (1)

Selected laboratory exercises based upon the course work of EL 413. 1 three-hour laboratory. Prerequisite: Senior standing. EL 303, 306; EE 313

EL 443 Microwave Laboratory (1)

Laboratory exercises and applications of microwaves. 1 three-hour laboratory. Concurrent: EL 403

EL 444 Digital Circuits Laboratory (1)

Selected laboratory exercises from topics covered in EL 404. 1 three-hour laboratory. Concurrent: EL 404

EL 445 Communications Laboratory (1)

Demonstrations of the individual aspects of communication techniques. 1 three-hour laboratory. Concurrent: EL 405

EL 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.

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

Selection and completion of a project under faculty supervision. Project results are presented in a formal report. Minimum 120 hours total time.

EL 463 Undergraduate Seminar (2)

Discussion of new developments in the fields of communications and industrial electronics, with particular reference to field of employment. Job analysis. 2 lectures.

Courses in Electrical Engineering

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 116, PHY 132. Prerequisite or concurrent: PHY 204

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

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 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

INDUSTRIAL ENGINEERING DEPARTMENT

Joseph P. Wymer, *Department Head*

Leonhard M. Myers

J. Garrard Wright

Robert A. Quaney

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 rate and quality of the product rather than on designing the product itself; and on the managerial and financial aspects of planning, production, and sales. The industrial engineer considers not only the functions of tools and equipment, but also the behavior of people as they operate together in organizations.

Instruction is realistic and characteristic of the requirements of industry. Many local industries have permitted students to work on projects in their plants.

Curriculum in Industrial Engineering

<i>Freshman</i>	F	W	S
Industrial Engineering (IE 111)	3		
Motion and Time Study (IE 122, 123)		3	3
Molding and Casting (IE 134)	2		
Industrial Engineering Laboratory (IE 141)	1		
*Engineering Drafting (ME 120 or 121, 122, 123)	2	2	2
Manufacturing Metrology (MPE 141)	1		
Welding Survey (WE 144)	1		
Production Welding Processes I, II (WE 145, 146)		1	1
Metal Processes (MPE 142, 143, 144)	1	1	1
†Analytic Geometry and Calculus (MAT 114, 115)		3	3
General Physics (PHY 131, 132)		4	4
Freshman Composition (ENG 104, 105)	3	3	
Life Science (BIO 110)	3		
†Literature			3
Physical Education (PE 141)	$\frac{1}{2}$	$\frac{1}{2}$	$\frac{1}{2}$
	$17\frac{1}{2}$	$17\frac{1}{2}$	$17\frac{1}{2}$

*ME 120 or 121 to be determined by the Mechanical Engineering department.

†To be selected from the General Education list.

‡Students not prepared to take MAT 114 will take MAT 104 and/or MAT 105 as determined by the Mathematics department.

Industrial Engineering

Sophomore

	F	W	S
Industrial Incentives (IE 214)	3		
Production Processes (IE 222)			3
Industrial Costs and Controls (IE 232, 233)		3	3
Production Planning and Control (IE 236)			4
Engineering Statics and Dynamics (ME 211, 212)	3	3	
Metal Processes (MPE 146)	1		
Manufacturing Processes Laboratory (MPE 148)		1	
Principles of Fabrication (MPE 155)	1		
Applied Creativity in Metals (MPE 156)		1	
Analytic Geometry and Calculus (MAT 116)	3		
Calculus and Differential Equations (MAT 214, 215)		4	4
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		
Physical Education (PE 141)	½	½	½
Health Education (PE 107)		2	
	17½	18½	18½

Junior

Electronics Production Processes (IE 223)	3		
Production Engineering (IE 324, 325, 343 or 344)	3	3	2
Plant Layout and Material Handling (IE 331, 332)		3	3
Engineering Economy (IE 405)		3	
Industrial Data Processing (IE 428)	3		
Electrical Engineering (EE 231, 232)	3	3	
Electronic Engineering (EL 322)			3
Strength of Materials (ME 218, 219)		3	3
Materials Test Laboratory (ME 249)			1
Statistical Methods in Engineering (MAT 309)	3		
Automatic Programming for Digital Computers (MAT 113)	1		
Metallurgy (WE 304)	2		
Metallurgy Laboratory (WE 343)		1	
General Psychology I (PSY 202)			3
Electives		2	3
	18	18	18

Senior

Senior Project (IE 461, 462)	2	2	
Undergraduate Seminar (IE 463)			2
Industrial Organization (IE 404)	3		
Systems and Procedures (IE 406)		3	
Quality Control (IE 415)	3		
Introduction to Operations Research (IE 416)			3
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
§Technical Electives		3	
Electives	3		4
	17	17	15

†To be selected from the General Education list.

§To be selected with the approval of the student's adviser.

Industrial Engineering

Courses in 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 122, 123 Motion and Time Study (3) (3)

Theory and application of methods analysis as related to production design, work place layout, tools and equipment, and services. Micromotion studies, flow process charts and diagrams, man-machine charting, etc. Principles and techniques used in establishing standard times, time study, standard data, formula application, predetermined motion times, work sampling, etc. 2 lectures, 1 three-hour laboratory.

IE 134 Molding and Casting (2)

Shaping of metals while in the liquid state; common molding and casting techniques for both ferrous and non-ferrous materials and alloys. 1 lecture, 1 three-hour laboratory.

IE 141 Industrial Engineering Laboratory (1)

Engineering approach to problem solving. Slide rule, elementary industrial engineering problems. Introduction to digital computer applications to industrial systems. 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 143, WE 145

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 122, 123

IE 222 Production Processes (3)

Manufacturing processes. Forging, drawing, extruding, mixing, milling, calendaring, etc. Ferrous and non-ferrous metals, plastics and rubber processes. New manufacturing techniques such as high energy forming, chemical milling, electrical machining, and numerical control. 2 lectures, 1 three-hour laboratory. Prerequisite: MPE 143, WE 145, IE 134

IE 223 Electronics Production Processes (3)

Manufacturing processes as used in the electronics industry from fabrication of sample chassis to manufacturing of complex printed circuits and master consoles. For majors other than IE. 2 lectures, 1 three-hour laboratory. Prerequisite: IE 222 or 202

IE 232, 233 Industrial Costs and Controls (3) (3)

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. 2 lectures, 1 three-hour laboratory. Prerequisite: IE 111

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 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)

Principles of designing and developing detailed production plans for given products. Selection of production processes, sequence of operations, equipment, facilities, methods, tool plans and requirements. Estimating costs. Value engineering and cost analysis techniques. Short-run as well as long-run production techniques. 2 lectures, 1 three-hour laboratory. Prerequisite: IE 223, MPE 146, WE 146

IE 325 Production Engineering II (3)

Manufacturing techniques, jigs, fixtures, dies and special purpose tooling. Manufacturing economy and reliability. Automating the manufacturing process. Tooling required for integrated methods, transfer mechanisms, production accessories, electromechanical tooling devices. 2 lectures, 1 three-hour laboratory. Prerequisite: IE 324, ME 123

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 223

IE 343 Production Engineering III (2)

Estimation, scheduling, and manufacture of selected items on a simulated industrial production line, utilizing the tooling designed and manufactured in IE 325. 2 three-hour laboratories. Prerequisite: IE 325

IE 344 Industrial Processes Laboratory (2)

Operation and use of modern machine tools, plastics and metal-forming machinery. Operation by the student of representative types of equipment. 2 three-hour laboratories. Prerequisite: IE 325

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 IE courses.

IE 406 Systems and Procedures (3)

Techniques of analysis and design applied to systems and procedures. Development of overall systems. Writing required procedures to implement efficient execution of assigned functions. 2 lectures, 1 three-hour laboratory. Prerequisite: Senior standing.

IE 415 Quality Control (3)

Systems of inspection, analysis and action taken to control manufacturing processes. Sampling plans, control charts, statistical analysis, and other tools used by management to control costs and improve quality. 3 lectures. Prerequisite: MAT 309

IE 416 Introduction to Operations Research (3)

Application of statistical methods, linear programming, queuing and other analysis techniques to problems encountered in industry. 3 lectures. Prerequisite: MAT 309

IE 419 Reliability Concepts and Techniques (3)

Reliability concepts and techniques as they are used in various types of

Industrial Engineering

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: Senior standing.

IE 428 Industrial Data Processing (3)

Production applications of various computers and combinations of supporting data processing equipment. Engineering studies of systems, methods and equipment applications. Problems in inventory control, production control, payroll, etc., requiring data processing equipment. 2 lectures, 1 three-hour laboratory. Prerequisite: Junior standing.

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.

MECHANICAL ENGINEERING DEPARTMENT

Walter E. Holtz, *Department Head*

Robert L. Beardmore
Walter J. Ebersole
George F. Engelke
Robert G. Feeny
Edward D. Galbraith
James D. Goodin

Charles J. Kessler
Harvey A. Mylander
Kenneth J. Schneider
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

<i>Freshman</i>	<i>F</i>	<i>W</i>	<i>S</i>
*Engineering Drafting (ME 120 or 121, 122)	2	2	
Mechanical Engineering (ME 131, 132, 133)	3	2	2
Mechanical Engineering Laboratory (ME 144)		1	

*ME 120 or ME 121 to be determined by the Mechanical Engineering department.

Mechanical Engineering

	F	W	S
Welding Survey (WE 144)	1		
Production Welding Processes I, II (WE 145, 146)		1	1
Metal Processes (MPE 142, 143)	1	1	
†Analytic Geometry and Calculus (MAT 114, 115)		3	3
Descriptive Geometry (ME 125)			2
General Chemistry (CHM 111, 112)	3	3	
General Chemistry Laboratory (CHM 151, 152)	1	1	
Freshman Composition (ENG 104, 105)	3	3	
General Physics (PHY 131)			4
General Psychology I (PSY 202)			3
Health Education (PE 107)			2
Physical Education (PE 141)	½	½	½
Electives	3		
Sophomore	17½	17½	17½
Engineering Statics (ME 214)	3		
Engineering Kinematics (ME 215)		3	
Engineering Kinetics (ME 216)			3
Engineering Drafting (ME 123)			2
Strength of Materials (ME 218, 219)		3	3
Materials Test Laboratory (ME 249)			1
Manufacturing Metrology (MPE 141)		1	
Metal Processes (MPE 144)		1	
Metallurgy Laboratory (WE 343)		1	
Metal Processes (MPE 146)			1
Metallurgy (WE 304)	2		
Analytic Geometry and Calculus (MAT 116)	3		
Calculus and Differential Equations (MAT 214, 215)		4	4
General Physics (PHY 132, 133)	4	4	
Life Science (BIO 110)	3		
Technical Writing (ENG 219)	2		
Production Processes (IE 202)			3
Physical Education (PE 141)	½	½	½
	17½	17½	17½
Junior			
Thermodynamics (ME 301, 302)	3	3	
Fluid Mechanics (ME 311, 312)	3	3	
Machine Design (ME 324, 325)	3	3	
Heat Transfer (ME 313)			3
Mechanical Engineering Laboratory (ME 345, 346)	1		1
Manufacturing Processes Laboratory (MPE 148)	1		
Electronic Engineering (EL 322, 323)		3	3
Principles and Practices of Electrical Engineering (EL 231, 232, 233)	3	3	3
Calculus and Differential Equations (MAT 216)	4		
†Literature			3
Senior Project (ME 461)			2
‡Technical Electives			3
Electives		3	
	18	18	18

†To be selected from the General Education list.

‡Students not prepared to take MAT 114 will take MAT 104 and/or MAT 105 as determined by the Mathematics department.

§To be selected with the approval of the student's adviser.

Mechanical Engineering

Senior	F	W	S
Senior Project (ME 462)	2		
Undergraduate Seminar (ME 463)		2	
Mechanical Vibrations (ME 315)	3		
Advanced Engineering Measurements (ME 435)		2	
Principles of Fabrication (MPE 155)	1		
Applied Creativity in Metals (MPE 156)		1	
American Civilization (AMC 301, 302, 303)	3	3	3
Principles of Economics (EC 201, 202)		3	3
†Literature or Philosophy			3
§Technical Electives	6	3	6
Electives	3	4	
	<hr/>	<hr/>	<hr/>
	18	18	15

Courses in Mechanical Engineering

ME 120 Engineering Drafting (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 Drafting (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 Drafting (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 Drafting (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 121 or ME 120

ME 131 Mechanical Engineering (3)

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, 1 three-hour laboratory.

ME 132 Mechanical Engineering (2)

Extension of problem solving. Problems involving basic computational methods including slide rule and 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.

Mechanical Engineering

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 144 Mechanical Engineering Laboratory (1)

Basic mechanical engineering measurements. Experimental determination of speed, time, pressure, temperature, density, viscosity, and related properties, using instruments found in general use in industry. Preparation of formal engineering reports. 1 three-hour laboratory. Concurrent: ME 131

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 EL, 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 EL, 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 (3)

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. 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 249 Materials Test Laboratory (1)

Commercial tests of materials. Familiarity with the physical properties of industrial materials. 1 three-hour laboratory. Prerequisite: ME 144 or CE 122, ME 218

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)

Antropy 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 315 Mechanical Vibrations (3)

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 multi-

cylinder engine balancing. Actual case studies of vibration isolation and machine balancing. 3 lectures. Prerequisite: ME 216, MAT 215

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, IE 202, MPE 144, 156, WE 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 345 Mechanical Engineering Laboratory (1)

Application of basic measurement techniques to actual equipment and the interpretation of results. Includes experiments in mechanics, instrumentation, turbomachinery, and elementary performance testing of mechanical equipment. Experimental results compared with analytical determinations. Preparation of formal engineering reports. 1 three-hour laboratory. Prerequisite: ME 144, 216

ME 346 Mechanical Engineering Laboratory (1)

Experiments in the application of thermodynamics and fluid mechanics theory to various types of equipment. Determinations of the efficiency of equipment using various heat cycles, modes of heat transfer and operation.

Mechanical Engineering

Determination of caloric value of various fuels and the study of fluid flow phenomena. Preparation of formal engineering reports. 1 three-hour laboratory. Prerequisite: ME 144, 301, 311. Concurrent: ME 312

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, PHY 211

***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

***ME 414 Advanced Dynamics (3)**

Applications of Lagrange's equations and Hamilton's principle to systems having many degrees of freedom, gyrostatics, trajectory studies of rigid and elastic bodies. 3 lectures. Prerequisite: ME 315, 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 420 Creativity (2)**

A survey of creativity. Learning the skill and technique of creative thought. Demonstration of creative solutions to problems. 2 lectures. Prerequisite: Junior standing.

***ME 421 Mechanisms (2)**

Application of special mechanisms to practical problems in engineering. Geneva wheels, ratchets, couplings, universal joints, governors, escapements, straight line motion mechanisms. 1 lecture, 1 three-hour laboratory. 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 435 Advanced Engineering Measurements (2)

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, 1 three-hour laboratory. Prerequisite: ME 302, 312, 315, EL 322

*To be offered when course enrollment justifies.

***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 315

***ME 440 Analog Computation (3)**

Application of the electronic analog computer to the solution of typical problems in engineering. 2 lectures, 1 three-hour laboratory. Prerequisite: ME 216 or 212; MAT 215

*To be offered when course enrollment justifies.

***ME 441 Control Systems (3)**

Introduction to automatic control system analysis and design. Mechanical, electromechanical, hydraulic and pneumatic systems will be treated. For non-Electronics Engineering majors. 3 lectures. Prerequisite: MAT 215, EL 323, EE 233, ME 311, 315

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.

METAL PROCESSES ENGINEERING DEPARTMENT

Russell A. Parish, *Chairman*

Bratcher L. Bright

Donald E. Brown

Daniel H. Fillhart

Quay D. Ives

Jack L. Pomeroy

Instruction in engineering manufacturing and shop practices offers the student a foundation in the basic skills and an understanding of the capabilities and limitations of machine tools. Knowledge of the role of machine tools in present-day engineering and manufacturing enterprises assists the student in relating experience to theory.

Laboratories in the department are equipped with the latest machine tools, attachments, and precision instruments for the construction of dies, tools, jigs, and fixtures such as are found in modern industry. Punch presses, die-sinking machines, plastic presses and plastic mold-making equipment are provided for engineering students taking advanced courses.

Courses in Metal Processes Engineering

MPE 141 Manufacturing Metrology (1)

Actual experience in linear metrology. Basic principles and techniques of measuring size, flatness, roundness, angles, threads and surface finish. Dimensional control concepts and methods of non-precision and precision measurement. 1 three-hour laboratory.

MPE 142 Metal Processes (1)

An introduction to the metal processes involving lathes, 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 materials. Machining experience on the lathe including taper turning, 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 144 Metal Processes (1)

Theory reinforced by experience using various work-holding and tool-holding devices in the set-up and operation of shapers and milling machines. Speeds and feeds, as related to manually and numerically controlled machines. 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. Prerequisite: MPE 144

MPE 148 Manufacturing Processes Laboratory (1)

Set-up and operation of various production machines including turret and tracer lathes, milling machines, surface and cylindrical grinders, and

Metal Processes Engineering

honing. Demonstration and operation of plastic equipment. Economic considerations and functional capabilities of production equipment. 1 three-hour laboratory. Prerequisite: MPE 141, 143, 146

MPE 155 Principles of Fabrication (1)

Theory reinforced with experience involving the principles of metal flow and plastic deformation. Experience in fundamental characteristics of blanking, bending, drawing, material handling, assembling and finishing techniques. Operational relationships between manually and numerically controlled equipment. 1 three-hour laboratory.

MPE 156 Applied Creativity in Metals (1)

Creative engineering in the area of plastic deformation metal manufacturing processes. Problems of designing a marketable product, building a proto-

type, making engineering changes, planning the operations, building the tooling, and producing a predetermined quantity. Involves making important economic decisions. 1 three-hour laboratory. Prerequisite: MPE 155

MPE 240 Individualized Problems (1-2)

Advanced individualized instruction, a depth study of a specific industrial process or operation. Intensive study, experimentation, and progressive evaluation; emphasis upon experimental research. 1 or 2 three-hour laboratories. Prerequisite: MPE 144 and MPE 156. Total credit limited to 4 units.

MPE 438 Plastics Manufacturing (2)

Theory reinforced with experience using modern equipment. Injection, compression and transfer molding; mixing, laminating, and vacuum forming. 1 lecture, 1 three-hour laboratory. Prerequisite: Senior standing.

WELDING ENGINEERING DEPARTMENT

William M. Harris, *Chairman*
Mel D. Compton
Daniel H. Fillhart

George D. Lanthorne

The Welding Engineering 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 the use of oxyacetylene, metallic arc, tig, mig, carbon dioxide, and submerged arc welding equipment; manual and automatic oxygen, and plasma severing equipment; and resistance welding equipment for spot, projection, seam, and flash-butt processes. In addition nondestructive testing equipment includes devices for the study of X-ray, ultrasonic, magnetic particle, and penetrant methods. The department also operates a metallographic laboratory.

Courses in Welding Engineering

WE 144 Welding Survey (1)

General survey of all major welding processes, weld nomenclature, types of joints, welding symbols, weld inspection, and thermal effects of welding. Basic oxyacetylene welding techniques and safety. 1 three-hour laboratory.

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. Prerequisite: WE 144

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 144

WE 156 Advanced Metallic Arc Welding (1)

Shielded metallic arc welding of heavy steel plates. Includes butt weld

types, uses of backing materials, hard facing, cast iron, and overhead fillets. Basic weld tests. Arc welding of light-gauge steel sheets. 1 three-hour laboratory. Prerequisite: WE 146

WE 240 Additional Welding Laboratory (1-2)

Additional experience with welding processes. 1 or 2 three-hour laboratories. Prerequisite: WE 145 or 146, permission of department head. Total credit limited to 4 units, with not more than 2 units in any one quarter.

WE 254 Advanced Welding (1)

Types and uses of various welding machines, operating costs. Use of structural steel shapes for building machinery and farm equipment. Welding symbols, strength of welded joints, and basic cost estimating problems. 1 three-hour laboratory. Prerequisite: WE 156

WE 304 Metallurgy (2)

Principles of physical metallurgy. Ferrous and non-ferrous metals and their alloys. Structure of metals. Constitutional diagrams, applications and designations. 2 lectures. Prerequisite: WE 144, PHY 131, CHM 112

WE 306 Advanced Physical Metallurgy (3)

Powder metallurgy and castings materials, processes, design and applications. Tool steels. 3 lectures. Prerequisite: WE 304

WE 322 Non-Destructive Testing (4)

Studies of non-destructive testing methods. Practice in X-ray and penetrant inspection. 2 lectures, 2 three-hour laboratories. Prerequisite: WE 304

WE 341 Special Problems in Welding (1-3)

Fundamentals of welding metallurgy, weldability of steels, steels and alloys for welded construction. Codes for construction of welded unfired pressure vessels. Design of pressure vessels according to the code used. 1, 2 or 3 three-hour laboratories. Prerequisite: WE 156

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: WE 146, MPE 144, ME 324, or ARO 349 or CE 341. WE 304 recommended.

WE 443 Mechanical Metallurgy (1)

A seminar course on the classification, designation, and properties of metals and alloys. Emphasis on trade nomenclature. 1 three-hour laboratory. Prerequisite: Senior standing.

WE 202 - Welding Laboratory (I)
This laboratory is designed to provide the student with a practical knowledge of the welding process. The student will be required to perform a variety of welding operations on mild steel, stainless steel, and aluminum.

WE 211, 212, 213, 214, 215, 216, 217, 218, 219, 220, 221, 222, 223, 224, 225, 226, 227, 228, 229, 230, 231, 232, 233, 234, 235, 236, 237, 238, 239, 240, 241, 242, 243, 244, 245, 246, 247, 248, 249, 250, 251, 252, 253, 254, 255, 256, 257, 258, 259, 260, 261, 262, 263, 264, 265, 266, 267, 268, 269, 270, 271, 272, 273, 274, 275, 276, 277, 278, 279, 280, 281, 282, 283, 284, 285, 286, 287, 288, 289, 290, 291, 292, 293, 294, 295, 296, 297, 298, 299, 300, 301, 302, 303, 304, 305, 306, 307, 308, 309, 310, 311, 312, 313, 314, 315, 316, 317, 318, 319, 320, 321, 322, 323, 324, 325, 326, 327, 328, 329, 330, 331, 332, 333, 334, 335, 336, 337, 338, 339, 340, 341, 342, 343, 344, 345, 346, 347, 348, 349, 350, 351, 352, 353, 354, 355, 356, 357, 358, 359, 360, 361, 362, 363, 364, 365, 366, 367, 368, 369, 370, 371, 372, 373, 374, 375, 376, 377, 378, 379, 380, 381, 382, 383, 384, 385, 386, 387, 388, 389, 390, 391, 392, 393, 394, 395, 396, 397, 398, 399, 400, 401, 402, 403, 404, 405, 406, 407, 408, 409, 410, 411, 412, 413, 414, 415, 416, 417, 418, 419, 420, 421, 422, 423, 424, 425, 426, 427, 428, 429, 430, 431, 432, 433, 434, 435, 436, 437, 438, 439, 440, 441, 442, 443, 444, 445, 446, 447, 448, 449, 450, 451, 452, 453, 454, 455, 456, 457, 458, 459, 460, 461, 462, 463, 464, 465, 466, 467, 468, 469, 470, 471, 472, 473, 474, 475, 476, 477, 478, 479, 480, 481, 482, 483, 484, 485, 486, 487, 488, 489, 490, 491, 492, 493, 494, 495, 496, 497, 498, 499, 500, 501, 502, 503, 504, 505, 506, 507, 508, 509, 510, 511, 512, 513, 514, 515, 516, 517, 518, 519, 520, 521, 522, 523, 524, 525, 526, 527, 528, 529, 530, 531, 532, 533, 534, 535, 536, 537, 538, 539, 540, 541, 542, 543, 544, 545, 546, 547, 548, 549, 550, 551, 552, 553, 554, 555, 556, 557, 558, 559, 560, 561, 562, 563, 564, 565, 566, 567, 568, 569, 570, 571, 572, 573, 574, 575, 576, 577, 578, 579, 580, 581, 582, 583, 584, 585, 586, 587, 588, 589, 590, 591, 592, 593, 594, 595, 596, 597, 598, 599, 600, 601, 602, 603, 604, 605, 606, 607, 608, 609, 610, 611, 612, 613, 614, 615, 616, 617, 618, 619, 620, 621, 622, 623, 624, 625, 626, 627, 628, 629, 630, 631, 632, 633, 634, 635, 636, 637, 638, 639, 640, 641, 642, 643, 644, 645, 646, 647, 648, 649, 650, 651, 652, 653, 654, 655, 656, 657, 658, 659, 660, 661, 662, 663, 664, 665, 666, 667, 668, 669, 670, 671, 672, 673, 674, 675, 676, 677, 678, 679, 680, 681, 682, 683, 684, 685, 686, 687, 688, 689, 690, 691, 692, 693, 694, 695, 696, 697, 698, 699, 700, 701, 702, 703, 704, 705, 706, 707, 708, 709, 710, 711, 712, 713, 714, 715, 716, 717, 718, 719, 720, 721, 722, 723, 724, 725, 726, 727, 728, 729, 730, 731, 732, 733, 734, 735, 736, 737, 738, 739, 740, 741, 742, 743, 744, 745, 746, 747, 748, 749, 750, 751, 752, 753, 754, 755, 756, 757, 758, 759, 760, 761, 762, 763, 764, 765, 766, 767, 768, 769, 770, 771, 772, 773, 774, 775, 776, 777, 778, 779, 780, 781, 782, 783, 784, 785, 786, 787, 788, 789, 790, 791, 792, 793, 794, 795, 796, 797, 798, 799, 800, 801, 802, 803, 804, 805, 806, 807, 808, 809, 810, 811, 812, 813, 814, 815, 816, 817, 818, 819, 820, 821, 822, 823, 824, 825, 826, 827, 828, 829, 830, 831, 832, 833, 834, 835, 836, 837, 838, 839, 840, 841, 842, 843, 844, 845, 846, 847, 848, 849, 850, 851, 852, 853, 854, 855, 856, 857, 858, 859, 860, 861, 862, 863, 864, 865, 866, 867, 868, 869, 870, 871, 872, 873, 874, 875, 876, 877, 878, 879, 880, 881, 882, 883, 884, 885, 886, 887, 888, 889, 890, 891, 892, 893, 894, 895, 896, 897, 898, 899, 900, 901, 902, 903, 904, 905, 906, 907, 908, 909, 910, 911, 912, 913, 914, 915, 916, 917, 918, 919, 920, 921, 922, 923, 924, 925, 926, 927, 928, 929, 930, 931, 932, 933, 934, 935, 936, 937, 938, 939, 940, 941, 942, 943, 944, 945, 946, 947, 948, 949, 950, 951, 952, 953, 954, 955, 956, 957, 958, 959, 960, 961, 962, 963, 964, 965, 966, 967, 968, 969, 970, 971, 972, 973, 974, 975, 976, 977, 978, 979, 980, 981, 982, 983, 984, 985, 986, 987, 988, 989, 990, 991, 992, 993, 994, 995, 996, 997, 998, 999, 1000

WE 203 - Welding Laboratory (II)
This laboratory is designed to provide the student with a practical knowledge of the welding process. The student will be required to perform a variety of welding operations on mild steel, stainless steel, and aluminum.

WE 204 - Welding Laboratory (III)
This laboratory is designed to provide the student with a practical knowledge of the welding process. The student will be required to perform a variety of welding operations on mild steel, stainless steel, and aluminum.

Welding Process in Detail

WE 205 - Welding Process in Detail (I)
This laboratory is designed to provide the student with a practical knowledge of the welding process. The student will be required to perform a variety of welding operations on mild steel, stainless steel, and aluminum.

WE 206 - Welding Process in Detail (II)
This laboratory is designed to provide the student with a practical knowledge of the welding process. The student will be required to perform a variety of welding operations on mild steel, stainless steel, and aluminum.

WE 207 - Industrial Welding
This laboratory is designed to provide the student with a practical knowledge of the welding process. The student will be required to perform a variety of welding operations on mild steel, stainless steel, and aluminum.

WE 208 - Advanced Metals for Welding (I)
This laboratory is designed to provide the student with a practical knowledge of the welding process. The student will be required to perform a variety of welding operations on mild steel, stainless steel, and aluminum.

WE 209 - Advanced Physics

This laboratory is designed to provide the student with a practical knowledge of the welding process. The student will be required to perform a variety of welding operations on mild steel, stainless steel, and aluminum.

WE 210 - Non-Destructive Testing (I)
This laboratory is designed to provide the student with a practical knowledge of the welding process. The student will be required to perform a variety of welding operations on mild steel, stainless steel, and aluminum.

WE 211 - Special Problems in Welding (I)
This laboratory is designed to provide the student with a practical knowledge of the welding process. The student will be required to perform a variety of welding operations on mild steel, stainless steel, and aluminum.

WE 212 - Special Problems in Welding (II)
This laboratory is designed to provide the student with a practical knowledge of the welding process. The student will be required to perform a variety of welding operations on mild steel, stainless steel, and aluminum.

WE 213 - Special Problems in Welding (III)
This laboratory is designed to provide the student with a practical knowledge of the welding process. The student will be required to perform a variety of welding operations on mild steel, stainless steel, and aluminum.

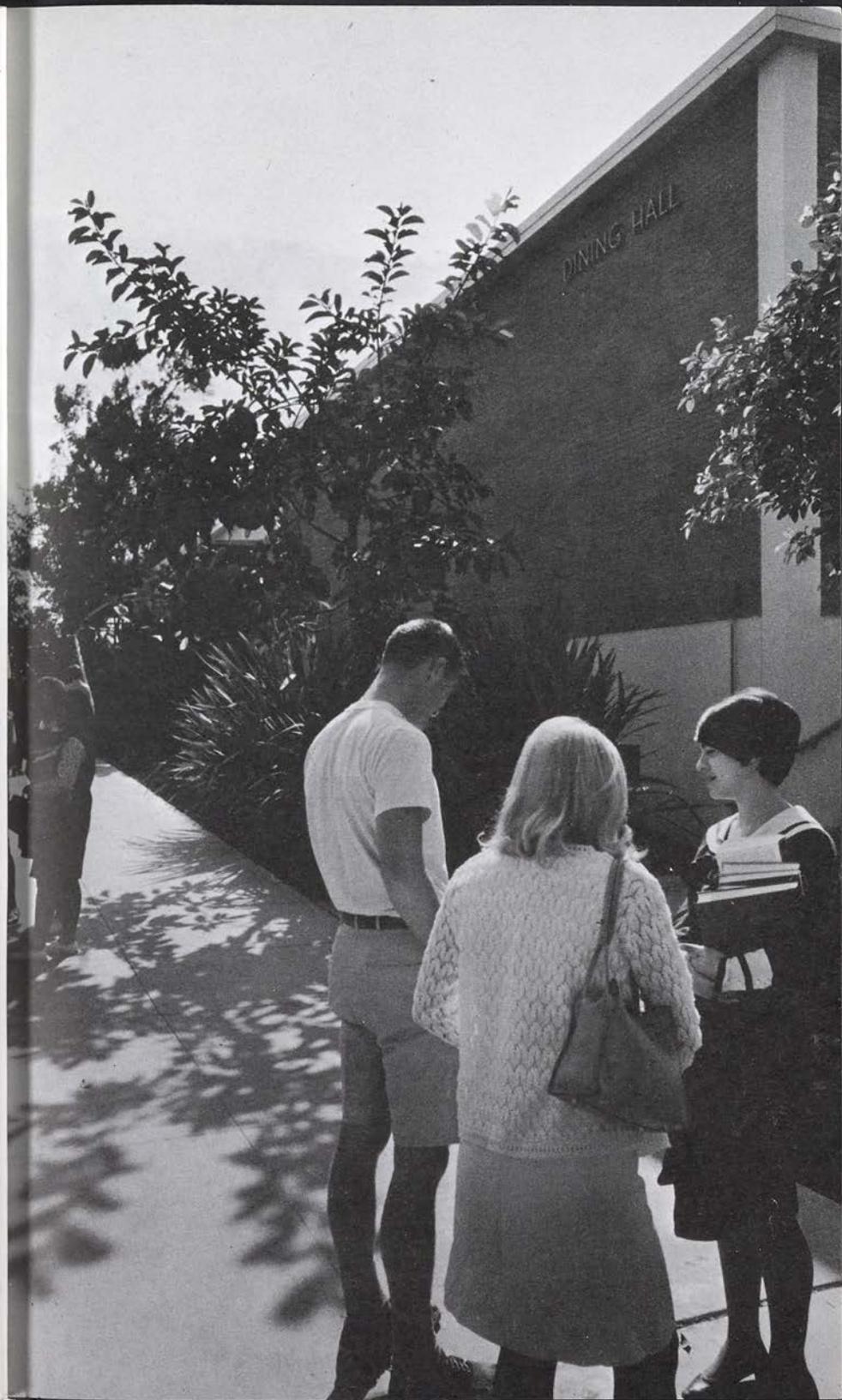
WE 214 - Advanced Welding Laboratory (I-2)

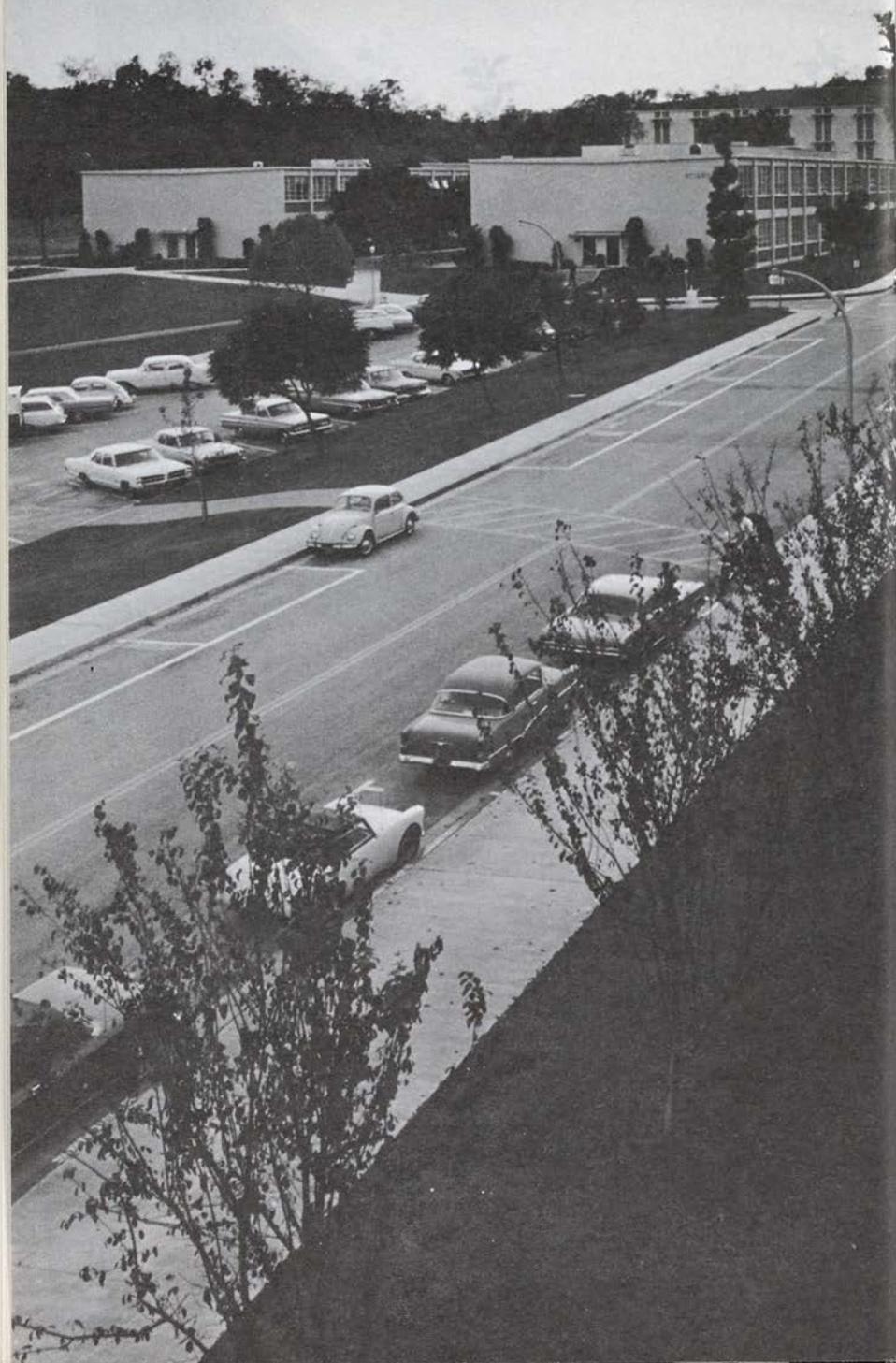
This laboratory is designed to provide the student with a practical knowledge of the welding process. The student will be required to perform a variety of welding operations on mild steel, stainless steel, and aluminum.

WE 215 - Advanced Welding (II)
This laboratory is designed to provide the student with a practical knowledge of the welding process. The student will be required to perform a variety of welding operations on mild steel, stainless steel, and aluminum.

WE 216 - Welding (2)

This laboratory is designed to provide the student with a practical knowledge of the welding process. The student will be required to perform a variety of welding operations on mild steel, stainless steel, and aluminum.





SCHOOL OF SCIENCE

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SCI

SCHOOL OF SCIENCE

BIOLOGICAL SCIENCES

MATHEMATICS

PHYSICAL SCIENCES

SCI

THE SCHOOL OF SCIENCE

Dean

The School of Science serves several important functions in the educational program of the college.

Majors leading to the Bachelor of Science degree are offered in Biological Sciences, Chemistry, Mathematics, and Physical Sciences. Within the Biological Sciences major students may pursue options in bacteriology, biology, botany, and zoology. Options in Physical Sciences include both physical science and physics.

The School of Science provides all students with instruction in general education. The need to understand the concept of modern science and mathematics and their relationship to our present world society has never been so needed as now. In addition, the School of Science offers basic supporting courses for students enrolled in the professional and technological degree programs of the college.

The Standard Teacher Credential program is offered for both the Elementary Specialization and the Secondary Specialization. A prospective elementary teacher may elect a major in biological sciences, mathematics, or physical sciences and a minor in biology, chemistry, mathematics or physics. A prospective secondary teacher may elect a major in biological sciences, chemistry, mathematics or physics and a minor in biology, chemistry, mathematics or physics.

Each curriculum offered by the School is designed to prepare graduates for specific professional positions as well as for advanced work in their disciplines. The four-year sequence covers the basic major courses but has a sufficient number of free electives to allow students to develop specializations within the major or in closely related fields.

An active co-curricular program includes Beta Beta Beta Biological honor society; Biovia, a club for Biological Science majors; a chapter of Kappa Mu Epsilon (mathematics); the Quantum Club, for Physical Science majors; a SCUBA club, and other organizations.

BIOLOGICAL SCIENCES DEPARTMENT

Jerome E. Dimitman, *Department Head*

Ralph W. Ames
Lawrence M. Blakely
Howard S. Brown
Jack L. Erspamer
Bruce L. Firstman
Donald C. Force
Vernon L. Gregory
Lamar M. Knill

Harold L. Lint
Edward T. Roche
Fred Shafia
Glenn R. Stewart
Martin F. Stoner
Laszlo J. Szijj
Jia-Hsi Wu

A four-year curriculum leading to a degree in Biological Sciences with options in Botany, Biology, Microbiology, and Zoology and a concentration in Systematic Entomology is offered by the department. The curriculum provides a broad and fundamental program essential to an understanding of the field of biology, yet allows sufficient latitude, through selection of electives, for concentration in various fields.

Courses also are offered by the department to fulfill the general education requirements in life science, and adequate undergraduate preparation is provided for beginning work at the graduate level. Besides laboratories, greenhouses for practical work in the plant sciences are available and the college location makes possible field work in desert, mountain, seashore, and coastal areas.

Curriculum in Biological Sciences

Freshman

	<i>F</i>	<i>W</i>	<i>S</i>
Freshman Composition (ENG 104, 105, 106)	3	3	3
Physical Education (PE 141)	½	½	½
Health Education (PE 107)	2		
Basic Biology (BIO 115)	3		
Basic Biology Laboratory (BIO 145)	2		
General Chemistry (CHM 111, 112)	3	3	
General Chemistry Laboratory (CHM 151, 152)	1	1	
Introduction to Mathematical Analysis (MAT 108, 109)		3	3
General Zoology (ZOO 134, 135)		4	4
Organic Chemistry (CHM 211)			3
Organic Chemistry Laboratory (CHM 251)			1
Biological Microscopy (BIO 151)		1	
Electives	2	1	2
	<hr/>	<hr/>	<hr/>
	16½	16½	16½

Sophomore

Physical Education (PE 141)	½	½	½
General Botany (BOT 124, 125)	5	5	
Genetics (BIO 303)	3		

Biological Sciences

	F	W	S
General Entomology (ENT 126)			4
College Physics (PHY 121, 122, 123)	4	4	4
†Literature			3
†Literature, Philosophy, Art or Music		3	3
Principles of Economics (EC 201, 202)		3	3
Introduction to Mathematical Analysis (MAT 204)	3		
Electives		1	
	15½	16½	17½

Junior

General Bacteriology (BAC 221)		4	
Principles of Evolution (BIO 213)			3
Public Speaking (SP 200)			3
American Civilization (AMC 301, 302, 303)	3	3	3
General Psychology I (PSY 202)		3	
Biometrics (BIO 311)	3		
†Electives and courses to complete major	11	7	8
	17	17	17

Senior

Senior Project (BIO 461, 462)	2	2	
Undergraduate Seminar (BIO 463)			2
Principles of Ecology (BIO 325)		3	
Principles of Taxonomy (BIO 306)	3		
†Electives and courses to complete major	11	11	14
	16	16	16

Curricular Options and Concentration

Biology

The option prepares the student for elementary or secondary teaching and for employment in many diverse areas of life science, including park and forest service work, and related positions.

Courses to complete major

Junior

- BIO 200—History of Biology (3)
- BIO 201—Conservation of
Natural Resources (3)
- ENT 334—Morphology of
Immature Insects (3)
- BIO 335—Fresh Water Biology— (4)

Senior

- ZOO 329—Ornithology (3)

- ZOO 341—Mammology (3)
- BIO 341, 342—Biotechniques (4)
- BOT 322—Plant Physiology (4)
- BOT 335—Plant Anatomy (4)

Botany

The option leads to preparation for work in the plant sciences such as mycology, plant pathology, plant physiology, and taxonomy.

Courses to complete major

Junior

- PTH 223—General Plant
Pathology (4)
- BOT 307—Economic Botany (3)
- BOT 322—Plant Physiology (4)
- BOT 334—Morphology of
Vascular Plants (4)

†To be selected from the General Education list.

‡Students concentrating in Systematic Entomology will select 18 to 29 units with the approval of the adviser.

Bacteriology

Senior

- BOT 426—Mycology (4)
BOT 335—Plant Anatomy (4)
BIO 423—General Cytology (4)
BIO 431—Radiation Biology (4)
BOT 343—Taxonomy of
Higher Plants (2)

Microbiology

The option prepares the student for employment in microbiology and related areas such as public health, sanitation, industrial and pharmaceutical industries, and medical and research laboratories. It also prepares the student for entrance into graduate schools in microbiology, and into medical and dental schools.

Courses to complete major

Junior

- BAC 424—Food Microbiology (4)
BAC 322—Dairy Bacteriology (4)
BAC 332—Soil Microbiology (4)
BAC 333—Sanitary and Industrial
Bacteriology (3)

Senior

- BAC 423—Pathogenic
Bacteriology (4)
CHM 327—Biochemistry (4)
BAC 431—General Virology (3)
BAC 432—Advanced
Microbiology (3)
BAC 433—Serology (3)
BAC 443—Immunology (3)

Courses in Bacteriology

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 145; CHM 111, 151 or CHM 104, 141

BAC 322 Dairy Bacteriology (4)

Micro-organisms involved in dairy products, milk, milk powders, butter, cheese, ice cream and other dairy products. 2 lectures, 2 three-hour laboratories. Prerequisite: BAC 221

Zoology

The option prepares the student for work in various fields of animal science, such as fish and game, wildlife, entomology, museums, and conservation, as well as entrance to graduate and pre-professional schools.

Courses to complete major

Junior

- ZOO 324—Animal Physiology (4)
ZOO 329—Ornithology (3)
ZOO 236—Invertebrate Zoology (4)
ZOO 326—Comparative Anatomy
of Vertebrates (4)

Senior

- ZOO 341—Mammology (3)
ZOO 422—Histology (4)
ZOO 425—Parasitology (4)
ZOO 429—Herpetology (3)
ZOO 435—Arthropod Vectors (3)
ZOO 323—Embryology (4)

Systematic Entomology

The concentration prepares the student for advanced training and employment in museum work, public health, and sanitation through emphasis of insect taxonomy, physiology, morphology, pathology, and related subjects.

BAC 332 Soil Microbiology (4)

Methods of studying soil microflora-plant rhizosphere relationships; methods of sampling and isolating micro-organisms 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 and Industrial Bacteriology (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 (3)

Theory and practice of serological methods involving antigen-antibody reactions. 2 lectures, 1 three-hour laboratory. Prerequisite: BAC 221

BAC 443 Immunology (3)

Principles of immunology involving a study of the mechanisms of resistance to infection and the procedures involved in evaluating the immune response. 2 lectures, 1 three-hour laboratory. Prerequisite: BAC 221

Courses in 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 151 Biological Microscopy (1)

Principles of microscopy, including structure, use, and care of various op-

tical instruments used in the study of biological materials and problems. 1 three-hour laboratory.

BIO 200 History of Biology (3)

Chronological résumé of events, inventions, discoveries, and workers contributing to growth of biological sciences. Less emphasis on purely medical events than those of general biological importance. 3 lectures.

BIO 201 Conservation of Natural Resources (3)

Fundamental concepts, practices, local and national laws concerning conservation of natural resources of the United States with emphasis on California and the western states. 3 lectures. Prerequisite: Consent of instructor.

BIO 213 Principles of Evolution (3)

Introduction to plant and animal evolution. 3 lectures. Prerequisite: BIO 145

Biology

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 115

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

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 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, CHM 327

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 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 of employment with results presented in a formal report. Minimum of 120 hours total time.

BIO 463 Undergraduate Seminar (2)

Study and discussion of recent developments in the field of biology. 2 meetings. Prerequisite: BIO 462

BIO 521 Curriculum and Methods in the Biological Sciences (3)

Curricula, methods, devices, and procedures that may be used effectively in organizing and conducting high school biology courses. 2 lectures, 1 laboratory. Prerequisite: Graduate standing and admission to teacher preparation program.

BIO 590 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.

Courses in Botany**BOT 116 Basic Concepts of Taxonomy (1)**

Gross morphology and taxonomy of flowering plants as applied to the study of plant materials. 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 phylogenetic relationships of plant groups from bacteria to angiosperms. 3 lectures, 2 three-hour laboratories. Prerequisite: BIO 145

Entomology

BOT 236 Families of Flowering Plants (3)

Recognition of the major orders and families of flowering plants. 1 lecture, 2 three-hour laboratories. Prerequisite: BIO 145 or BOT 116

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. Prerequisite: BIO 145

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 116, 120; BOT 124 or 125; 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

Courses in 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 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

Courses in 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 324 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

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

Courses in 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

Zoology

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 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

MATHEMATICS DEPARTMENT

Harold F. Simmons, *Department Head*

Laure I. Abu-Haydar
 Alice M. Becker
 Cameron C. Bogue
 George C. Carlstedt
 George W. Carson
 Yu Chang
 Theodore J. Cullen
 Thomas J. Flynn
 Carlos Ford-Livene
 Samuel Gendelman
 Simon Green
 David A. Horwitz
 Alice A. Huffman

Larry D. Irwin
 Joseph Kachun
 Thomas M. King
 Albert Konigsberg
 Kenneth B. Kriege
 Kei A. Lee
 Kenneth A. MacDonald
 Douglas H. Moore
 Lydia P. Moore
 William C. Paugstat
 Sidney Spital
 Eldon J. Vought
 Harry A. Wilson

The major in Mathematics has two objectives: first, to prepare secondary school teachers who are aware of the significance of mathematics and of its contributions to modern living; second, to prepare mathematicians for industrial and governmental employment.

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.

The department also offers courses needed by students in the Schools of Agriculture, Arts, and Engineering for the purpose of developing occupational proficiency.

Curriculum in Mathematics

<i>Freshman</i>	<i>F</i>	<i>W</i>	<i>S</i>
Freshman Composition (ENG 104, 105, 106)	3	3	3
Physical Education (PE 141)	½	½	½
†Biological Science	3		
General Physics (PHY 131)	-		4
Analytic Geometry and Calculus (MAT 114, 115, 116)	3	3	3
General Chemistry (CHM 111, 112)	3	3	
General Chemistry Laboratory (CHM 151, 152)	1	1	
Fortran and Elementary Numerical Methods (MAT 119)		2	
Symbolic Logic and Set Theory (PHL 205)	3		
Introduction to Probability (MAT 123)			3
Electives		4	3
	16½	16½	16½

†To be selected from the General Education list.

Mathematics

Sophomore

	F	W	S
Health Education (PE 107)	2		
Physical Education (PE 141)	½	½	½
Physics (PHY 132; 133, or 204)	4	4	
Principles of Economics (EC 201, 202, 203)	3	3	3
Calculus and Differential Equations (MAT 214, 215, 216)	4	4	4
General Psychology I (PSY 202)			3
Linear Algebra I (MAT 208)		3	
Electives	3	2	6
	<hr/>	<hr/>	<hr/>
	16½	16½	16½

Junior

American Civilization (AMC 301, 302, 303)	3	3	3
Differential Equations (MAT 317)	3		
Mathematical Analysis of Engineering Problems (MAT 319)			3
Senior Project (MAT 461)			2
Mathematical Statistics I (MAT 311)		3	
†Literature	3		
†Literature, Philosophy, Art or Music		4	
Mathematics electives	3	3	3
Electives	5	4	6
	<hr/>	<hr/>	<hr/>
	17	17	17

Senior

Senior Project (MAT 462)	2		
Undergraduate Seminar (MAT 463)			2
Mathematics electives	3	3	3
Electives	11	13	11
	<hr/>	<hr/>	<hr/>
	16	16	16

Courses in Mathematics

MAT 1 Preparatory Mathematics (3)

Fundamentals of arithmetic, denominate numbers, introduction to algebra, percentage, exponents, simultaneous linear equations. Required of all students who show a deficiency in algebra. 3 lectures.

MAT 7 Preparatory Algebra (5)

Signed numbers, linear equations, literal equations, formula evaluation, functional relationships, graphing linear and quadratic equations, factoring algebraic functions, fractional equations. 5 lectures.

MAT 101 Basic Mathematics (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 for General Education (3)

Elements of trigonometry, analytic geometry, and statistics as applied to biological sciences, physical education, social sciences. 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

†To be selected from the General Education list.

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: MAT 7 or equivalent.

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: MAT 7 or equivalent.

MAT 107 Descriptive Statistics (3)

Graphical representation of statistical data; calculation and uses of various averages, measures of variability, elementary probability and the normal probability curve, simple linear correlation. 3 lectures. Prerequisite: MAT 101 or 105 or 207

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: MAT 101 or equivalent.

MAT 113 Automatic Programming for Digital Computers (1)

Solution of scientific and engineering problems using automatic programming for a general purpose computer. Special emphasis on formula translation through the use of the Fortran compiler. 1 lecture. Prerequisite: MAT 102 or 108 or concurrent MAT 105

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 119 Fortran and Elementary Numerical Methods (2)

Fortran programming for the digital computer. Execution of elementary numerical algorithms; interpolation, integration, solution of linear systems. 2 lectures. Corequisite: MAT 115

MAT 123 Introduction to Probability (3)

Probability in theory and practice; permutations, combinations, equiprobable outcomes, finite sample spaces, distributions of random variables. 2 lectures, 1 two-hour activity. Prerequisite: MAT 115 or concurrent MAT 204

MAT 200 Mathematics of Digital Computers (3)

Boolean algebras and number systems with particular reference to the calculus of binary numbers. 3 lectures. Prerequisite: MAT 114

MAT 201, 202, 203 Analytic Geometry and Calculus (3) (3) (3)

3 lectures. (Sequence being phased out and replaced by MAT 116, 214, 215 in 1967-68.)

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)

Historical development of systems of numeration, the evolution of the number concept, the logical basis of the number system, fundamental operations, mensuration, measurement, functions and graphs. Selected topics in algebra and geometry. 3 lectures. Prerequisite: High school algebra and geometry.

Mathematics

MAT 208 Linear Algebra I (3)

Geometric introduction to vector spaces of 3 and N dimensions, systems of linear equations, matrix algebra. 3 lectures. Prerequisite: MAT 116

MAT 209 Linear Algebra II (3)

Algebra and geometry of linear transformations, quadratic forms, the eigenvalue problem. 3 lectures. Prerequisite: MAT 208

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 304 Programming of Digital Computers (3)

Coding of general purpose and special purpose digital computers. Preparation of programs of general purpose computers. Sub-routines. 3 lectures. Prerequisite: MAT 200

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. 3 lectures. Prerequisite: MAT 214

MAT 311 Mathematical Statistics I (3)

Distributions for discrete and for continuous variates, expected values and moments, sampling distributions, point estimates. 3 lectures. Prerequisite: MAT 123 and either MAT 204 or 214

MAT 317 Differential Equations (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

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. 3 lectures. Prerequisite: MAT 216

MAT 319 Mathematical Analysis of Engineering Problems (3)

Introduction to the solution of partial differential equations, Fourier integral. 3 lectures. Prerequisite: MAT 317

MAT 322 Mathematical Statistics II (3)

Maximum likelihood estimators, interval estimation, tests of hypotheses, linear regression, analysis of variance and distribution free methods. 2 lectures, 1 activity period. Prerequisite: MAT 311

MAT 332 Numerical Methods in Analysis (3)

Numerical solution of algebraic and transcendental equations and systems of equations, finite differences, interpolation, numerical integration, and numerical solution of ordinary differential equations. 3 lectures. Prerequisite: MAT 216

MAT 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.

MAT 404 Vector Analysis (2)

Algebra of free vectors with applications. Introduction to differential and integral calculus of vectors. 2 lectures. Prerequisite: MAT 216

MAT 405 Vector Analysis (2)

Calculus of scalar and vector functions. Derivation and properties of gradient, divergence, and curl. Applications of analytic vector methods to problems of physics and engineering. 2 lectures. Prerequisite: MAT 404

MAT 408, 409 Functions of a Complex Variable (2) (2)

Fundamental properties of a complex variable. Integration in the complex plane, power series, contour integration, conformal mapping with applications. 2 lectures. Prerequisite: MAT 216

MAT 410 Introduction to Modern Algebra (3)

An introduction to abstract algebra, structure of number systems, groups, rings, integral domains and fields. 3 lectures. Prerequisite: MAT 215 or 204

MAT 411 Foundations of Geometry (3)

Selected topics in synthetic and projective geometry; Euclidian and non-Euclidian geometry. 3 lectures. Prerequisite: MAT 215 or 204

MAT 412, 413, 414 Advanced Calculus (3) (3) (3)

Sequences, limits, infinite series, convergence, continuity, derivatives and differentials, partial derivatives. Riemann integration, fundamental theorem of integral calculus, approximate integration, improper integrals, multiple integrals, applications to analysis. 3 lectures. Prerequisite: MAT 215

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 322

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 322

MAT 432 Numerical Methods in Analysis (3)

Expansion and continuation of MAT 332. Interpolation and numerical differentiation and integration of formulas of Lagrange, Gauss, Bessel, and Stirling. Numerical solution of ordinary, difference and partial differential equations. 2 lectures, 1 activity period. Prerequisite: MAT 332

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 521 Curriculum and Methods in Mathematics (3)

Modern tendencies and general aims of secondary school mathematics. Objectives of and methods for effective teaching in general mathematics, algebra, geometry, and trigonometry. 3 lectures. Prerequisite: Admission to teacher education program and graduate standing.

MAT 590 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

Gabriel T. Moran, *Department Head*

Robert T. Bush
 Myron S. Dendurent
 Vasu Dev
 Horace G. Ferris
 John M. Flournoy
 Irwin Geller
 Lawrence J. Herber
 Walter H. Hesse
 Paul C. Hiemenz
 David A. Horsma

Edward M. Kelly
 Bernard O. Lane
 John Macropol
 Elmer H. Rice
 Donald D. Smith
 Franklin R. Turner
 Johannes Tuul
 Arnulf Vollmar
 Dorothy V. Winslow

A major in Chemistry and a major in Physical Sciences with options in Physics or Physical Sciences 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 as chemists in industrial, educational, or governmental positions. Through choice of electives, it is possible for the student to specialize in areas of agricultural chemistry, mathematical or theoretical chemistry, and biological chemistry. The major satisfies the requirements for the Standard Teaching Credential through fifth-year courses in chemistry offered as part of the credential program.

Students majoring in engineering, agriculture, Mathematics, and the Biological Sciences take courses in the department designed to provide the necessary background of the scientific principles of their specific field. General education courses for all students provide a foundation in the physical sciences and the roles these disciplines play in modern society.

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

<i>Freshman</i>	<i>F</i>	<i>W</i>	<i>S</i>
General Chemistry (CHM 111, 112)	3	3	
General Chemistry Laboratory (CHM 151, 152)	1	1	
Ionic Equilibria (CHM 153)			1
General Physics (PHY 131, 132; 133 or 204)	4	4	4

Chemistry

	<i>F</i>	<i>W</i>	<i>S</i>
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
Electives	2	2	3
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	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
Elements of Atomic Physics (PHY 212)		3	
Introduction to Nuclear Physics (PHY 213)			3
Calculus and Differential Equations (MAT 214, 215)	4	4	
†Biological Sciences	3		
Principles of Economics (EC 201, 202)		3	3
Physical Education (PE 141)	½	½	½
Electives	2	2	5
	<hr/>	<hr/>	<hr/>
	17½	17½	16½

Junior

Physical Chemistry (CHM 311, 312, 313)	4	4	4
Physical Chemistry Laboratory (CHM 352, 353)		2	2
Advanced Analytical Chemistry (CHM 332)		4	
American Civilization (AMC 301, 302, 303)	3	3	3
†Literature	3		
Electives	6	3	7
	<hr/>	<hr/>	<hr/>
	16	16	16

Senior

Senior Project (CHM 461, 462)	2	2	
Undergraduate Seminar (CHM 463)			2
Advanced Inorganic Chemistry (CHM 401, 402)	3	3	
Public Speaking (SP 200)	3		
General Psychology I (PSY 202)		3	
†Literature, Philosophy, Art or Music	3		3
Organic Analytical Chemistry (CHM 421)	2		
*Advanced Chemistry Electives	3	3	3
Electives		5	9
	<hr/>	<hr/>	<hr/>
	16	16	17

Curriculum in Physical Sciences

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
Basic Biology (BIO 115)	3		

*Select from CHM 405, 409, 411, 415, 422, 423.

†To be selected from the General Education list.

Physical Sciences

	F	W	S
Analytic Geometry and Calculus (MAT 114, 115, 116)	3	3	3
Health Education (PE 107)			2
Electives and courses to complete major	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)	4		
General Psychology I (PSY 202)		3	
General Physics (PHY 133 or 204)	4		
†Literature			3
Public Speaking (SP 200)		3	
Elements of Atomic Physics (PHY 212)		3	
Introduction to Nuclear Physics (PHY 213)			3
Electives and courses to complete major	5	4	10
	16½	16½	16½

Junior

†Literature, Philosophy, Art or Music	3	4	
American Civilization (AMC 301, 302, 303)	3	3	3
†Natural Sciences		4	
Electives and courses to complete major	11	6	14
	17	17	17

Senior

Senior Project (PHY 461, 462)	2	2	
Undergraduate Seminar (PHY 463)			2
Physical Chemistry (CHM 311, 312, 313)	4	4	4
Physical Chemistry Laboratory (CHM 352, 353)		2	2
Electives and courses to complete major	9	8	9
	15	16	17

Curricular Options

Physical Sciences

The option is designed for students who desire a broad knowledge of the physical sciences but do not intend to pursue careers as physicists or chemists. The curriculum contains a number of intermediate level courses in the earth sciences and biological sciences and advanced courses in physics and chemistry. A graduate in this curriculum is uniquely suited for sales or managerial positions in com-

panies which service industries that employ physicists, chemists, geologists, mathematicians, and biologists. The option is recognized as a course of study which leads to the Standard Teaching Credential—Elementary Specialization.

Courses to complete major

Sophomore

- SS 231—Basic Soil Science ---- (4)
- PSC 221—Physical Geology ---- (4)
- PSC 222—Historical Geology = (3)

†To be selected from the General Education list.

Physical Sciences

Junior

- PSC 215—Astronomy (3)
PSC 223—Mineralogy (3)
PSC 323—Geomorphology (3)
CHM 211—Organic Chemistry = (3)
CHM 251—Organic Chemistry
Laboratory (1)
ZOO 236—Invertebrate Zoology.. (4)

Senior

- SS 339—Soil Physics (2)
PSC 423—Invertebrate Paleon-
tology (3)

Physics

This option 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

Courses in Chemistry

CHM 103 Fundamentals of Chemistry (4)

Chemical changes and their uses. A number of recent advances. Objective observation and experimentation in the solution of problems relating to natural phenomena. CHM 103 is not open to students who have credit for CHM 104 or 111. 3 lectures, 1 recitation.

CHM 104 College Chemistry (3)

General principles of atomic structure, periodic table, stoichiometry, chemical bonding, chemical reactions, electrochemistry, and chemical calculations. General chemistry for those who do not require calculus in their major. 3 lecture-discussions. Prerequisite: CHM 103 or one year of high school chemistry with an average grade of B or better.

CHM 105 College Chemistry (3)

Gases, liquids, solids, colloids, solutions, and colligative properties. Equi-

librium, kinetics, properties of common elements, and their compounds. 3 lecture-discussions. Prerequisite: CHM 104

Courses to complete major Sophomore

- MAT 215, 216—Calculus and Differential Equations (8)

Junior

- PHY 301—Physics of Thermal Phenomena (3)
PHY 303, 304, 305—Mathematical Methods in Applied Physics ... (9)
PHY 313, 314—Physics of Electrical and Magnetic Phenomena (6)

Senior

- PHY 401, 402—Modern Physics (6)
PHY 403—Advanced Nuclear Physics (3)
PHY 406—Solid State Physics ... (3)
PHY 407—Statistical Physics ... (3)
PHY 408—Quantum Mechanics... (3)

librium, kinetics, properties of common elements, and their compounds. 3 lecture-discussions. 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

Chemistry

CHM 113 Chemical Principles (3)

Electrochemistry, nuclear chemistry, metals, alloys, macromolecules, and special topics. 3 lecture-discussions. Prerequisite: CHM 105 or 112

CHM 141 College Chemistry

Laboratory (1)

Analysis of problems of physical-chemical measurements. Experiments in stoichiometry, chemical properties and reactions, use of analytical balance. 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 analytical 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

CHM 211 Organic Chemistry (3)

The fundamental concepts of organic chemistry with emphasis on nomenclature, practical applications in technological processes. 3 lecture-discussions. Prerequisite: CHM 105 or 112. Concurrent: CHM 251 for students planning to take CHM 212 or 327

CHM 212 Organic Chemistry (3)

Aliphatic and alicyclic hydrocarbons and their derivatives together with modern concepts of chemical bonding and reaction mechanisms. Basic principles of stereochemistry. 3 lecture-discussions. Prerequisite: CHM 211. Concurrent: CHM 252

CHM 213 Organic Chemistry (3)

Aromatic derivatives, substitution reactions, and molecular rearrangements. 3 lecture-discussions. Prerequisite: CHM 212. Concurrent: CHM 253

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 211

CHM 252 Organic Chemistry

Laboratory (2)

Synthetic work emphasized, along with experiments illustrating chemical mechanisms and stereochemistry and concepts. 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, atomic structure, thermochemistry, and thermodynamics. 4 lecture-problems. Prerequisite: MAT 215, CHM 112, one year of college physics.

CHM 312 Physical Chemistry (4)

Theory of chemical bonding, molecular structure, rates and mechanisms of chemical reactions, the liquid and solid states. 4 lecture-problems. Prerequisite: CHM 311

CHM 313 Physical Chemistry (4)

Phase equilibria, thermodynamics of solutions, colligative properties of solutions, electrolyte solutions, electrochemistry, adsorption and heterogeneous catalysts. 4 lecture-problems. Prerequisite: CHM 312

CHM 327 Biochemistry (4)

Chemistry of carbohydrates, liquids, 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 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 electro-deposition 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

CHM 336 Radiochemistry (4)

Properties and detection of nuclear radiation. Methods in radioisotope tracing including "straight tracing," precursor-product relationship and isotope dilution. Biological effects of radiation. Dosimetry and safety. 2 lectures, 2 three-hour laboratories. Prerequisite: CHM 105 or 112

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 312

Chemistry

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 Advanced 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. Corequisite: CHM 313

CHM 402 Advanced 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)

Applications of the principles of physical chemistry to the study and discussion of reaction mechanisms in organic chemistry. Emphasis on conformational analysis, substitution, elimination and free radical reactions. 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 421 Organic Analysis (2)

Modern methods for identification of organic compounds and for determining molecular structure. 1 lecture, 1 three-hour laboratory. Prerequisite: CHM 253, 313

CHM 422 Organic Synthesis (3)

Modern methods in organic synthesis with emphasis on multistep processes and preparations found in recent chemical journals. 1 lecture, 2 three-hour laboratories. Prerequisite: CHM 253, 313

CHM 423 Inorganic Synthesis (3)

Systematic study of the preparation, properties, analysis, and reactions of inorganic compounds emphasizing the application of thermodynamics and physicochemical techniques. 1 lecture-problem, 2 three-hour laboratories. Prerequisite: CHM 313

CHM 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.

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 Curriculum and Methods in the Physical Sciences (3)

Techniques, aims, and objectives in the teaching of chemistry, and physical science at the secondary school level, and general science at the ele-

mentary level. Selection and organization of teaching material. Evaluation of results. 3 lectures. Prerequisite: AV 441, ED 420, graduate standing, and admission to teacher preparation program.

CHM 590 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.

Courses in Physical Sciences**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 221 or 215. 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 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 PSC 221.

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

Courses in 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 laboratory. For non-engineering students. Prerequisite: PHY 121

PHY 123 College Physics (4)

Electrostatics, magnetostatics, current electricity, potential, dielectrics, capacitance, Ohm's Law, electromagnetism. 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. Concurrent: 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 115

PHY 212 Elements of Atomic Physics (3)

Basic physical optics and applications. Introduction to the fundamental particles, interpretation of spectra, radioactivity and atomic structure. 3 lectures. Prerequisite: PHY 133 or 204

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. Not open to students in Physics option.

PHY 222 Sound (3)

Vibratory motion. Transverse waves, longitudinal waves, vibration of bars. Velocity of sound, vibrating air columns. Interference. Intensity and intensity level. Loudness and loudness level. 3 lectures. Prerequisite: PHY 133 or 204

PHY 223 Light (4)

The physical nature of light. Reflection, refraction, diffraction, interference, polarization, and absorption of light. 3 lectures, 1 three-hour laboratory. Prerequisite: PHY 133 or 204

PHY 301 Physics of Thermal Phenomena (3)

The physical nature of thermal processes. Fundamental concepts of thermodynamics and thermodynamic systems necessary for the treatment of practical problems dealing with phenomena associated with heat flow and the utilization of thermal energy. 3 lectures. Prerequisite: PHY 133 or 204 and MAT 214

PHY 303, 304, 305 Mathematical Methods in Applied Physics (3) (3) (3)

Solution of practical 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 variation, and complex variables; Lagrange's and Hamilton's equations. 3 lectures. Prerequisite: PHY 133 or 204, and MAT 216

PHY 313, 314 Physics of Electrical and Magnetic Phenomena (3) (3)

Principles of electrical 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. 3 lectures. Prerequisite: PHY 133 or 204, 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 216

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, interactions with matter of charged particles and gamma rays. Neutron physics, nuclear fusion, nuclear fission, nuclear reactions and related applications. 3 lectures. Prerequisite: PHY 402

PHY 406 Solid State Physics (3)

The crystalline structure of solids. Properties of metallic and ionic lattices. Electrical properties of insulators, metals and semi-conductors. 3 lectures. Prerequisite: Consent of instructor.

PHY 407 Statistical Physics (3)

Study of the statistical behavior of physical systems composed of large numbers of similar particles. Applications to thermal phenomena and the physics of gases. 3 lectures. Prerequisite: MAT 216, PHY 301

Physics

PHY 408 Quantum Mechanics (3)

Experimental foundations of quantum theory. The Schrodinger wave equation and its interpretation. Solutions for one dimensional problems and the one electron atom. 3 lectures. Prerequisite: MAT 216, PHY 401

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)

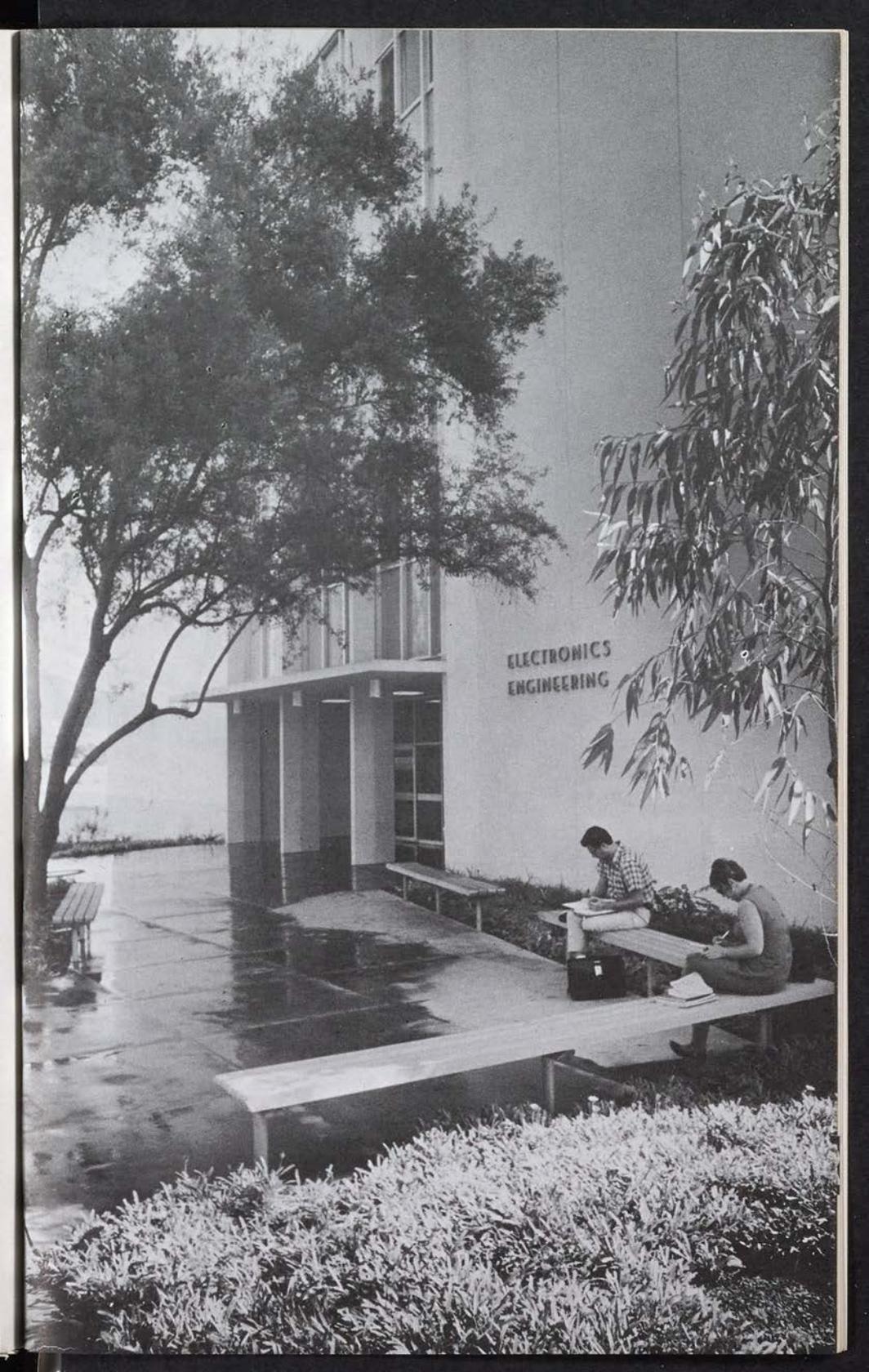
Study of current developments in physics and discussion of periodicals of an appropriate level. 2 lecture-discussions.

PHY 521 Curriculum and Methods in the Physical Sciences (3)

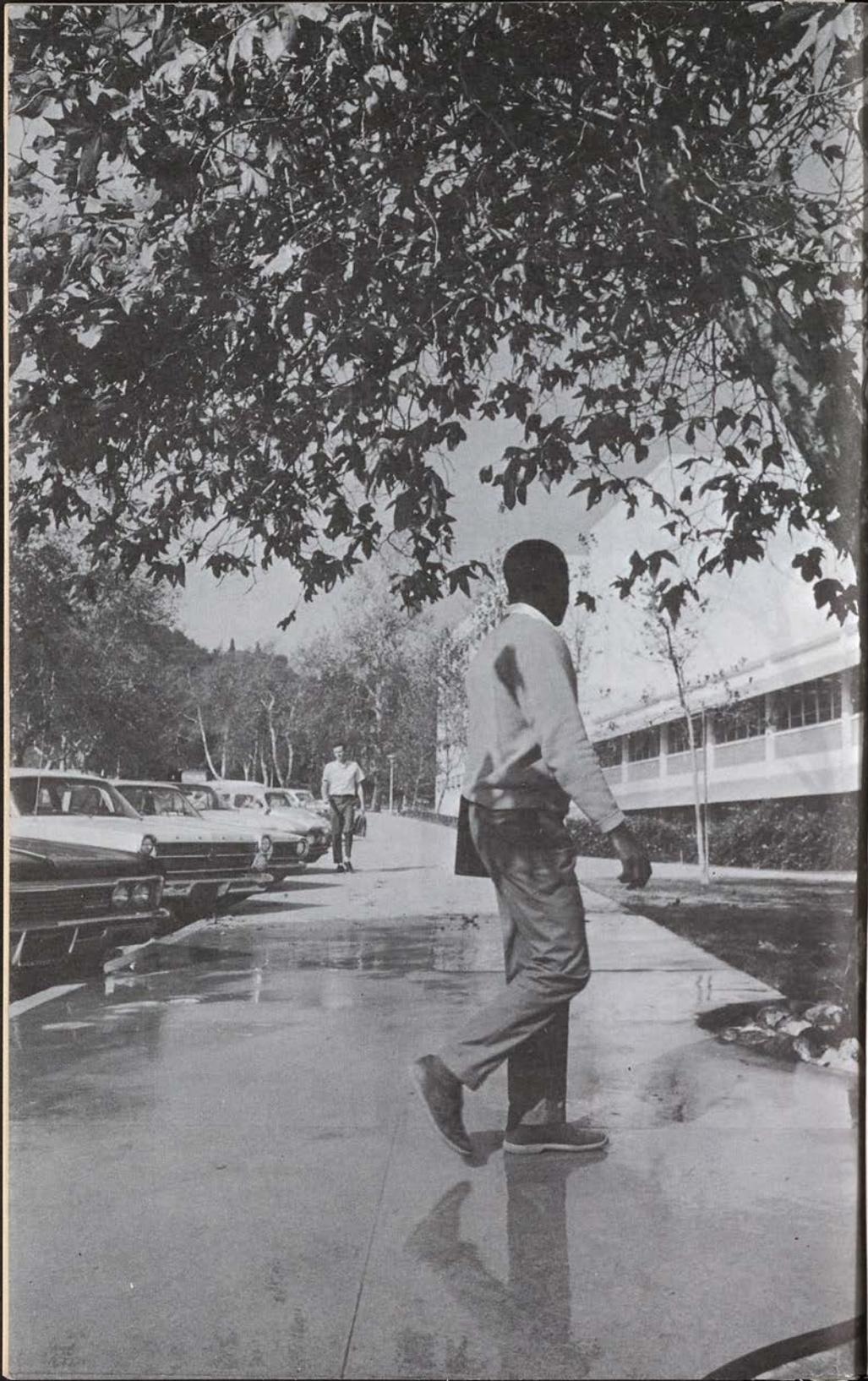
Techniques, aims and objectives in the teaching of physics and physical science at the secondary level, and of general science at the elementary level. Selection and organization of teaching material. Evaluation of results. 3 lectures. Prerequisite: AV 441, ED 420, graduate standing and admission to teacher preparation program.

PHY 590 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.

A black and white photograph of a modern building with large windows and a flat roof. The building is partially obscured by trees and foliage. In the foreground, a paved walkway is wet, reflecting the sky. A long wooden bench runs along the base of the building. Two people are sitting on the bench, looking at books or papers. A black bag sits on the bench between them. The overall atmosphere is quiet and studious.

ELECTRONICS
ENGINEERING



FACULTY

(Number of parentheses indicates year of appointment)

Listed as of March, 1967

BOARD, ROBERT S. (1967)

President

B.S., Purdue University, 1931

Michigan State University, 1932

Ph.D., 1937, Michigan State University

Harvard University, 1938

Ph.D., 1939, Michigan State University

Ph.D., 1940, Michigan State University

Ph.D., 1941, Michigan State University

Ph.D., 1942, Michigan State University

Ph.D., 1943, Michigan State University

Ph.D., 1944, Michigan State University

Ph.D., 1945, Michigan State University

Ph.D., 1946, Michigan State University

Ph.D., 1947, Michigan State University

Ph.D., 1948, Michigan State University

Ph.D., 1949, Michigan State University

Ph.D., 1950, Michigan State University

Ph.D., 1951, Michigan State University

Ph.D., 1952, Michigan State University

Ph.D., 1953, Michigan State University

Ph.D., 1954, Michigan State University

Ph.D., 1955, Michigan State University

Ph.D., 1956, Michigan State University

Ph.D., 1957, Michigan State University

Ph.D., 1958, Michigan State University

Ph.D., 1959, Michigan State University

Ph.D., 1960, Michigan State University

Ph.D., 1961, Michigan State University

Ph.D., 1962, Michigan State University

Ph.D., 1963, Michigan State University

Ph.D., 1964, Michigan State University

Ph.D., 1965, Michigan State University

Ph.D., 1966, Michigan State University

Ph.D., 1967, Michigan State University

Ph.D., 1968, Michigan State University

Ph.D., 1969, Michigan State University

Ph.D., 1970, Michigan State University

Ph.D., 1971, Michigan State University

Ph.D., 1972, Michigan State University

Ph.D., 1973, Michigan State University

Ph.D., 1974, Michigan State University

Ph.D., 1975, Michigan State University

Ph.D., 1976, Michigan State University

Ph.D., 1977, Michigan State University

Ph.D., 1978, Michigan State University

Ph.D., 1979, Michigan State University

Ph.D., 1980, Michigan State University

Ph.D., 1981, Michigan State University

Ph.D., 1982, Michigan State University

Ph.D., 1983, Michigan State University

Ph.D., 1984, Michigan State University

DIRECTORIES

FACULTY . . . 275

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AMIR-HAYDAR, LAUREA (1960)

Mathematician

B.S., American University, Beirut, Lebanon, 1949; Mathematics, University of London, 1951; M.A., University of Southern California, 1954; advanced diploma, University of London, 1956.

Experience: Lecturer, University of Southern California.

ARLEY, CHARLES W. (1966)

Social Scientist

B.S., South Pacific College, 1914; S.T.B., New York Theological Seminary, 1916; S.T.M., Harvard Divinity School, 1919; additional graduate study, University of Southern California, Claremont Graduate School.

Experience: Moderator, Marine, United States Navy, 1914-1916; chaplain, U.S. Navy, 1916-1918; field representative, Los Angeles Pacific College, 1918-1921; faculty, College.

ARADAR, VIRGINIA H. (1967)

Language Arts

B.A., Mount Holyoke College, 1911; M.A., Radcliffe College, 1912; additional graduate study, University of Wisconsin, University of Washington, Claremont Graduate School.

Experience: Teaching fellow, University of Wisconsin; instructor and bibliotherapist, Institute, College of William and Mary, Princess College, Le Yare College.

ARBUCKLE, ROBERT S. (1964)

Associate Dean (Academics)

B.S., California State Polytechnic College, San Luis Obispo, 1937; M.A., California State College at Los Angeles, 1942; additional graduate study, University of California, Los Angeles, Andrew Grove Institute.

Experience: Assistant to the president, California State Polytechnic College; general manager, National Union, California State Polytechnic College; director of regional activities, California State College at Los Angeles; assistant to the president, University of California, Los Angeles.

AMEX, RALPH W. (1967)

Biological Sciences

B.S., University of Wisconsin, 1910; M.S., 1912; Ph.D., University of Illinois, 1915.

Experience: Associate plant pathologist, William Field Station; associate professor of botany and plant pathology, Utah State Agricultural College; professor and head department of botany and pathology, Utah State University; plant pathologist, Los Angeles State and County Arboretum, J. Paul and Frances G. Arboretum.

DIR

DIR

FACULTY

(Number in parentheses indicates year of appointment)

Listed as of March, 1967

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.

Experience: Vice President, California State Polytechnic College, Kellogg-Voorhis; professor, Michigan State University; program leader for marketing and assistant director—marketing, Michigan Cooperative Extension Service; director, Agricultural Marketing and Utilization Center, Michigan State University; visiting professor, Harvard Graduate School of Business Administration, Cornell University, University of Arkansas, Colorado State University, University of Wisconsin, and University of California, Berkeley; consultant, United States Department of Agriculture, O.E.C.D., Paris, France, Bank of America, and business corporations and trade and commodity associations; officer, USNR.

ABU-HAYDAR, LAURE I. (1960)

Mathematics

A.B., American University, Beirut, Lebanon, 1949; Mathematiques, Generales, University of Lyon, 1951; M.A., University of Southern California, 1956; additional graduate study, University of Southern California.

Experience: Lecturer, University of Southern California.

ACKLEY, CHARLES W. (1966)

Social Sciences

B.A., Seattle Pacific College, 1936; S.T.B., New York Theological Seminary, 1940; S.T.M., Harvard Divinity School, 1953; additional graduate study, University of Southern California, Claremont Graduate School.

Experience: Merchant Marine; Methodist minister; chaplain, U.S. Navy (Ret.); field representative, Los Angeles Pacific College; lecturer, Chaffey College.

ADAIR, VIRGINIA H. (1957)

Language Arts

B.A., Mount Holyoke College, 1933; M.A., Radcliffe College, 1936; additional graduate study, University of Wisconsin, University of Washington, Claremont Graduate School.

Experience: Teaching fellow, University of Wisconsin; librarian and bibliotherapist; instructor, College of William and Mary, Pomona College, La Verne College.

ALBERTI, ROBERT E. (1963)

Associate Dean (Activities)

B.S., California State Polytechnic College, San Luis Obispo, 1959; M.A., California State College at Los Angeles, 1962; additional graduate study, University of California, Los Angeles, Arizona State University.

Experience: Assistant to the vice president, California State Polytechnic College; program director, Memorial Union, Arizona State University; coordinator of student activities, California State College at Los Angeles; research technician, University of California, Los Angeles.

AMES, RALPH W. (1961)

Biological Sciences

B.S., University of Wyoming, 1941; M.S., 1942; Ph.D., University of Illinois, 1950.

Experience: Assistant plant pathologist, Waltham Field Station; associate professor of botany and plant pathology, Utah State Agricultural College; professor and head department of botany and pathology, Utah State University; plant pathologist, Los Angeles State and County Arboretum, J. Harold Mitchell Company.

Faculty

ANDERSON, KENNETH H.
(1963)

Coordinator of Academic Development

B.S., Brigham Young University, 1953; M.S., 1955; Ph.D., University of Southern California, 1963.

Experience: U.S. Army; instructor, South Dakota School of Mines and Technology; guest professor, Brigham Young University; instructor, Bakersfield College; teaching assistant, University of Southern California; assistant professor, California State College at Los Angeles; post-doctoral research, University of Southern California.

ANOOSHIAN, V. BARNEY (1958)

Physical Education

A.B., San Jose State College, 1947; M.A., Claremont Graduate School, 1961; additional graduate study, San Jose State College, Stanford University, University of Nevada.

Experience: Instructor, Summerville High School, Tuolumne County; coach and instructor, Modesto High School.

APPEL, EDWARD CARL, JR.
(1946)

Head, Agricultural Biology Department

B.S., Oregon State College, 1940.

Experience: Agricultural inspector and deputy county agricultural commissioner, Department of Agriculture, San Bernardino County; officer, U.S. Navy.

ARMSTRONG, WILLIAM W., JR.
(1960)

Audio Visual Coordinator

B.S., California State Polytechnic College, 1958; M.S., University of California, Riverside, 1964.

Experience: Horticulturist, USDA, Indio; citrus orchard manager, Indio; vineyardist, 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: Custer County High School, Miles City, Montana; Infantry School, Fort Benning, Georgia. Instructor, English and social sciences; registrar and admissions officer, associate dean, counseling and testing, California State Polytechnic College, Kellogg-Voorhis.

BANKS, DORVAL D. (1965)

Ornamental Horticulture

B.S., Texas Technological College, 1963; M.S., Indiana University, 1965.

Experience: Skelly Oil Company, Texas; laboratory instructor, Texas Technological College, Lubbock; Texas Division of State Parks, Lubbock; operations supervisor, Indiana Division of State Parks, Indianapolis.

BARRETT, MARTIN K. (1965)

Accountancy

B.S., University of Pittsburgh, 1937; M.A., Ohio State University, 1939; additional graduate study, University of Redlands, University of California, Los Angeles.

Experience: Staffman, Arthur Andersen & Company, New York; assistant instructor, Ohio State University; U.S. Army; certified public accountant; assistant professor, University of Redlands; instructor, San Bernardino Valley College, Woodbury College.

BATCHELLER, OLIVER A. (1946)

Head, Ornamental Horticulture Department

B.S., Oregon State University, 1936; graduate study, Oregon State University, California State Polytechnic College, San Luis Obispo.

Experience: Assistant county agent and horticulturist, Land County, Oregon; salesman, foreman, branch manager, and manager of World's Fair exhibit for California Nursery Company; horticultural consultant; field officer, U.S. Army.

BEARDMORE, ROBERT L. (1958)

Mechanical Engineering

B.S.M.E., 1951; M.S.M.E., 1952, University of Illinois.

Experience: Industrial engineer and mechanical engineer, Hood Sponge Rubber Company, Chicago, Illinois; industrial engineer, U.S. Rubber Com-

pany, Chicago, Illinois; design engineer, Cannon Electric Company, Los Angeles, California; registered professional engineer, California.

BEAUCHAMP, KENNETH L.

(1965)

Social Sciences

A.B., Whitman College, Washington, 1962; M.A., Claremont Graduate School, 1965.

Experience: Research assistant, teaching assistant, Claremont Graduate School; research scientist, Aeronutronic; instructor, Peninsula College, Washington.

BECKER, A. MARTHA (1966)

Mathematics

B.S., Marian College, Indianapolis, 1959; M.S., Purdue University, 1964; additional graduate study, University of California, Los Angeles.

Experience: Teacher, Indianapolis High Schools; teaching assistant, Purdue University; assistant professor, State University of New York, Oneonta.

BELCHER, MELVIN B. (1958)

Electronics Engineering

B.S.E.E., 1951, University of California, Berkeley.

Experience: Test engineer, analytical engineer, manager Southern Nevada Area, General Electric, Schenectady, and Las Vegas, Nevada; service engineer, Western Audiograph, Los Angeles.

BELLMAN, SAMUEL I. (1957)

Language Arts

B.A., University of Texas, 1947; M.A., Wayne University, 1951; Ph.D., Ohio State University, 1955.

Experience: Assistant instructor and university fellow, Ohio State University; columnist, the *Fresno Guide*; Instructor: Fresno State College; California State Polytechnic College, San Luis Obispo; San Luis Obispo Adult School; University of California Extension, Los Angeles and Riverside.

BERNE, JOHN R. (1960)

Housing Coordinator

B.S., University of Southern California, 1958; graduate study, University

of Southern California.

Experience: Counselor of men's organizations, University of Southern California.

BLACK, RICHARD T. (1960)

Head, 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; communications-electronics officer, USAF; director, flight facilities, Air Communications Service; commander, Air Force Proving Ground Electronics unit; group commander, Strategic Air Command; chairman, European Radio Frequency Agency (NATO).

BLACKBURN, THOMAS C. (1965)

Social Sciences

B.A., University of Hawaii, 1959; graduate study, University of California, Los Angeles.

Experience: Teaching assistant, Santa Monica City College, University of California, Los Angeles.

BLAKELY, LAWRENCE M. (1963)

Biological Sciences

B.A., Montana State University, 1956; M.A., 1958; Ph.D., Cornell University, 1963.

Experience: Graduate assistant, Montana State University; teaching and research assistant, research associate and instructor, Cornell University.

BLEIWEISS, GAIL A. (1964)

Physical Education

B.S., Purdue University, 1961; M.A., University of California, Berkeley, 1964.

Experience: Instructor, Penn High School, Indiana; junior supervisor, University of California, Berkeley.

BLINKHERN, LOUISE (1955)

Library

B.A., University of California, Los Angeles, 1929; Certificate in Librarianship, University of California, 1931.

Experience: Librarian, San Marino Public Library, San Marino; cataloger and audio-visual assistant, Arcadia Unified School District, Arcadia.

Faculty

BOBB, SYDNEY RALPH (1958)

Language Arts

A.B., University of Chicago, 1939; M.A., 1948; Ph.D., Stanford University, 1954.

Experience: U.S. Army; instructor, Washington State College; acting instructor, Stanford University; instructor, California State Polytechnic College, San Luis Obispo.

BOGUE, CAMERON C. (1955)

Mathematics

B.A., University of Redlands, 1943; M.A., University of Michigan, 1947; additional graduate study, North Carolina State College.

Experience: Occidental Life Insurance Company, Los Angeles; instructor, Eliot Junior High School, Altadena.

BOLAND, GERTRUDE C. (1957)

Economics

A.B., Mt. St. Mary's College, 1936; B.S., Georgetown University, 1948; M.A., Catholic University of America, 1950; Ph.D., Claremont University College, 1961.

Experience: Elementary teacher, Los Angeles City Schools; U.S. Navy; instructor, Manhattanville College of the Sacred Heart; senior statistician and group leader, Aerojet-General Corp.

BOLTZ, HOWARD O. (1947)

Head, Landscape

Architecture Department

B.S., University of California, 1941; M.S., 1947.

Experience: Landscape architect in private practice; officer, U.S. Army; registered landscape architect, California.

BONDE, ROBERT G. (1966)

Executive Dean

B.A., San Jose State College, 1955; M.A., 1956; Ed.D., Colorado State, 1964.

Experience: Teacher, Livermore Joint Union High; teacher-consultant, San Diego County Schools; assistant professor, Humboldt State College; associate professor, Long Beach State College; facilities planner, Chancellor's Office, California State Colleges.

BOVEE, GEORGE R. (1965)

Accountancy

B.S., California State College at Los Angeles, 1957; graduate study, University of California, Los Angeles.

Experience: Teacher, Riverside City College; senior revenue agent, Internal Revenue Service, Riverside; U.S. Army; staff accountant, Sheppard & Reynolds, CPA's; certified public accountant.

BRAY, ROBERT T. (1965)

Economics

B.S., Pennsylvania State University, 1957; M.A., 1959.

Experience: Teaching assistant, Pennsylvania State University, University of California, Los Angeles; research assistant, University of California, Los Angeles.

BRIGHT, BRATCHER L. (1964)

Metal Processes Engineering

B.S., Buffalo State University, 1960; M.A., Colorado State University, 1961.

Experience: Teacher, Ramona Junior High School, Chino; machinist, Buchman Tool and Mfg. Co., Tonawanda, New York; mechanic, Deming Brake and Tractor Co., Deming, New Mexico.

BROWN, DONALD E. (1958)

Metal Processes Engineering

B.V.E., California State College at Los Angeles, 1963.

Experience: Foreman, Milling Department, Glenn-Jones Machinists, Ontario, California; job planning and cost estimating, Hi-Q Manufacturing Company, Pomona, California; general machinist, Hanson Manufacturing Co., Pomona; production and experimental machinist, H. W. Loud Machine Works, Pomona.

BROWN, HOWARD S. (1948)

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; officer, U.S. Marine Corps.

BROWNE, PHILIP R. (1963)

Music

B.A., Arizona State University, 1956; M.A., Eastman School of Music, 1959; composition studies with Darius Milhaud, Bernard Rogers, Wayne Barlow, Thomas Canning, Louis Mennini, Alan McHose.

Experience: Music teacher, elementary, junior high and high schools; musician, Phoenix Symphony, Eastman Wind Ensemble; arranger, King Arranging Association, Chicago, Crawley Film Corporation, Ottawa; composer, performances in Europe (International Music Educators' Convention) and United States including Eastman-Rochester Symphony Orchestra, Howard Hanson.

BRUNS, ROBERT A. (1965)

Electronics Engineering

B.S., M.S., Oregon State University, 1942; additional graduate study, University of California, Berkeley.

Experience: Instructor, Oregon State University; assistant professor, University of California; lecturer, University of Southern California; engineering specialist, Jet Propulsion Laboratory; manager of research, Kinologic Corporation.

BURDICK, THOMAS A. (1962)

Public Relations Coordinator

B.A., M.A., California State College at Long Beach; additional graduate study, University of California, Los Angeles, California State College at Los Angeles.

Experience: Editorial departments, *Pasadena Star-News*, *Alhambra Post-Advocate*, *Long Beach Independent-Press-Telegram* newspapers; teacher, English and journalism, Garden Grove High School District; administrative assistant, public relations, Orange Coast College; public relations coordinator, Long Beach State College; supervisor of publications, Alhambra Elementary and High School Districts.

BUSH, ROBERT T. (1966)

Physical Sciences

B.S., Michigan State University, 1959; M.A., University of California, Berkeley, 1962; additional graduate study, University of California, Berkeley.

Experience: Instructor, National Science Foundation Summer Institute, St. Mary's College, Moraga, California; teaching assistant and research assistant, University of California, Berkeley.

BUTTERWORTH, JOHN R.

(1961)

Language Arts

B.A., Syracuse University, 1933; M.A., University of Southern California, 1938; Ph.D., University of California, Los Angeles, 1959.

Experience: Instructor in English, University of Nevada; assistant professor of science (USAF), University of Southern California; staff officer, U.S. Air Force.

CANHAM, ALBERT E. (1948)

Head, Fruit Industries

Department

B.S., University of California, Los Angeles, 1941.

Experience: Officer, U.S. Navy; manager of avocado and citrus orchards; owner and operator of commercial weed and pest control company; instructor in I-on-F program, Palomar College, Vista, California.

CARLBERG, GEORGE E. (1949)

Head, Accountancy Department

B.S., University of California, 1947; graduate study, University of California, Los Angeles and Claremont Graduate School.

Experience: Livestock buyer, Armour & Co., officer, U.S. Army; field man, Arden Farms Co.

CARLSTEDT, GEORGE C. (1959)

Mathematics

B.S., U.S. Coast Guard Academy, 1924; M.S., Purdue University, 1958.

Experience: Instructor, Bradley University; line officer, U.S. Coast Guard; district commander; commanding officer, Curtis Bay Training Station.

CARSON, GEORGE W. (1961)

Mathematics

A.B., Hanover College, 1927; M.A., University of Illinois, 1935; additional graduate study, University of Pittsburgh; Stanford University.

Faculty

Experience: Public schools; Pikeville College; professor of mathematics, Grove City College; associate professor of mathematics, University of Redlands.

CHANG, YU (1963)

Mathematics

B.A., Sacramento State College, 1961; M.A., University of California, Davis, 1963; additional graduate study, University of California, Davis.

Experience: Teaching assistant, University of California, Davis; programmer, Computer Center, University of California, Davis.

CHORNEY, ALEXANDER H.

(1962)

Language Arts

A.B., University of California, Los Angeles, 1948; M.A., 1951; Ph.D., 1963.

Experience: Teaching assistant, University of California, Los Angeles; instructor and assistant professor, University of Southern California; William Andrews Clark Memorial Library fellow; radio, music experience.

CHRISTENSEN, ALLEN C. (1964)

Animal Science

B.S., Brigham Young University, 1957; M.S., University of California, 1960; additional graduate study, University of Nevada.

Experience: Teaching assistant, University of California; instructor, White Pine County Schools, Nevada; co-owner-operator, general farm, American Fork, Utah.

CHURCH, DAVID A. (1962)

Language Arts

B.A., California State College at Los Angeles, 1959; M.A., 1961; additional graduate study, University of Southern California.

Experience: Graduate assistant, California State College at Los Angeles, University of Southern California; teacher, Los Angeles City Schools; lecturer, Loyola University; instructor, California State College at Los Angeles; communications consultant, Mechanical Department, County of Los Angeles.

CHYLINSKI, RICHARD J. (1964)

Landscape Architecture

B. of Arch., University of California, 1962; M. of Arch., 1963.

Experience: Associate planner, Wilsey, Ham & Blair, Milbrae; planner/designer, Ruth & Krushkhov, Berkeley; climate consultant; private practice.

CLAIBORNE, GAYLON R. (1965)

Civil Engineering

B.S., California State College at Los Angeles, 1961; Graduate Certificate in Highway Traffic, Yale University, 1964; M.S.C.E., University of Southern California, 1965.

Experience: Assistant traffic engineer, City of Norwalk, California; steel designer, Dudley Steel Corporation; steel detailer, G. J. Weisbrod, Inc.; civil engineer, City of Vernon, California; registered civil engineer, California.

CLANTON, HENRY M. (1964)

Electronics Engineering

B.S., Louisiana Polytechnic Institute, 1934; M.S., Ph.D., University of Pennsylvania, 1950.

Experience: Manager, trainers and simulators, Marquardt Corp., Pomona; United States Army; project manager, phase of project Defender; chief, analysis and integration branch, ballistic missile defense office; executive, Army Rocket and Guided Missile Agency; liaison officer, Army Air Defense Board; battalion commander, group commander of antiaircraft artillery units; member, Antiaircraft Artillery Board; instructor, radar school, Antiaircraft Artillery School.

CLARK, DAVID L. (1966)

Electronics Engineering

B.S.E.E., California State College at Los Angeles, 1960; graduate study, California State College at Los Angeles.

Experience: Electronic engineer in charge of Telemetry Data Acquisition and Processing, General Dynamics.

COCHRAN, DOROTHY B. (1959)

Placement Interviewer

B.A., Kansas Teacher's College; graduate study, Claremont Graduate School.

Experience: Placement counselor, Claremont Graduate School; placement director, Claremont Men's College.

COCHRANE, KENNETH H.
(1963)

Physical Education

B.A., San Diego State College, 1959; M.A., 1966.

Experience: U.S. Navy; graduate assistant, San Diego State College; teacher and coach, Lincoln High School and Helix High School, San Diego.

COLE, DAVID E. (1962)

Agricultural Business Management

B.S., California State Polytechnic College, 1952.

Experience: Produce broker, Patterson; general manager, Santa Lucia Tomato Growers Co-op; general manager, Nutting and Hogue; district manager, American National Foods, Inc.; nurseryman, Monterey Park Nursery; salesman, Standard Stations, Inc.

COMER, JOHN W. (1962)

Head, Civil Engineering Department

B.S., Oklahoma State University, 1935; M.S., 1950.

Experience: Associate professor, Oklahoma State University; inspector, Bureau of Reclamation; field engineer, Atlantic Refining Company; officer, U.S. Army Transportation Corps; registered professional engineer, Oklahoma.

COMPTON, MEL D. (1958)

Welding Engineering

B.V.E., California State Polytechnic College, 1964.

Experience: Welder and teacher in apprentice program, Standard Oil Company; instructor in welding, Compton College, El Camino College, and California State Polytechnic College, San Luis Obispo; quality assurance engineer, Mare Island Naval Shipyard; consultant in welding and quality control procedures, Sociedad Espanol de Construccion Naval, Bilbao, Spain.

CONARD, HAVEN Q. (1946)

Chairman, Agricultural Engineering Department

B.S., Iowa State College, 1943.

Experience: Teaching, Engineering Drafting Department, Iowa State College; officer, U.S. Air Force.

COULTER, CHARLES A. (1961)

Music

B.S., Indiana University, 1947; M.A., Columbia Teachers College, 1948; additional graduate study, Arizona State University, Tempe, Occidental College, University of Arizona; studies with Roger Wagner, Howard Swan, and Peter Wilhousky.

Experience: Music teacher, elementary, junior high, and high schools; faculty member, Interlochen Music Camp; first trombonist, Phoenix Symphony; pilot, U.S. Navy.

CRETSER, GARY A. (1966)

Social Sciences

B.A., University of Southern California, 1965; M.A., 1967; additional graduate study, University of Southern California.

Experience: Teacher training, University of Southern California, Valley College, Los Angeles; research assistant, Los Angeles Interethnic Marriage Project.

CROISSANT, GERALD L. (1964)

Agronomy

B.S., Colorado State University, 1959; M.S., University of Idaho, 1961; Ph.D., University of Wisconsin, 1965.

Experience: Research fellow, University of Idaho; teaching assistant, University of Wisconsin.

CROKE, REGIS E. (1966)

Medical Officer

B.S., University of Pittsburgh, 1933; M.D., Georgetown University Medical School, 1950.

Experience: Internship, Queen of Angels Hospital, Los Angeles; residency, Internal Medicine at Queen of Angels Hospital, Los Angeles; general practice, Pomona.

Faculty

CULLEN, THEODORE J. (1966)

Mathematics

B.S., De Paul University, 1955; M.S., 1956; additional graduate study, University of Pittsburgh, University of Southern California, University of California, Los Angeles.

Experience: Instructor, University of Illinois; assistant professor, Arizona State College, California State College at Los Angeles.

CURRAN, DONALD C. (1966)

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; additional graduate study, University of Minnesota, Naval War College.

Experience: Director, Turbojet Engine Section, U.S. Navy Bureau of Aeronautics; assistant head, War Gaming Department, Naval War College; fleet aircraft squadron command, U.S. Navy; fleet air wing staff aircraft maintenance officer, U.S. Navy; commander (ret.), U.S. Navy.

DAUGHERTY, RAYMOND C.

(1960)

Physical Education

B.S., State University of New York, 1951; M.S., 1956; additional graduate study, Springfield School of Physical Education, University of Buffalo, California State College at Los Angeles, Cortland State Teachers College, University of Southern California.

Experience: Physical Education director, coach, Azusa High School; teacher, recreation director, coach, Alexander and Lowville, New York; instructor, Citrus College; chairman, Red Cross Water Safety Program, Pomona.

DAVIS, ANNEMARIE J. (1965)

Physical Education

B.A., San Jose State College, 1955; M.S., University of California, Los Angeles, 1961.

Experience: Lecturer, San Jose State College; program director, club director, Special Services, U.S. Air Force, U.S.A. and Europe; teaching assistant,

University of California, Los Angeles; assistant professor, Fresno State College.

DEGEN, JAMES L. (1959)

Ornamental Horticulture

B.S., California State Polytechnic College, 1954.

Experience: Nurseryman, landscape contractor, Costa Mesa, California; U.S. Army; instructor, landscape gardening, California Institution for Men, Chino; horticultural consultant.

DENDURENT, MYRON S. (1957)

Physical Sciences

B.S., Kansas State College, 1939; M.S., 1939.

Experience: Engineer, Westvaco Chlorine Products Corp., U.S. Army Chemical Warfare Service, Goodyear Tire and Rubber Co.; instructor, University of Kansas City, Bethany College, Idaho State College.

DEV, VASU (1965)

Physical Sciences

B.S., Punjab University, 1951; M.S., 1954; Ph.D., University of California, Davis, 1962.

Experience: Chemist, Drug Research Laboratory, India; instructor, Department of Pharmacology, Medical College, Patiala, India; teaching assistant, University of California, Davis; research associate, University of Chicago; assistant professor, University of Tennessee, Memphis.

DIMITMAN, JEROME E. (1949)

Head, Biological Sciences Department

B.S., University of California, Berkeley, 1943; M.S., University of California, Citrus Experiment Station, Riverside, 1949; Ph.D., University of California, Berkeley, 1958.

Experience: Research assistant, University of California, Los Angeles; assistant plant pathologist, California State Department of Agriculture; officer, U.S. Navy.

DIVELBESS, DIANE (1963)

Art

B.A., Scripps College, 1957; M.F.A., Claremont Graduate School, 1959; additional graduate study, Claremont

Graduate School, Fresno State College, California State College at Los Angeles.

Experience: Teacher, Chaffey Union High School District, Riverside Art Center, Children's Creative Workshops; professional painter.

DONNELLY, CLAIRE
KATHERINE (1961)

Registered Nurse

R.N., St. John's Hospital School of Nursing, St. Louis, Mo., 1946.

Experience: Inter-Community Hospital, Covina; Marr-Jacobs Medical Group, Pomona.

DUNN, NORMAN K. (1960)

Animal Science

B.S., Colorado State University, 1951; M.S., Kansas State University, 1960.

Experience: County agricultural agent, Gunnison, Colorado; graduate research assistant, Kansas State University; lecturer, University of California extension and Mt. San Antonio College.

DUSTMAN, JACK R. (1962)

Business Management

B.S., Arizona State University, 1958; M.S., 1959; additional graduate study, University of Southern California.

Experience: Lecturer, University of Southern California; instructor, Arizona State University; research interviewer, SBA Motel Study, University of Arizona; collateral-discount teller, Midland National Bank, Minneapolis; salesman, Dale's Department Store, Phoenix, Arizona; assistant to president, Holmberg Organ Company, Rockford, Illinois; personnel interviewer and counselor, U.S. Army.

DUTRA, RAMIRO C. (1959)

Head, Foods and Nutrition Department

B.S., University of California, 1954; M.S., 1956; Ph.D., 1958.

Experience: Teaching assistant and research assistant, University of California; assistant food specialist, California Agricultural Experiment Station; lecturer in dairy chemistry, Department of Food Science and

Technology, University of California; chemistry instructor, Physical Sciences Department, California State Polytechnic College, Kellogg-Voorhis.

EBERSOLE, WALTER J. (1958)

Mechanical Engineering

B.A., Santa Barbara State College, 1941; graduate study, University of Southern California, Los Angeles.

Experience: Project engineer, Shaffer Tool Works, Brea; designer, University of Southern California Engineering Center; process engineer, B. H. Hadley Company, Pomona; instructor, engineering, drafting, etc., Mount San Antonio College.

ENGELKE, GEORGE F. (1965)

Mechanical Engineering

A.B., Occidental College, 1958; B.S., California Institute of Technology, 1958; M.S., 1959.

Experience: Associate preliminary design engineer, AiResearch Manufacturing Company; research engineer, Marquardt Corporation; design engineer, Astropower, Inc.; senior engineer, Ray D. Bowerman Consulting Engineers; self-employed.

ENGLUND, CARL R. (1948)

Dean, School of Agriculture

B.S., University of California, Berkeley, 1939.

Experience: Director of vocational agriculture, Reedley Union High School and Junior College, Reedley; head, crops department, California State Polytechnic College, Voorhis Unit.

EPPS, MAX (1960)

Head, Chemical Engineering Department

B.S., University of Southern California, 1934; M.S., 1935.

Experience: Chief automotive engineer, General Petroleum Corporation; assistant supervisor, engine laboratory, Socony Vacuum, Paulsboro, New Jersey; assistant to chief engineer, Fairchild Aircraft Engines, Farmingdale, New York; research engineer, Naval Ordnance Laboratory, Corona; registered professional engineer, California.

Faculty

ERSPAMER, JACK L. (1956)

Biological Sciences

B.S., University of Washington, 1941; Ph.D., University of California, 1953.

Experience: Teaching assistant, University of Washington, University of California; research assistant, University of California, Citrus Experiment Station, Riverside.

EWERT, LEONORE H. (1966)

Language Arts

B.A., Upland College, 1958; M.A., Claremont Graduate School, 1962; doctoral candidate.

Experience: Teacher, Ontario School District; assistant professor, Upland College; Fulbright lecturer, Munich Secondary Schools, Munich, Austria.

FAUSCH, HOMER D. (1956)

Animal Science

B.S., University of Minnesota, 1947; M.S., 1950; Ph.D., 1953; additional graduate study, University of Washington, University of Minnesota, University of Alberta.

Experience: Lieutenant jg. (A1), U.S. Navy Air Corps; associate professor and head, Animal Husbandry Department, N.W. Experiment Station, University of Minnesota, Crookston; secretary-treasurer, Red River Valley Aerial Sprayers, Crookston.

FEENEY, ROBERT G. (1965)

Chemical Engineering

B.S., University of Pennsylvania, 1939; graduate study, Yale University.

Experience: Group leader, Colgate Palmolive Company; development associate, Celanese Plastics Company; junior engineer, Scott Paper Company; shift chemist and development engineer, Brunswick Pulp and Paper Company; chemical engineer, U.S. Bureau of Mines; instructor, Newark College of Engineering.

FELGEMAKER, GERHARDT H.

(1966)

Landscape Architecture

B.F.A., University of Illinois, 1964; M.L.A., University of Pennsylvania, 1966.

Experience: Planner and landscape architect, Harland Bartholomew & Associates, Inc., Ltd., Atlanta, Georgia and Freeport, Grand Bahama Island; landscape architect, George Patton and Associates, Philadelphia, Pennsylvania; landscape architect, Forest Preserve District of Cook County, Chicago, Illinois.

FERRIS, HORACE GARFIELD

(1958)

Physical Sciences

B.A., Pomona College, 1936; M.A., University of California, Los Angeles, 1939; Ph.D., 1949.

Experience: Physicist, U.S. Naval Ordnance Test Division, California Institute of Technology, Scripps Institution of Oceanography, Robert Shaw-Fulton Company, Anaheim; Hughes Aircraft Company, Fullerton; lecturer, Pomona College, University of Southern California; instructor, San Diego State College; associate professor, Chapman College.

FIGGINS, ROSS F. (1965)

Language Arts

B.A., San Fernando Valley State College, 1960; M.A., 1962; M.A., University of Illinois, 1964; additional graduate study, University of Southern California.

Experience: Graduate assistant, San Fernando Valley State College, University of Illinois; instructor, University of Illinois.

FILLHART, DANIEL H. (1961)

Metal Processes Engineering

B.V.E., California State College at Los Angeles, 1966.

Experience: Experimental machinist, Meister Engineering Co., Pasadena; tool and die maker, Winslow Prod. Engineering Corp., Arcadia; toolroom leadman, James Jones Company, El Monte; tool maker, Custom Bearing Mfg. Co., Pasadena; tool room machinist, Gladden Products Corporation, Glendale; instrument machinist, Gianini Controls Corp., Pasadena; tool and die maker, General Dynamics, Pomona; officer, U.S. Army.

FIRSTMAN, BRUCE L. (1962)

Biological Sciences

A.B., Stanford University, 1952; M.A., 1954; additional graduate study, Stanford University and University of California, Riverside.

Experience: Graduate laboratory assistant, Stanford University; associate in biology, San Jose State College; teaching fellow, University of California, Santa Barbara; instructor, City College of San Francisco.

FISHER, DONALD A. (1966)

Financial Aids Officer

B.A., University of Chicago, 1956; graduate study, Boston University, Claremont Graduate School.

Experience: Production staff, WGBH-TV, Boston, Massachusetts, National Broadcasting Co., Chicago, Illinois; sales correspondent, Babcock and Wilcox Tubular Products Division; English instructor, Peace Corps, University of Zulia, Maracaibo, Venezuela; personnel staff, Ponomo College.

FLOURNOY, JOHN M. (1966)

Physical Sciences

B.S., Georgia Tech, 1950; Ph.D., University of Southern California, 1956.

Experience: Technical specialist, Aerojet-General Corporation; research specialist, Jet Propulsion Laboratory.

FLYNN, THOMAS J. (1959)

Mathematics

B.S., United States Naval Academy, 1927; M.S., Purdue University, 1959; additional graduate study, U.S. Naval Postgraduate School, Graduate School of Business Administration, Harvard University.

Experience: Line officer, U.S. Navy; director of the armor, Projectile, Bomb, and Ballistic Section, Research Division, Bureau of Ordnance; assistant director for planning and assistant director for production; Material Division, Bureau of Ordnance, Navy Department; command of battleship, cruiser and tanker, U.S. Navy; command of U.S. Naval Weapons Station.

FORCE, DONALD C. (1965)

Biological Sciences

A.B., Fresno State College, 1954; M.S., University of California, Davis, 1958; Ph.D., University of California, Berkeley, 1963.

Experience: Research assistant, University of California, Davis; entomologist, Stauffer Chemical Company and U.S. Department of Agriculture, California and Missouri; lab technician, University of California, Berkeley.

FORD-LIVENE, CARLOS (1964)

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; participant in Summer Institute in Analysis, University of British Columbia, Canada, 1962.

FOX, WILLIAM E. (1961)

Marketing

B.S., Ohio State University, 1951; M.B.A., University of Miami, 1959; additional graduate study, University of Southern California.

Experience: Instructor, Marketing Department, Arizona State University; research associate, Bureau of Business Services, Arizona State University; instructor, summer session, Arizona State College; agent, Prudential Insurance Company; instructor, Naval Electronics School, U.S. Navy.

FOXEN, MILDRED E. (1955)

Supervising Nurse

R.N., Women's Christian Association, 1943.

Experience: Resident nurse, College of Wooster, Wooster, Ohio; Intercommunity Hospital and office nurse, Medical Center, Covina.

FRANCIS, JOHN W. (1960)

Foundation Manager

B.A., University of California, Los Angeles, 1950; LL.B., 1960.

Experience: Teacher, Los Angeles City Schools; California bar, 1961.

Faculty

FREEMAN, JOHN F. (1966)

Social Sciences

B.A., Antioch College, 1963; M.A., University of Michigan, 1964; additional graduate study, University of Michigan.

Experience: Teaching fellow, University of Michigan.

FRENCH, JERE STUART (1957)

Landscape Architecture

A.B., Washington University, 1951; B.S., Michigan State University, 1956.

Experience: Paving construction, St. Louis, Missouri; landscape architect, National Park Service, San Francisco; landscape architect, F. B. Stressau, Miami, Florida; instructor, U.S. Navy; registered landscape architect, California.

FRENCH, MILTON L. (1961)

Language Arts

B.S., New York University, 1932; M.A., Columbia University, 1936; Ph.D., New York University, 1938; additional graduate study, University of Clermont-Ferrand, France, University of Paris, France, Heidelberg University, Germany, Munich University, Germany, Guanajuato University, Mexico, International Cultural Institute of Vichy, France, Alliance Francaise, France, University of Salzburg, Austria.

Experience: Instructor, Monmouth College; director of beginning English, American College, Sofia, Bulgaria; assistant professor, Baylor University; director of publications, Northern State Teachers College, Minot State Teachers College; assistant field director, American Red Cross; display advertising representative, *Fresno Bee*; instructor, Selma Union High School; product service engineer, American Radiator and Standard Sanitary Corp.

FULBECK, JOHN F. (1958)

Language Arts

A.B., University of Southern California, 1951; Ph.D., 1960.

Experience: New Jersey state representative, *Scholastic Magazine*; advertising manager, *Independent Press*, Bloomfield, New Jersey; reporter, *The Newark Ledger*, New Jersey; U.S. Navy; editor, *Southwest News Press*,

The South End Bee, Los Angeles; instructor and lecturer, University of Southern California, Chouinard Art Institute, Los Angeles; coordinator, business management program, University of Southern California; editor, *Conservation Topics*, *The Writer's Mailbag*, *The Bridge*.

GALBRAITH, EDWARD D. (1962)

Mechanical Engineering

B.S.M.E., University of Toledo, 1952; M.S.I.E., 1960.

Experience: Assistant professor, University of Toledo; engineer, Owens-Illinois Glass Company, Toledo Edison Company; officer, U.S. Army.

GALBREATH, GEORGE T. (1953)

Head, Economics Department

A.B., Stanford University, 1948; M.A., 1949; additional graduate study, University of California.

Experience: Instructor, California State Polytechnic College, San Luis Obispo; assistant professor of economics, Armstrong College; manager, Galbreath Orchards; economic consultant.

GANTZ, BEN S. (1963)

Social Sciences

B.A., University of Southern California, 1942; M.A., University of Chicago, 1956; Ph.D., Claremont Graduate School, 1966.

Experience: Officer, U.S. Navy; administrative staff, U.S. Navy Post Graduate School, Monterey; instructor, University of Alaska, University of California Extension; psychologist, Desert Family Counseling Service, Alaska Crippled Children's Treatment Center; research psychologist, Naval Ordnance Test Station, China Lake; research assistant, intern, visiting lecturer, Claremont Graduate School.

GARRITY, RODMAN F. (1962)

Head, Social Sciences Department; Coordinator of Teacher Credential Programs

A.B., California State College at Los Angeles, 1950; M.A., Southern Methodist University, 1955; Ed.D., University of Southern California, 1962.

Experience: Teacher, principal and psychologist, Palmdale and Redondo Beach City Schools; junior college instructor, Los Angeles, Palo Verde, San Bernardino and Citrus Junior Colleges; consulting psychologist to Big Bear Lake and Palo Verde Unified Schools; assistant director of educational placement, assistant coordinator of Congolese program, lecturer in educational administration, University of Southern California; California certified psychologist.

GASSER, OTTO F. W. (1966)

Physical Education

B.A., University of California, Los Angeles, 1964; M.A., 1965; additional graduate study, University of California, Los Angeles.

Experience: Part-time instructor in physical education and laboratory technician in performance physiology, University of California, Los Angeles.

GELLER, IRWIN (1962)

Physical Sciences

B.A., Emory and Henry College, 1943; M.S., University of Puget Sound, 1953; Ph.D., Pennsylvania State University, 1959.

Experience: Manager, Bulk Oil Storage Depot, Leyte, Philippine Islands; part-owner, automobile agency, Roslyn, New York; research assistant in fuel technology, Pennsylvania State University; research chemist, solid rocket fuels, Aerojet-General Corporation, Azusa; evening instructor, Citrus College.

GENDELMAN, SAMUEL (1964)

Mathematics

B.A., University of Wisconsin, 1938; M.A., University of Southern California, 1961; additional graduate study, University of California, Los Angeles.

Experience: Teaching assistant, University of Wisconsin; lecturer, University of Southern California; assistant professor, California State College at Los Angeles.

GESLER, JACK T. (1957)

Animal Science

B.S., California State Polytechnic College, 1952; M.S., Kansas State College, 1956; additional graduate study,

State College of Washington.

Experience: Instructor in meats, State College of Washington; assistant meats instructor, Kansas State College.

GLASER, WALTER W. (1960)

Art

B.A., University of California, Los Angeles, 1953; M.F.A., Claremont Graduate School, 1959.

Experience: Staff artist, U.S. Navy; teacher, San Gabriel City Schools; freelance artist.

GOODIN, JAMES D. (1962)

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 Corp.; production supervisor, Union Carbide Chemicals Co.; junior mechanical engineer, Southern California Edison Co.

GRAVES, GEORGE R. (1958)

Aerospace Engineering

B.S., Marquette University, 1955; graduate study, University of Southern California, California State College at Long Beach.

Experience: Stress analyst, Douglas Aircraft Company; consultant, U.S. Air Force, Aerojet-General Corp.

GRAY, MARGARET S. (1958)

(1965)

Library

B.A., Whittier College; 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)

Social Sciences

A.B., University of California, Berkeley, 1948; M.S.W., 1950.

Experience: Counselor, Conciliation Court, Los Angeles County, Family Counseling Service, Los Angeles; director of social service, Sierra Madre Lodge for Alcoholism; mental health counselor, Santa Rita Rehabilitation Center.

Faculty

GREEN, SIMON (1964)

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; associate professor, Tulsa University; professor, Arizona State University; research associate: Meteorological Institute, University of Uppsala; Royal Telephone Company, Sweden; Boeing Airplane Company, Kansas and Washington; consultant, Navy Electronics Laboratory, San Diego.

GREGORY, VERNON L. (1953)

Biological Sciences

B.S., University of Miami, 1941; M.A., DePauw University, 1947; additional graduate study, University of Southern California.

Experience: Undergraduate assistant in zoology, University of Miami; graduate assistant, DePauw University; naval aviator, flight instructor, U.S. Navy; instructor in zoology, University of Miami; graduate associate, University of Southern California; curriculum specialist, California State Polytechnic College.

GRIFFIN, JAMES M. (1949)

Ornamental Horticulture

B.S., California State Polytechnic College, 1949; M.A., 1952.

Experience: Instructor, Veterans Training Program; landscape and nursery business, San Diego; studio greensman, Hollywood; horticultural consultant.

GRISELLE, SHERMAN W. (1966)

Landscape Architecture

B.S., Land. Arch., Michigan State University, 1953; B.S., U.P., 1954; M.U.P., 1958.

Experience: Planner, City of Lansing; chief of planning administration, City and County of Tulsa; director of planning, City of Downey.

HALDERMAN, DONALD L.

(1959)

Physical Education

B.S., University of Southern Cali-

fornia, 1951; M.S., 1959; additional graduate study, University of Southern California.

Experience: Naval aviator, flight instructor, officer, U.S. Navy; track coach, teacher, Whittier and California High Schools, Whittier.

HALL, CLARENCE L. (1965)

Civil Engineering

B.S., Brown University, 1947; M.B.A., University of Pennsylvania, 1949; M.S., University of Southern California, 1962.

Experience: Commissioned officer, United States Navy; civil engineering designer-draftsman, contract basis; civil engineering assistant, City of Los Angeles; structural engineering, Ralph McLean; engineering calculator; civil engineering associate, City of Torrance; civil engineer, Staples Engineering Co.; real estate loan man, W. R. DuBois Co.; civil engineer, self-employed.

HAND, ROBERT F. (1964)

Physical Education

B.S., Louisiana Polytechnic Institute, 1941; M.S., University of Arkansas, 1948; additional graduate study, University of Houston.

Experience: Athletic trainer, Louisiana Polytechnic Institute; assistant chemist, Holly Sugar Corporation; athletic trainer, United States Naval Training Center, San Diego.

HANEY, SUE M. (1964)

Library

B.A., California State College at Long Beach, 1962; M.L.S., University of California, Los Angeles, 1964.

Experience: Student assistant, Catalog Department, California State College at Long Beach; catalog assistant, Washington State Law Library.

HARDING, FENTON (1965)

Civil Engineering

B.S., Texas Technological College, 1933; M.S., Armour Institute, 1940.

Experience: Consulting engineer in structures, mechanics, and stress analysis in Texas and Louisiana; instructor to associate professor, Texas Technological College; professor, University

of Southern Louisiana; registered structural engineer, Texas; registered civil engineer, Louisiana.

HARMER, RUTH M. (1960)

Language Arts

B.A., Barnard College, 1941; M.A., Columbia University, 1942; additional graduate study, University of Southern California.

Experience: Instructor, University of Southern California, Mexico City College; lecturer, University of California, Los Angeles, Extension Division; reporter, *Hartford Courant*, Washington, D.C. *Times-Herald*, Mexico City *Herald and News*; editor, *Modern Mexico*; editorial assistant, *American Speech*; writer.

HARRIS, WILLIAM M. (1960)

Chairman, Welding

Engineering Department

B.S. Met.E., Missouri School of Mines and Metallurgy, 1950; B.S.M.E., 1952; graduate study, Washington University, St. Louis, Missouri.

Experience: Materials and process engineer, McDonnell Aircraft Corp.; metallurgical engineer, Ramsey Corp.; senior research engineer, Autonetics Division, North American Aviation, Inc.; instructor, Missouri School of Mines and Metallurgy; welder, Wagner Electric Corporation, American Iron-Steel Mfg. Co.; U.S. Army; registered professional engineer, California, Missouri.

HARWOOD, C. EDWIN (1966)

Head, Language Arts
Department

A.B., Olivet College, 1935; M.A., University of Michigan, 1940; Ph.D., University of Colorado, 1958.

Experience: English teacher, high schools in Michigan; cost accounting, Fisher Body; personnel, Fisher Body; technical instructor, General Motors Institute of Technology; instructor, University of Colorado; professor, Pasadena College; associate professor, professor, chairman, Division of the Humanities, North Carolina Wesleyan College.

HEALEY, ROBERT J. (1958)

Business Management

B.S., State Teachers' College, Salem, Massachusetts, 1950; M.S., Oklahoma State University, 1952; additional graduate study, San Francisco State College.

Experience: U.S. Navy; teaching fellow and instructor, Oklahoma State University; office manager, Groendyke Transportation, Inc., Wichita, Kansas; instructor, Modesto High School, Modesto; coordinator of athletics, California State Polytechnic College.

HEATH, FREDERICK B. (1962)

Social Sciences

A.B., Syracuse University, 1949; M.A., 1950; Ph.D., University of Southern California, 1958.

Experience: United States Army; graduate fellow, lecturer, University of Southern California; instructor, Chouinard Art Institute; lecturer, California State College at Long Beach, California State College at Los Angeles.

HENDERSON, LAUREN J. (1962)

Medical Officer

M.D., State University of Iowa, Iowa City, 1932; internship, Jersey City Medical Center, 1932-33; residency, Hudson County Hospital, Secaucus, New Jersey, 1933-36.

Experience: General and surgical practice, Cedar Falls, Iowa; major, Medical Corps, U.S. Army; command of field hospital, surgical platoon, North African and Italian theaters.

HERBER, LAWRENCE J. (1966)

Physical Sciences

B.S., St. Joseph's College, 1959; M.S., New Mexico Institute of Mining and Technology, 1963; additional graduate study, University of Nevada.

Experience: Part-time instructor, St. Joseph's College; summer assistant, New Mexico Bureau of Mines and Mineral Resources.

HESSE, WALTER H. (1956)

Physical Sciences

B.S., California State Polytechnic College, 1952; M.S., Cornell University, 1953; Ph.D., 1955.

Faculty

Experience: Research assistant, Cornell University; teaching and research, University of Nevada; research, California Institute of Technology; engineering officer, USNR and Merchant Marine.

HIEMENZ, PAUL C. (1965)

Physical Sciences

B.S., Loyola University, 1958; Ph.D., University of Southern California, 1964.

Experience: Teaching assistant and research fellow, University of Southern California; instructor, Pierce College; research chemist, Dow Chemical Company, Michigan.

HO, FRANKLIN Y. H. (1961)

Economics

B.A., National Southwestern Associated University, 1942; M.A., University of Southern California, 1951; Ph.D., 1957; additional graduate study, University of Washington, University of California.

Experience: Editor, National Construct; industrial engineer, Utility Appliance Corp.; U.S. Government service; instructor, National Sun Yat-sen University; instructor, Santa Rosa Junior College; associate professor of business administration and research project director, University of Portland.

HOBBS, KENNETH R. (1950)

Agricultural Biology

B.S., Oregon State University, 1946; M.A., 1948; Ph.D., 1955.

Experience: Technician and curator, Department of Entomology, Oregon State College; agricultural inspector, Los Angeles County Department of Agriculture; inspector, Bureau of Nursery Service, State Department of Agriculture; field representative, structural pest control.

HOLTZ, WALTER E. (1954)

Head, Mechanical Engineering Department

B.S., Illinois Institute of Technology, 1949; M.S.M.E., California Institute of Technology, 1953; M.S., University of Washington, 1964.

Experience: Project engineer, Aerojet Corporation, Azusa; Baker Engineering Corporation, Los Angeles; en-

gineer, Carrier Corporation, Chicago; U.S. Naval Air Missile Test Center, Point Mugu; instructor, mechanical engineering, California State Polytechnic College, San Luis Obispo; officer, U.S. Air Force; consultant, U.S.A.I.D.; registered professional engineer, California.

HORSMA, DAVID A. (1966)

Physical Sciences

B.S., Michigan College of Mining and Technology, 1962; Ph.D., University of California, Davis, 1966; additional graduate study, University of California, Los Angeles.

Experience: Teaching assistant, Michigan College of Mining and Technology; research assistant, Institute of Mineral Research; research assistant and teaching assistant, University of California, Davis; research chemist, University of California, Los Angeles.

HORWITZ, DAVID A. (1965)

Mathematics

B.A., University of Southern California, 1955; M.S.Ed., 1959; M.A., California State College at Los Angeles, 1963; additional graduate study, Claremont Graduate School.

Experience: Teacher, John Muir High School, Pasadena; instructor, Los Angeles Trade Technical College; lecturer, assistant professor, California State College at Los Angeles.

HOUSE, HENRY (1947)

Dean of Students

B.S., California State Polytechnic College, 1943; graduate study, University of California, California State Polytechnic College.

Experience: Associate dean (activities), California State Polytechnic College; director of vocational agriculture, Brawley Union High School; officer, U.S. Marine Corps.

HUFFMAN, ALICE A. (1965)

Mathematics

B.A., University of California, Riverside, 1956; M.A., 1965.

Experience: Math associate, University of California, Riverside; teacher, Notre Dame Preparatory School; extension teacher, teaching assistant, University of California, Riverside.

HUTCHINSON, RALPH B. (1960)

Economics

A.B., University of California, 1953; M.A., 1960; additional graduate study, University of California, Los Angeles.

Experience: Instructor, California State College at Long Beach; officer, U.S. Army.

ILLSLEY, NORMAN S. (1964)

Agricultural Engineering

B.S., California State Polytechnic College, 1953; M.A., University of Oregon, 1961.

Experience: Flight instructor, Federal Aviation Agency; pilot, Army Air Force; vice president, Optical Coating Laboratory; land resettlement technician, University of Maryland team in British Guiana; field worker, American Friends Service Committee; instructor, California State Polytechnic College.

IRWIN, LARRY D. (1965)

Mathematics

B.A., Hardin-Simmons University, Texas, 1961; M.S., New Mexico State University, 1963.

Experience: Radarman, U.S. Army; Western Tablet and Stationery Corporation; project engineer, Sperry Utah Company; research engineer, General Dynamics, Pomona.

IVES, QUAY D. (1960)

Metal Processes Engineering

B.S., M.S., Texas College, 1951; additional graduate study, University of California, Los Angeles.

Experience: Instructor, Claremont Unified Schools, Claremont; Starr Commonwealth School, Albion, Michigan; factory superintendent and assistant engineer, Dico Corporation, Des Moines, Iowa; instructor, Del Mar College, Corpus Christi, Texas; tool and die maker, Ryan Aircraft, San Diego; manufacturing engineer, Jackson Co.

JACKMAN, CLARENCE H. (1960)

*Business Management,
Coordinator of Business
Internships*

B.S., Northwestern University, 1935; M.A., 1939; M.B.A., Bradley University, 1956.

Experience: Instructor, Spencerian College, Monmouth (Illinois) High School, University of Illinois; associate professor and assistant director of Evening Division, Bradley University; general manager, Schafer Feed and Grain Company; auditor, Arthur Young & Company; officer, U.S. Air Force Auditor General; auditor, Bowman Bros. Shoe stores; certified public accountant.

JACKSON, LEON S. (1961)

Physical Education

B.S., California State Polytechnic College, 1960; M.A., 1965.

Experience: U.S. Army Special Services; recreation adviser, Boys Republic.

JACYKEWYCZ, DIANA T. (1966)

Library

B.A., Kent State University, 1960; M.A., University of Denver, 1966; additional graduate study, Smith College.

Experience: Library assistant, Library of Congress, Arizona State University.

JOHNSON, ALBEN C. (1966)

Electronics Engineering

B.S., California State Polytechnic College, San Luis Obispo, 1954.

Experience: Chief engineer, X-ray equipment development, Exactar, Inc., Davenport, Iowa; instructor, California State Polytechnic College, San Luis Obispo; research and development of missile guidance systems, General Dynamics, Pomona; Applied Physics Laboratory, Johns Hopkins University; design specialist, Missile System Integration; assistant project engineer, Missile Guidance Systems, General Dynamics.

JOHNSON, JOHN L. (1966)

*Physical Education and
Coordinator of Athletics*

A.B., University of California, Los Angeles, 1962; M.Ed., 1962; Ed.D., 1965.

Experience: Assistant football coach and lecturer, University of California, Los Angeles; fraternity adviser and administrative assistant, Office of the Dean of Students, University of California, Los Angeles.

Faculty

JONES, CECIL W. (1939)

Business Manager

Riverside College, 1934; Riverside Business College, 1936; Certificate International Accountancy Society, 1942.

Experience: Fiscal Office, U.S. Army Medical Corps; accountant, Arlington Packing Corp.; bookkeeper, California State Polytechnic College. Licensed public accountant.

KACHUN, JOSEPH (1959)

Mathematics

B.A., University of Pittsburgh, 1940; graduate study, University of Pittsburgh.

Experience: Assistant professor of mathematics, University of Pittsburgh; lieutenant, U.S. Navy, instructing navigation; instructor, Duquesne University, Pittsburgh, Penn State University; National Science Program, summer.

KAMMEYER, KENNETH K.

(1966)

Ornamental Horticulture

B.S., California State Polytechnic College, Pomona, 1957; graduate study, California State College at Los Angeles.

Experience: Landscape contractor, administrative assistant, Alvord Unified School District; horticulture consultant, Linesch and Reynolds Landscape Architects.

KAUFMAN, LOUIS (1961)

Business Management

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; general manager, retail department, store chain; warehouse manager, plastics manufacturer; assistant plant manager, aluminum manufacturer and converter.

KAUK, DOYLE E. (1966)

Agricultural Business Management

B.S., University of Nebraska, 1965; M.S., University of California, Davis, 1966.

Experience: Research assistant, University of California, Davis.

KEATING, EUGENE K. (1964)

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)

Physical Sciences

B.S., Pennsylvania State College, 1943; M.S., 1945; Ph.D., Brown University, 1950.

Experience: Assistant professor, University of Maine; physicist, North American Aviation; physicist, Rheem Manufacturing Co.

KENNINGTON, MACK H. (1958)

Animal Science

B.S., University of Idaho, 1946; M.S., Purdue University, 1956; Ph.D., 1958.

Experience: U.S. Air Force; assistant agricultural extension agent, Bannock Company, Pocatello, Idaho; research assistant, Purdue University.

KERSHAW, JOHN (1966)

Social Sciences

B.A., University of Oxford, England, 1934; Diploma in Education, 1935; M.A., 1937.

Experience: History instructor, Chadwick School; head, history department, Bancroft's School, England; captain, War Service (British Army); history instructor, Foyle College, N. Ireland; exchange teacher, Teacher Training College, Silesia, Germany.

KESSLER, CHARLES J. (1960)

Mechanical Engineering

B.S.M.E., University of Michigan, 1941; graduate study, University of Southern California.

Experience: Works manager, Angle Products Company; consultant, McDonnell Aircraft; design engineer, Convair; instructor, Case Institute of Technology; assistant professor, Kent State University, University of Florida; associate professor, University of Missouri; registered professional engineer, Ohio.

KIEFER, DOROTHY L. (1962)

Physical Education

B.S., University of California, Los Angeles, 1943; graduate study, University of California, Los Angeles; University of California, Riverside; Claremont Graduate School.

Experience: Teacher, Huntington Beach High School, Riverside Polytechnic High School, Claremont High School.

KING, DONALD W. (1961)

Civil Engineering

A.B., M.S., C.E., Stanford University, 1949-1959.

Experience: Instructor, Stanford University, San Jose State College; engineer, Lockheed Aircraft, Aerojet-General, Western Knapp Engineering Co., Hydrocarbon Research; engineer superintendent, Peter Kiewit Sons' Co.

KING, LOUIS J. (1958)

Social Sciences

B.A., University of California, Los Angeles, 1943; M.S.W., University of Southern California, 1951; Ed.D., 1958.

Experience: Marriage counselor, American Institute of Family Relations, Los Angeles; vocational and personal counselor, University of Southern California, Veterans Administration; instructor, Los Angeles City Schools, Torrance City Schools, Santa Ana Junior College, University of California, Los Angeles; assistant supervisor, attendance and welfare, Los Angeles City Schools; probation officer, Los Angeles County Probation Department.

KING, THOMAS M. (1966)

Mathematics

A.B., University of California, Berkeley, 1963; graduate study, Western Washington State College.

Experience: Teaching assistant, Western Washington State College; teacher, St. Helena High School, St. Helena, California; research assistant, California Research Corporation, Richmond; ship clerk, Pacific Maritime Association; laboratory assistant, University of California, Berkeley.

KITCH, KENNETH H. (1950)

Director, Educational Center

A.B., Southwestern College, 1930; A.M., Kansas University, 1937.

Experience: Reporting, editing and advertising staffs, Midwestern daily newspapers; journalism instructor and publications supervisor, Arlington and Labette County Community High Schools, Kansas, and Dallas, Texas, Technical High School; editor and writer, Associated Press; assistant director, Dallas Adult Education Program, in charge of the Dallas Public Evening Schools and Smith-Hughes adult programming; management's representative, Supervisory Promotion and Demotion Board, North American Aviation; member, Board of Directors, Texas Trade Schools; public relations and management counsel; managing editor and executive vice president, Wilson Publishing Co., agricultural and horticultural trade publications specialists, San Antonio; head, Department of Journalism, California State Polytechnic College, San Luis Obispo; assistant to the president, Kellogg-Voorhis.

KLEBSCH, HOWARD K. (1965)

Electronics Engineering

B.S., California State Polytechnic College, 1952.

Experience: Engineer, Douglas Aircraft Co., General Telephone Co.; senior engineer, General Dynamics Corp.

KNIGHT, BARRY A. (1964)

Accountancy

B.S., University of California, Los Angeles, 1960; graduate study, University of Southern California.

Experience: U.S. Army Security Agency; senior accountant, Lybrand, Ross Bros. and Montgomery; certified public accountant; instructor, Central Training School, Lybrand, Ross Bros. and Montgomery.

KNILL, LAMAR M. (1960)

Biological Sciences

B.S., Colorado State University, 1951; M.S., 1955; doctoral candidate, Colorado State University.

Experience: Graduate assistant, Colorado State University; fellow, Squibb Institute for Medical Research; research physiologist, Veterans Adminis-

Faculty

tration Hospital, Albuquerque; training officer, Armed Forces Special Weapons Project, Sandia Base, New Mexico; technical representative, Braun Chemical Company, Los Angeles; officer, U.S. Army; fellow, U.S. Public Health Service, National Institute of General Medical Sciences.

KNUDSEN, A. RUSSELL (1960)

Electronics Engineering

A.B., Brigham Young University, 1941; graduate study, North Carolina State College.

Experience: Instructor in electronics and mathematics, Valparaiso Technical Institute, Valparaiso, Indiana; assistant dean of education, Valparaiso Technical Institute; special instructor in electronics, Valparaiso University; instructor, National Science Foundation, Oklahoma State University; engineer, General Electric Co., Utica, N.Y.; staff member, Sandia Corporation, Albuquerque, New Mexico.

KOHLAN, RICHARD G. (1966)

Social Sciences

B.A., University of Minnesota, 1961; Ph.D., 1966.

Experience: Business office supervisor, Northwestern Bell Telephone Co.; instructor, University of Minnesota.

KONIGSBERG, ALBERT (1961)

Mathematics

B.S., U.S. Naval Academy, 1930; M.S., Purdue University, 1960.

Experience: Officer, U.S. Navy (retired); director of material, Pennsylvania Optical Company; instructor, Claremont Men's College.

KORDUS, HENRY (1964)

Landscape Architecture

M.S., University of Agriculture, Warsaw, Poland, 1951; M.A., University of Warsaw, 1957.

Experience: Landscape designer, "Flora" Forestry Office; professor, Lyceum of Landscape Architecture; assistant professor, University of Agriculture, Warsaw, Poland; landscape architect, Andrews and Clark Construction Engineers and Friedberg.

KRAMER, LLOYD A. (1963)

Library

B.A., University of California, 1948; B.L.S., 1950; graduate study, U.S. Navy Language School.

Experience: Slavic librarian, Hoover Institute and Library; social sciences librarian, Washington State University; head, technical services division, Humboldt State College Library; director, technical services division, Pomona Public Library.

KRIEGE, KENNETH B. (1957)

Mathematics

B.S., California State Polytechnic College, 1951; M.A., 1951; additional graduate study, University of Southern California, University of California, Los Angeles.

Experience: Teacher, San Luis Obispo Junior High School, Pomona High School.

KRUEPER, HARRY J. (1964)

Civil Engineering

B.S., University of California, Los Angeles, 1951; M.S., 1953.

Experience: Traffic section, City of Berkeley, California; instructor and project engineer, U.S. Navy Civil Engineer Corps; assistant district traffic engineer, California Division of Highways; consulting engineer; registered professional civil engineer, California.

LABOUNTY, HUGH O., JR. (1953)

Dean of the College

B.A., M.A., University of Redlands, 1950-51; Ed.D., University of California, Los Angeles, 1960.

Experience: Teacher-administrator; Citrus High School and Junior College. Chairman, English department; head, social sciences department; and coordinator, teacher education; executive dean, California State Polytechnic College.

LACY, MILO G. (1959)

Agricultural Business Management

B.S., University of Oregon, 1938; graduate study, University of California, Los Angeles.

Experience: Instructor, Long Beach City College, Pasadena City College, Orange Coast College, Mount San Antonio College; agricultural extension service retail marketing specialist, United States Department of Agriculture, Washington, D.C.; general manager, Richard's Market, Newport Beach; instructor, Food Distribution Program, University of Southern California.

LAMIMAN, JOHN F. (1946)

Professor Emeritus

B.S., University of California, 1922; M.S., 1924; Ph.D., 1931; additional graduate study, University of California.

Experience: S.A.T.C. (Army) University of California; research assistant in entomology; instructor in entomology, University of California; entomologist in Experiment Station.

LANE, BERNARD O. (1963)

Physical Sciences

B.S., University of North Carolina, 1950; M.S., Brown University, 1955; Ph.D., University of Southern California, 1962.

Experience: Graduate assistant, University of Southern California; geologist, Union Oil Company; lecturer, University of Nevada; curator of paleontology, Mackay Museum; curator of geology, Santa Barbara Museum of Natural History.

LANSFORD, FRANK D. (1964)

Head, Physical Education Department

B.S., Tennessee Polytechnic Institute, 1953; M.A., George Peabody College, 1954; additional graduate study, Claremont School of Theology, Whittier College.

Experience: Physical education instructor, Young Men's Christian Association, Florida; director and coach, Young Men's Christian Association, Pomona.

LANTHORNE, GEORGE D.

(1965)

Welding Engineering

B.A., University of California, Santa Barbara, 1958.

Experience: Welding specialist, U.S. Air Force; sales representative, Air Reduction Sales Co.; sales engineer, Reeves Soundcraft, Inc., Air Products and Chemicals, Inc.

LAPP, RUSSELL V. (1962)

Language Arts

Experience: Staff photographer, *Los Angeles Examiner*; staff photographer, *Garden Grove News*; free lance photographer.

LASSWELL, MARCIA E. (1961)

Social Sciences

B.A., University of California, 1949; M.A., University of Southern California, 1952.

Experience: Instructor, George Pepperdine College; consultant, Affiliated Psychological Consultants; marriage counselor and psychometric consultant, Institute Therapeutic Psychology.

LECOCQ, VERNE L. (1966)

Electronics Engineering

B.S.E.E., South Dakota School of Mines and Technology, 1958.

Experience: Electronics engineer, White Sands Missile Range, Hughes Aircraft Company, General Dynamics, Pomona; senior electronics engineer, Lear-Sielers, Anaheim.

LEE, KEI A. (1965)

Mathematics

B.S., University of Michigan, 1960; B.S., 1961; M.S., 1962; additional graduate study, University of California, Los Angeles.

Experience: Assistant in research, University of Michigan; assistant professor, Piedmont College.

LEEBHOFF, BERNARD (1966)

Business Management

B.A., San Francisco State College, 1953; M.A., 1957; additional graduate study, Stanford University and University of California, Berkeley.

Experience: Teacher, San Leandro High School, Healds Business College; instructor, Gavilan Junior College, College of San Mateo; executive secretary to corporation president, Bayle LaCoste & Company; administrative personnel supervisor, San Francisco

Faculty

Naval Shipyard; chief clerk for Office of Signal Officer, Presidio of San Francisco.

LEVERING, DAVID L. (1963)

Social Sciences

B.A., University of Redlands, 1950; M.A., Claremont Graduate School, 1959; additional graduate study, Claremont Graduate School.

Experience: Regional executive, World University Service; associate in humanities, University of California, Riverside.

LIEB, THEODORE L. (1964)

Agronomy and Agricultural Engineering

B.S., California State Polytechnic College, 1947.

Experience: Teacher, Federal Government; dairy farmer, Corona; head farmer, California State Polytechnic College.

LINDAUER, JACQUELINE S.

(1966)

Language Arts

B.A., University of Arizona, 1953; M.S., Kansas State University, 1954.

Experience: Instructor, Oklahoma State University, Glendale College.

LINGENFELTER, BARBARA H.

(1964)

Social Sciences

B.A., Santa Barbara State College, 1934; M.E., University of California, Los Angeles, 1955; additional graduate study, San Jose State College.

Experience: Teacher, Pasadena City Schools; Little Lake School District; elementary consultant, Imperial, Alameda and Los Angeles Counties; primary consultant, San Carlos City Schools; instructor, University of California Extension, Los Angeles and Riverside.

LINT, HAROLD L. (1947)

Biological Sciences

B.A., University of California, Los Angeles, 1940; M.A., 1942; additional graduate study, Oregon State University.

Experience: Inspector, United States Food and Drug Administration; ran-

ger-naturalist, United States National Park Service.

LISOWSKI, MARTIE L. (1959)

Library

B.A., University of California, Los Angeles, 1933; M.S. in Library Science, University of Southern California, 1959.

Experience: Counseling, testing, and special placement, California Department of Employment; evening school instructor, Los Angeles City Schools; library aide, Los Angeles County Library.

LOGGINS, CHERYL L. (1966)

Foods and Nutrition

B.S., University of California, Los Angeles, 1955; M.S., 1958.

Experience: Dietetic internship, Veterans Administration Center, Los Angeles; research dietitian, University of California, Los Angeles; public health nutritionist, Los Angeles City Health Department and Los Angeles County Health Department.

LUGO, EDWARD A., JR. (1966)

Animal Science

B.S., California State Polytechnic College, 1964; M.S., Kansas State University, 1966.

Experience: Graduate research assistant, Kansas State University; instructor, Animal Husbandry Department, Kansas State University.

McALLISTER, JAMES A. (1964)

Electronics Engineering

B.S., U.S. Naval Academy, Annapolis, 1939; M.S., University of California, 1948.

Experience: Assistant professor, Physics, California Western University, San Diego; United States Navy; division director, Research and Development Division for Undersea Warfare and Ocean Surveillance; assistant director, Electronics Division, Bureau of Ships; assistant director, U.S. Navy Electronics Laboratory, San Diego; electronics and radiological safety officer, San Francisco Naval Shipyard; assistant director, Ship Electronics Division, Bureau of Ships.

McCORKLE, C. O. (1932)

Dean Emeritus

B.S., University of California, 1927; M.S., 1937.

Experience: Director of agriculture and critic teacher, Red Bluff Union High School; executive secretary, California Association Future Farmers of America; teacher trainer, Agricultural Education, Bureau of Agricultural Education; head, agricultural division, California Polytechnic; research assistant, Giannini Foundation of Agricultural Economics, University of California; instructor, agricultural economics; subject matter specialist, Bureau of Agricultural Education, State Department of Education (California); assistant to the president, dean of instruction, administrative dean, instruction, California State Polytechnic College.

McCORMIC, RALPH C. (1959)

Language Arts

B.A., Oklahoma State University, 1947; M.A., Stanford University, 1950; additional graduate study, Stanford University.

Experience: Temporary instructor, Oklahoma State University; instructor, San Francisco State College; assistant professor, University of Texas; Command Entertainment Director, United States Army in Europe; technical director, Actor's Workshop of San Francisco.

McINTOSH, WILLIAM C. (1951)

Coordinator, Scheduling and Institutional Studies

A.B., University of California, Berkeley, 1948; M.A., 1950; additional graduate study, University of Southern California.

Experience: Teacher, Richmond Union High School; mathematics and physics instructor, California State Polytechnic College, San Luis Obispo; instructor, mathematics, California State Polytechnic College, Kellogg.

McLACHLIN, HARRY B. (1954)

Head, Animal Science Department

B.S., North Dakota State University, 1930.

Experience: U.S. Navy; extension animal husbandman, North Dakota; livestock specialist, *Market News*, Des Moines; ranch management.

McMILLAN, JOHN C. (1962)

Electronics Engineering

B.A., Pomona College, 1948; M.A., Claremont University College, 1956; additional graduate study, University of California, Los Angeles.

Experience: Senior electronics engineer and group leader, General Dynamics; V.P. engineering, Hubot, Inc.; chief engineer, Edcliff Instruments; communications and electronics technical staff officer, U.S. Air Force; consultant, electronic instrumentation; instructor, mathematics, Mt. San Antonio College.

McPHEE, JULIAN A. (1933)

President Emeritus

B.S., University of California, 1917; M.A., 1928; LL.D., Armstrong College, 1952.

Experience: Agriculture Extension Service, University of California; U.S. Navy; director of vocational agriculture, El Dorado County High School and Gilroy Union High School; chief, Bureau of Agricultural Education, State Department of Education (California); director, War Food Production Training Program for California; acting chief, Bureau of Readjustment Education; assistant executive officer, State Board of Vocational Education; state director, Vocational Education (California).

McWILLIAMS, ROBERT D. (1966)

Marketing

B.B.A., Texas Technological College, 1964; M.B.A., 1965; additional graduate study, Texas Technological College, University of Southern California.

Experience: Teaching assistant, research assistant, instructor, marketing department, Texas Technological College; truck leasor, Ken Garff Sales, Inc., Salt Lake City, Utah; physical distribution trainee, Armour and Company, Lubbock, Texas.

Faculty

MacDONALD, KENNETH A.
(1962)

Mathematics

B.A., University of Arizona, 1956; M.A., University of Vermont, 1958; additional graduate study, University of California, Riverside.

Experience: Teaching assistant, University of Vermont; instructor, Idaho State College, San Diego State College.

MacDONALD, LACHLAN P.
(1963)

Director of Information Services

M.A., University of Chicago, 1957.

Experience: Reporter, *Daily Mining Gazette*, Michigan; news editor, Radio Station KBYR, Alaska; feature reporter, *Anchorage Daily Times*; Alaska correspondent, Associated Press Seattle Bureau; public information specialist, U.S. Army, Alaska; public relations counsel, Alaska National Guard; editor, *Chicago Review*, lecturer and editor, University College, University of Chicago; reporter and copy editor, City News Service, Los Angeles; teacher, Webb School of California; free lance magazine and television writer and photographer.

MACROPOL, JOHN (1960)

Physical Sciences

B.A., University of California, 1954; M.S., Michigan State University, 1955.

Experience: Dynamics engineer, Convair, San Diego; head, physics department, Lawrence Institute of Technology, Detroit, Michigan.

MAKOW, YORAM (1965)

Audio-Visual

B.A., University of California, Los Angeles, 1963; M.A., 1965.

Experience: Free lance designer, California; teacher and supervisor, University Synagogue; designer, Northwestern; research assistant, University of California.

MARSHALL, ROBERT D. (1957)

Library

A.B., University of Washington, 1940; B.L.S., University of California, 1953.

Experience: Social science librarian, University of Oregon.

MARTI, WERNER H. (1956)

Social Sciences

A.B., University of California, Los Angeles, 1943; M.A., Claremont Graduate School, 1951; Ph.D., University of California, Los Angeles, 1953.

MATTERN, DAVID C. (1964)

Library

B.A., Wesleyan University, 1961; M.S., University of Southern California, 1962.

Experience: Reference librarian, Anaheim Public Library; catalog librarian, professional Library Service, Santa Ana.

MAURER, ROBERT L. (1948)

Social Sciences

B.A., Western Reserve University, 1935; M.A., 1936; Ph.D., Ohio State University, 1951.

Experience: Teaching assistant and research fellow, Ohio State University; instructor, Oregon State University, California State Polytechnic College, San Luis Obispo; dean of arts and sciences, California State Polytechnic College; officer, U.S. Air Force; California certified psychologist.

MELLARD, GEORGE A. (1957)

Electronics Engineering

B.S.E.E., B.S.M.E., Kansas State University, 1947; M.S., 1952; additional graduate study, University of Oklahoma, University of California, Los Angeles, Kansas State University.

Experience: Consultant, The Ford Foundation; senior research engineer, General Dynamics, Pomona; senior electronic engineer, Sylvania, Mountain View; R. M. Parsons Company; aerodynamicist, Beech Aircraft Corp.; instructor, Kansas State University.

MOORE, DOUGLAS H. (1958)

Mathematics

A.B., 1942; University of California, M.A., 1948; Ph.D., 1962.

Experience: U.S. Air Force; instructor, University of California, West Coast University, Los Angeles; research engineer, North American Aviation, Hughes Aircraft Company.

MOORE, LYDIA P. (1964)

Mathematics

B.A., University of California, Los Angeles, 1959; M.A., California State College at Los Angeles, 1964; additional graduate study, Claremont Graduate School.

Experience: Lecturer, California State College at Los Angeles.

MOORE, SHERREL L. (1966)

Accountancy

B.S., University of Utah, 1950; M.Acct., University of Southern California, 1963.

Experience: Senior accountant, Moore, Rife and Associates; finance officer, U.S. Air Force; controller staff, Los Angeles Division of North American Aviation, Inc.; vice-president, treasurer, Brown-Eichler & Co.; audit manager, Glenn Ingram & Co.; self-employed, certified public accountant.

MORALES, RAY (1961)

Civil Engineering

B.S., Loyola University, 1960; M.S., Stanford University, 1961; Engineer's Degree, 1965; additional graduate study, West Virginia University and Utah State University.

Experience: Assistant civil engineer and field engineering aid, Department of Water and Power, Los Angeles; design draftsman, Electro-cord Corp., Williams Metal Products.

MORAN, GABRIEL T. (1948)

Head, Physical Sciences Department

B.A., Whittier College, 1942; graduate study, Whittier College.

Experience: Chemist, American Potash and Chemical Company, Trona; Thompson Products, Bell; Paul Dickerson, Chemistry Laboratory; District Agricultural Laboratory, Whittier.

MORGAN, HORATIO O. (1963)

Aerospace Engineering

B.A., Pomona College, 1928; graduate study, Claremont College, George Washington University.

Experience: United States Air Force as group commander, executive officer, commander air base group, air inspector, personnel officer; director person-

nel, Boston Air Defense Sector; colonel (retired) U.S. Air Force.

MULDER, GEORGE (1960)

Associate Dean (Counseling)

B.A., California State College at Long Beach, 1956; M.A., 1957; additional graduate study, University of Southern California.

Experience: Counselor, California State Polytechnic College; teacher, Excelsior Union High School District; counselor-instructor, Cerritos College.

MYERS, LEONHARD M. (1964)

Industrial Engineering

B.A., University of Missouri, 1956; B.S., 1960; graduate study, University of Missouri.

Experience: Industrial engineer, General Dynamics; human factors engineer, Boeing Airplane Co.; instructor, University of Missouri.

MYLANDER, HARVEY A. (1958)

Mechanical Engineering

B.S.M.E., University of Arizona, 1931; graduate study, University of Arizona.

Experience: General engineer, U.S. Naval Ordnance Laboratory; instructor, Mt. San Antonio College, University of California, Berkeley; consulting hydraulic engineer, private practice; district manager, De Laval Steam Turbine Company; Pacific Coast manager, American Hoist & Derrick Co.; sales engineer, General Electric Co.; foreign representative, International General Electric Co.; engineer, U.S. Geological Survey; registered mechanical engineer, California.

NELSON, EDWARD A. (1958)

Animal Science

B.S., Utah State Agricultural College, 1952; M.S., 1953; Ph.D., Kansas State College, 1958.

Experience: Manager, B.A.C. Valley Farm, Cedar City, Utah; co-owner and operator of livestock ranch, Cedar City, Utah; graduate research assistant, Kansas State College; U.S. Navy.

NELSON, RICHARD T. (1961)

Business Management

B.A., California State College at

Faculty

Long Beach, 1959; M.S., 1961.

Experience: Operations control analyst, Aerojet-General Corporation; management and traffic consultant; assistant traffic manager, Treesweet Products Company; proprietor of retail grocery.

NEWBERRY, CONRAD F. (1964)

Aerospace Engineering

B.E.M.E., University of Southern California, 1957; graduate study, University of Southern California.

Experience: Senior engineer, aerodynamics, North American Aviation, Inc., Los Angeles; Atlantic Research Corporation, Duarte, California; senior design engineer, Lockheed Aircraft Service Company, Ontario, California.

NEWELL, LLOYD A. (1956)

Fruit Industries

B.S., South Dakota State College, 1941.

Experience: Agricultural inspector, Department of Agriculture, San Diego County; instructor I-on-F program, Escondido and El Cajon; instructor, adult education, Escondido; deciduous orchard manager, Escondido; livestock superintendent, San Diego, Riverside, and Orange County Fairs; U.S. Marine Corps.

NEWMAN, PAUL M. (1965)

Language Arts

B.A., San Fernando Valley State College, 1961; M.A., 1961.

Experience: Assistant business manager, State University of Iowa Theatre; instructor, University of Iowa; assistant professor, University of California.

NISE, NORMAN S. (1963)

Electronics Engineering

B.S.E.E., Drexel Institute of Technology, 1960; M.S.E.E., Lehigh University, 1962; additional graduate study, Purdue University.

Experience: Part-time instructor, Purdue University; Remington Rand Univac; electronics engineer, Hughes Aircraft Company.

O'DONNELL, PATRICK I. (1966)

Registrar

B.A., University of Southern Cali-

fornia, 1955; M.A., 1961; additional graduate study, University of Southern California.

Experience: English teacher, Los Angeles City Schools; assistant registrar, University of Southern California; registrar and admissions officer, California Lutheran College.

OGLE, CLAUDE B., JR. (1966)

Civil Engineering

B.S.C.E., University of Southern California, 1943; M.S.C.E., 1947; additional graduate study, University of Southern California.

Experience: Chief engineer, vice president, Atlas Scraper and Engineering Co.; lecturer, Civil Engineering, University of Southern California; designer, heavy equipment; consultant, self-employed; Lt. CEC USNR (ret.), Civil Engineer Corps.

OSBORN, NEAL J. (1965)

Language Arts

B.A., University of Washington, 1947; M.A., 1953; additional graduate study, University of California, San Diego.

Experience: Assistant professor and associate professor, Westminster College; associate professor, La Verne College.

OURY, THOMAS H. (1966)

Counselor

B.A., Pomona College, 1950; M.S. (Ed.), University of Southern California, 1953; additional graduate study, University of Southern California.

Experience: High school teacher, Kern County, Long Beach; counselor, Long Beach Unified School District; field supervisor (Counselor Education), University of Southern California.

PARISH, RUSSELL A. (1958)

Chairman, Metal Processes Engineering Department

B.S., Oshkosh State Teacher's College, 1932; graduate study, University of Michigan.

Experience: Instructor, General Motors Institute, Public Schools, Michigan; writing and conducting management training conferences and tool and

die maker, General Motors Corp.; training director, General Railway Signal Co.

PARK, DAVID J. (1965)

Economics

B.A., Claremont Men's College, 1957; M.A., University of Southern California, 1959; Ph.D., 1962.

Experience: Mathematics teacher, Los Angeles City Schools; assistant professor, La Verne College, University of Maryland; head, Overseas Marketing Department, Janseng Corporation.

PAUGSTAT, WILLIAM C. (1956)

Mathematics

A.B., Miami University, 1952; M.Sc., Cornell University, 1954; additional graduate study, San Jose State College, New Mexico State University.

Experience: Assistant professor, mathematics and chemistry, Upland College; quality control chemist, Exchange Orange Products Company, Ontario, California.

PAUL, FRANK (1960)

Accountancy

B.B.A., City College of New York, 1942; M.A., University of San Francisco, 1958; additional graduate study, City College of New York, University of Washington.

Experience: Statistical accountant and supervisor, Wilson Distilling Company; cost accountant, Washington State Co-op; chief accountant and office manager, Resort Airlines; staff accountant, J. G. Weiss, Hurdman and Cranston, John Proctor, Alexander Grant and Company, Egan and Company; partner, Citizen's Tax Service; associate professor, Armstrong College; certified public accountant.

PETERS, GILBERT A. (1966)

Associated Students Business Manager

B.S., University of Wisconsin, 1961; J.D., University of Wisconsin Law School, 1966.

Experience: Law clerk, McDonald, Buss, Biart, Purcell, and Piper Law Firm, Madison, Wisconsin; counselor

and outing director, Wisconsin Union, University of Wisconsin.

PFLUEGER, DONALD H. (1952)

Social Sciences

B.A., Pomona College, 1949; M.A., Stanford University, 1951; additional graduate study, University of California, Los Angeles, California State College at Los Angeles, Claremont Graduate School, Foreign Service Institute, Washington, D.C.

Experience: U.S. Navy; teacher, Covina High School; cultural attache, American Embassy, Amman, Jordan; member, California Constitution Revision Commission; fellow, Institute of American History, Stanford University.

PHILBRICK, JOSEPH L. (1960)

Social Sciences

B.A., Baylor University, 1949; M.A., 1950; Ph.D., 1955; additional graduate study, University of Southern California, California State College at Long Beach, University of California, Berkeley.

Experience: Elementary school; registrar and chairman of department of psychology and philosophy, California Baptist Theological Seminary; dean of student personnel services, chairman of department of psychology and philosophy, Howard Payne College; instructor in psychology and sociology, Fullerton Junior College; instructor in philosophy, Cerritos College; instructor in education, University of California Extension, National Science Foundation Psychology Scholar; resident counselor, American Institute of Family Relations.

POLLOCK, FRANCES H. (1963)

Language Arts

A.B., University of California, 1943; M.A., University of California, Los Angeles, 1959; additional graduate study, University of Southern California, Neighborhood Playhouse School of the Theater, New York.

Experience: Instructor, Hartnell College, Salinas; managing-director, Community Players, Berkeley; partner-producer, Gallery Stage, Hollywood; summer stock, New York, New Hampshire.

Faculty

POMERENING, JAMES A. (1965)

Agronomy

B.S., University of Wisconsin, 1951; M.S., Cornell University, 1956; Ph.D., Oregon State University, 1961.

Experience: Soil surveyor, Wisconsin Geological and Natural History Survey; teaching assistant, Cornell University; air photo interpreter, U.S. Army; research fellow, Oregon State University; assistant professor, University of Maryland; assistant professor, Oregon State University.

POMEROY, JACK L. (1964)

Metal Processes Engineering

Experience: Engineering consultant; director of technical services, Product Techniques, Inc., Los Angeles; mechanical designer, Magnavox Research Laboratories, Torrance; mechanical engineering and designer, Hughes Aircraft Co., Culver City; mechanical engineer, Celon Co., Madison, Wisconsin; mechanical engineer, George Gorton Machine Co., Racine, Wisconsin; instructor, Racine Vocational School, Racine, Wisconsin.

PROCSAL, ROBERT L. (1949)

Head, Agronomy Department

B.S., California State Polytechnic College, 1946.

Experience: Borden's Dairy Delivery Service, Oakland; vocational agricultural instructor, El Centro; diversified farming, Imperial County; officer, U.S. Army Air Force.

PURCIEL, DAVID W. (1965)

Landscape Architecture

A.A., East Los Angeles College, 1959.

Experience: Architect, J. F. Hedrick, San Gabriel; delineator, self-employed, South Pasadena, California.

QUANEY, ROBERT A. (1959)

Industrial Engineering

B.S.I.E., Stanford University, 1954; M.S.I.E., 1965; additional graduate study, University of California, Los Angeles.

Experience: Manufacturing engineer, R.C.A., Los Angeles; manufacturing planner, Lockheed Missile, Van Nuys; coordinator of engineering planning, manufacturing research engineer and

production planning supervisor, Lockheed Missile, Sunnyvale; senior manufacturing engineer, Autonetics; officer and aviator, U.S. Navy.

RAUCH, RAYMOND C. (1963)

Business Management

B.S., University of Oregon, 1951; M.B.A., 1959; additional graduate study, Ohio State University.

Experience: Teaching assistant, Ohio State University; assistant professor, San Fernando Valley State College; underwriter, Fireman's Fund Insurance Company; general agent and partner, Powell & Rauch Insurance Agency; instructor, American College of Life Underwriters, Insurance Institute of America; consultant to the insurance industry.

RICE, ELMER H. (1959)

Physical Sciences

B.A., Whittier College, 1947; Ph.D., University of Southern California, 1958.

Experience: Analytical chemist, Truesdail Laboratories; junior research biochemist, University of California Medical Center.

RICHARDS, RICHARD C. (1964)

Social Sciences

B.A., University of California, Santa Barbara, 1957; M.A., University of California, Los Angeles, 1964; additional graduate study, University of California, Los Angeles.

Experience: Teaching assistant, University of California; instructor, San Fernando Valley State College, California State College at Los Angeles.

RIDDLE, JEWEL M. (1959)

Accountancy

B.A., San Jose State College, 1951; graduate study, Golden Gate College, University of California, Los Angeles, University of Southern California.

Experience: Instructor, Golden Gate College, Los Angeles Metropolitan College, University of California Extension; tax department, Perkins and Trousdale, CPA's; staff accountant, Arthur Young and Company, CPA's; certified public accountant.

RITCHIE, MARGARET (1965)

Foods and Nutrition

B.S., Columbia University, 1918; M.A., 1932; additional graduate study, University of Chicago.

Experience: Professor and head, home economics department, Battle Creek College, Michigan, University of Idaho.

ROCHE, EDWARD T. (1959)

Biological Sciences

B.A., San Diego State College, 1948; M.S., University of Southern California, 1952; Ph.D., 1957.

Experience: Teaching assistant, University of Southern California; field and laboratory research assistant for O.N.R. and U.S.A.F. Alaskan research projects; instructor of life science, Compton College; consultant in marine biology, Extended Submergence Specialists team, Aerojet-General Corp.

ROWLEY, WILLIAM P. (1958)

Head, Agricultural Business Management Department

A.B., University of California, Los Angeles, 1933; graduate study, University of Southern California, California State College at Los Angeles.

Experience: Case supervisor, California State Relief and Welfare, Los Angeles; field man, U.S.D.A., Agricultural Marketing Administration, Los Angeles and Boise, Idaho; public relations director, Associated Produce Dealers and Brokers of Los Angeles.

RUPPERT, ALVIN C. (1965)

Business Management

B.A., Pomona College, 1951; M.B.A., Harvard Business School, 1953.

Experience: Instructor, Mt. San Jacinto College; operations control analyst, Aerojet-General; procedures designer, Kaiser Steel Corporation; assistant examiner, Standard Oil Company.

SANFORD, ALBERT D. (1964)

Aerospace Engineering

B.S., University of Colorado, 1956; graduate study, University of California.

Experience: Engineer, Marquardt Corp., Van Nuys; engineer, Boeing Co., Seattle; research engineer, Rocketdyne Co., Canoga Park; teaching assistant, University of California, Berkeley.

SCHAEFER, D. JUNE (1962)

Activities Advisor

B.A., Scripps College, 1940; M.A., Claremont Graduate School, 1962; additional graduate study, Claremont Graduate School.

Experience: Executive director, Camp Fire Girls, Burbank and Arcadia Councils.

SCHENCK, W. DONALD (1956)

Language Arts

B.A., University of Redlands, 1949; M.A., University of Southern California, 1955; additional graduate study, University of Southern California, San Francisco State College, Claremont Graduate School.

Experience: Teacher, San Bernardino City Schools; instructor, Mt. San Antonio College, American Institute of Banking; editor for personnel department, Convair-Pomona.

SCHMITZ, GEORGE W. (1961)

Agronomy

B.S., University of Arizona, 1948; M.S., 1950; Ph.D., Ohio State University, 1952.

Experience: Agronomist, Zonolite Corporation; assistant professor and assistant soil scientist, Oregon State University and Oregon Agricultural Experiment Station; agronomist, California Spray Chemical Corporation; assistant professor plant science, Fresno State College.

SCHNEIDER, KENNETH J. (1961)

Mechanical Engineering

B.S.M.E., University of Southern California, 1958; M.S.M.E., 1961; additional graduate study, University of Southern California.

Experience: Technical consultant, Aerojet Corp., Downey; civil engineer, Department of Interior; instructor, Citrus College; research engineer, General Dynamics, Pomona; research and design engineer, Aerojet Corp., Azusa; design engineer, C. F. Braun, Alhambra.

Faculty

SCHNEIDER, ROBERT R. (1966)

Civil Engineering

B.S.C.E., University of New Mexico, 1944; M.S.C.E., University of Southern California, 1952.

Experience: Assistant professor, civil engineering, University of Southern California; design engineer, C. Devel & Associates, structural engineers; chief engineer, Aluminum Structures Division, Harvey Aluminum Company; regional development engineer, Reynolds Aluminum Company; president, Modern Alloys Fabricators, Inc.; registered professional engineer, California.

SCHOENWETTER, EARL E.

(1960)

Electronics Engineering

B.S., University of Wisconsin, 1957; certificate, Radio-Television Technician, Milwaukee School of Engineering, 1952.

Experience: Flight test engineer, Convair, Pomona; development engineer, Aerojet-General Corp., Azusa; test engineer, Collins Radio Co., Cedar Rapids, Iowa.

SCHONING, RICHARD H. (1963)

Head, Business Management Department

A.B., University of California, Berkeley, 1943; M.B.A., Wharton School, University of Pennsylvania, 1959; additional graduate study, College of William and Mary; U.S. Army Transportation School, U.S. Army Command and General Staff College, Industrial College of the Armed Forces, British staff officers "War Course," at the Royal Army Service Corps Officers' School.

Experience: Surveyor, rivers and harbors, San Francisco district, U.S. Engineers; rate clerk, Railway Express Agency; transportation officer, U.S. Army; instructor, U.S. Army Transportation School, U.S. Army Command and General Staff College.

SCHWIEDER, ROBERT M. (1966)

Social Sciences

B.A., University of Southern California, 1959; M.A., 1965; additional

graduate study, University of Southern California.

Experience: Instructor, University of Southern California.

SCOLINOS, JOHN H. (1960)

Physical Education

B.S., Pepperdine College, 1950; M.A., University of Southern California, 1952; additional graduate study, University of Southern California.

Experience: Instructor and head coach, Pepperdine College; professional baseball player; U.S. Army.

SEIBERT, KATHERINE B. (1963)

Business Management

B.A., New Mexico Highlands University, 1948; M.A., 1951.

Experience: Teacher, high schools, New Mexico and California; associate professor, Chaffey College; certified professional secretary; instructor, University of Alabama, Extension Division; contract instructor, Maxwell AFB, Alabama.

SELLE, MARY ETTA B. (1956)

Associate Dean (Women)

B.A., University of Southern California, 1937; M.A., 1938; Ph.D., 1960.

Experience: Instructor, San Bernardino High School; head of language department, El Monte High School; associate dean (women), California State Polytechnic College, San Luis Obispo.

SEUBERLING, HARRISON P.

(1963)

Civil Engineering

C.E., University of Cincinnati, 1939; graduate study, University of Cincinnati and California State College at Long Beach.

Experience: Associate engineer, U.S. Engineer Office; engineer, Larson White and Hunt; Walter and Wilham; construction analyst, Veterans Administration; engineer, Vogt, Ivers, Seaman and Associates; partner, Muller and Seuberling; engineer, Edward J. Nie-meier.

SHAFFER, RALPH E. (1963)

Social Sciences

A.B., University of California, Los Angeles, 1951; M.A., University of California, 1955; Ph.D., 1962.

Experience: Teaching assistant, University of California, Davis; teacher, Sacramento City Schools; instructor, Oakland City College.

SHAFIA, FRED (1964)

Biological Sciences

B.S., California State Polytechnic College, 1957; M.S., Brigham Young University, 1960; Ph.D., University of Nebraska, 1963.

Experience: Teaching assistant and research assistant, Brigham Young University; University of Nebraska; predoctoral fellow, U.S. Public Health Service; assistant professor of microbiology, Rutgers University.

SHAPIRO, MILTON M. (1962)

Economics

A.B., Brooklyn College, 1943; Ph.D., University of Southern California, 1963.

Experience: Instructor, University of Southern California; assistant professor, Occidental College; economist and marketing analyst, National Industrial Conference Board, North American Aviation, Marquardt Corporation, World Trade Foundation, The Sherman Foundation, Jewish Agency for Palestine.

SHELDON, ALFRED E., JR. (1966)

Language Arts

B.S., United States Military Academy, 1955; M.A., Washington State University, 1963; additional graduate study, Claremont Graduate School.

Experience: Officer, U.S. Air Force; assistant professor, United States Air Force Academy.

SHRAGER, SIDNEY (1960)

Language Arts

A.B., University of Southern California, 1949; M.A., University of California, Los Angeles, 1951; additional graduate study, University of Southern California.

Experience: Lecturer, University of Southern California; instructor, Chouinard.

SIEGEL, BEN (1957)

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)

Head, Mathematics Department

B.A., University of Wichita, 1950; M.A., 1952; Ph.D., Iowa State College, 1958.

Experience: Teaching fellow, University of Wichita, Wichita, Kansas; graduate assistant, Iowa State College, Ames, Iowa; assistant professor, University of Wichita, Wichita, Kansas.

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, Douglas Aircraft Company, Boeing Aircraft Company, Reo Motors Company, National Iron Company, Northwestern Railroad.

SKOUSEN, OWEN K. (1960)

Electronics Engineering

B.A., University of California, Los Angeles, 1949; M.S., Stanford University, 1950; E.E., 1952; additional graduate study, University of New Mexico, Brigham Young University, Stanford University.

Experience: Senior instrumentation engineer, Marquardt Jet Laboratory, Ogden, Utah; research engineer, Sandia Corporation, Albuquerque; electronic development engineer, Hewlett-Packard Company, Palo Alto; instructor electrical engineering, Brigham Young University; electronics officer, U.S. Navy; teaching assistant, Stanford University.

Faculty

SMEDLEY, DONALD B. (1959)

Electronics Engineering

B.S.E.E., University of Oklahoma, 1956; graduate study, University of California, Los Angeles, California State College at Los Angeles.

Experience: Electronics engineer, General Dynamics Corp.; senior design engineer, Space and Information of N.A.A.; technical consultant, Aerojet-General Corp., Radio Station KMPC, Birtcher Corp., Instrument Division.

SMITH, DONALD D. (1965)

Physical Sciences

B.S., University of Oklahoma, 1947; M.S., 1948; Ph.D., Purdue University, 1953.

Experience: Senior chemist, Aerojet-General; research chemist, Dow-Corning Corporation, Ethyl Corporation; research fellow, teaching assistant, Purdue University; instructor, teaching assistant, University of Oklahoma.

SMITH, DUDLEY R. (1957)

Agricultural Engineering

B.S., Cornell University, 1954; graduate study, Cornell University.

Experience: Instructor in agricultural engineering, State University of New York, Morrisville.

SMITH, MARVIN E. (1966)

Library

B.A., University of California, Los Angeles, 1958; M.S.L.S., University of Southern California, 1962.

Experience: Catalog librarian, California State College at Los Angeles; map librarian, U.S. Peace Corps; city librarian, Temple City, California; regional reference librarian, Los Angeles County Public Library.

SMITH, RICHARD H. (1960)

Business Management

B.S., Massachusetts Institute of Technology, 1948; M.B.A., Northwestern University, 1954.

Experience: Industrial engineer, Graver Tank and Manufacturing Company, Inc., Foote Brothers Gear and Machine Corporation; management consultant, Parsons Corporation, Arthur Young and Company, Armour Research Foundation; instructor, Illi-

nois Institute of Technology, Menlo College; systems analyst, Kaiser Steel Corporation; specialist senior programmer, Jet Propulsion Laboratories; certificate in data processing.

SMITH, STANLEY B. (1963)

Assistant to the President

B.S., University of Utah, 1953; M.B.A., 1962.

Experience: J. C. Penney Company; commissioned officer, U.S. Air Force; assistant director of personnel, University of Utah; assistant to the dean of the college, California State Polytechnic College, Kellogg.

SMITH, WILLIAM A. (1964)

Social Sciences

B.A., Fresno State College, 1953; M.A., Claremont Graduate School, 1960; Ph.D., 1965.

Experience: Instructor, Pomona College; instructor, Mt. San Antonio College; visiting lecturer, Claremont Graduate School, summer session.

SPITAL, SIDNEY (1964)

Mathematics

B.S., Brooklyn College, 1949; Ph.D., University of Rochester, 1957.

Experience: Associate professor, University of Toledo; staff scientist, Hughes Aerospace Corporation.

STAHLEY, J. ROBERT (1966)

Language Arts

B.S., State University of New York at Fredonia, New York, 1960; M.A., The Pennsylvania State University, 1965; additional graduate study, University of California, Los Angeles.

Experience: Radio/TV announcer, WICU, Erie, Pennsylvania; director, Gannon College Summer Theatre; actor, Erie Playhouse, Town & Country Musicals, Rochester Playhouse, Mateer Playhouse; teacher, Harbor Creek Central School, Brighton High School, Rochester, New York; teaching assistant, Pennsylvania State University; substitute teacher, Los Angeles City Schools.

STALLINGS, DALE G. (1964)

Economics

B.S., University of Idaho, 1950; M.S., University of Minnesota, 1952; Ph.D.,

1962; additional graduate study, University of California, Berkeley.

Experience: Research assistant, University of Minnesota; associate agricultural economist, University of California and United States Department of Agriculture; agricultural economist, United States Department of Agriculture.

STEWART, GLENN R. (1963)

Biological Sciences

B.S., California State Polytechnic College, 1958; M.A., Oregon State University, 1960; Ph.D., 1963.

Experience: Graduate assistant in zoology, Oregon State University.

STONER, MARTIN F. (1967)

Biological Sciences

B.S., California State Polytechnic College, Pomona, 1963; graduate study, Washington State University.

Experience: Research assistant, Washington State University; information aid, L. A. County Department of Arboreta & Botanic Garden; greenhouse manager, teaching assistant, lab assistant, California State Polytechnic College, Pomona; lab assistant, Earhart Plant Research Lab, California Institute of Technology.

STULL, ROBERT B. (1947)

Physical Education

A.B., Whittier College, 1941; M.A., 1947; additional graduate study, University of Southern California.

Experience: Freshman basketball coach, Whittier College; graduate manager, Whittier College, athletic specialist, U.S. Navy; officer, U.S. Navy; instructor, political science and physical education, Valencia Union High School.

SUTHERLAND, RODNEY D.

(1960)

Head, Aerospace Engineering Department

B.S., University of California, Los Angeles, 1952; M.S., 1953; additional graduate study, Massachusetts Institute of Technology.

Experience: Rocket design and chemical engineer, U.S. Naval Ordnance Test Station, Inyokern; senior thermodynamics and propulsion engineer, Convair, Pomona.

SUTTON, ARTHUR W., JR.

(1961)

Electronics Engineering

B.S.E.E., Rose Polytechnic Institute, 1956; graduate study, Ohio State University.

Experience: Project engineer, Wright Air Development Division, Dayton, Ohio.

SUTTON, JAMES E. (1964)

Economics

B.S., University of Wisconsin, 1955; graduate study, University of Wisconsin, University of Michigan.

Experience: Teaching assistant, University of Wisconsin; instructor, University of Michigan; instructor, Pomona College; research coordinator, Southern California Research Council; lecturer, Pomona College.

SYVERSON, MAGNUS (1957)

Physical Education

B.S., Oregon College of Education, 1942; M.S., University of Oregon, 1950; Ed.D., 1952.

Experience: Teacher-coach, Newburg and Klamath Falls, Oregon; instructor, Portland State College; assistant professor, University of California, Los Angeles; U.S. Navy.

SZIJJ, LASZLO J. (1963)

Biological Sciences

B.A., University of Sciences, Budapest, Hungary, 1954; Ph.D., University of Toronto, 1962.

Experience: Assistant curator of birds, National Museum, Hungary; research assistant, Royal Ontario Museum, Toronto, Canada; laboratory instructor, University of Toronto; instructor, Loyola University, Chicago.

TAPP, D. RODNEY (1966)

Landscape Architecture

B.S.L.A., Michigan State University, 1964; M.S.L.A., 1966.

Experience: Instructor, Michigan State University; landscape architect,

Faculty

Munson-Anderson Associates, Detroit, Michigan; W.O.D.C. National Park Service, Torret, Utah; Hancock Regional Planning Commission, Findlay, Ohio; site planning consultant, Lansing, Michigan.

TAYLOR, HALSEY P. (1967)

Language Arts

A.B., Colorado College, 1943; Ph.D., Claremont Graduate School, 1964.

Experience: Teacher, Glendale College, Glendale High School; English area chairman, Claremont High School; reading teacher, Adult Education Division, Pasadena City Schools; reading clinician, Occidental College; staff associate, Claremont Graduate School; associate professor, supervisor of interns, California State College at Los Angeles.

TENNANT, FRANK A. (1955)

Language Arts

B.A., University of California, Los Angeles, 1950; M.S., 1953.

Experience: Editor, *Monterey Park Californian*; reporter, *Los Angeles Mirror*; director of press relations, Title Insurance and Trust Company, Los Angeles; United States Army, psychological warfare unit.

THOMAS, WILLIAM O. (1960)

Electronics Engineering

B.S., New Mexico State University, 1951; graduate study, Claremont Graduate School.

Experience: Distribution engineer, estimator, Southern California Edison; communications officer, 40th Inf. Div., U.S. Army; graduate student training program, Westinghouse Electric Corp.; physical science laboratory supervisor, New Mexico State College.

THOMASSEAU, D. JEAN (1961)

Placement Supervisor

B.A., Willamette University, 1946; M.A., California State College at Los Angeles, 1959.

Experience: Teacher, Los Angeles County Schools; self-employed, professional employment agency.

THOMPSON, BENJAMIN F. (1961)

Language Arts

A.B., Lycoming College, 1950; M.J., University of California, Berkeley, 1961.

Experience: Reporter, *Harrisburg Patriot-News*; state editor, *Williamsport Sun-Gazette*; business editor, *Honolulu Star-Bulletin*; Hawaii field representative, Dudley-Anderson-Yutzy; technical writer-editor, Institute of Transportation and Traffic Engineering, University of California, Richmond Field Station.

THORNBURGH, PAUL A. (1962)

Psychometrist (Counseling and Testing)

B.A., University of California, Santa Barbara, 1955; graduate study, California State College at Los Angeles.

Experience: Psychometrist, Advice Service, Los Angeles City Schools.

TOTTEN, JESSIE I. (1961)

Physical Education

B.S., Oregon State University, 1953; M.S., University of California, Los Angeles, 1966; additional graduate study, Portland State College, University of California, Riverside.

Experience: West Linn High School and Beaverton High School, Portland, Oregon; instructor, University of Idaho; teacher, Pacific High School, San Bernardino; director, city recreation program; program director, girls' private camp, Oregon.

TUCKER, DOROTHY McNEILL

(1957)

Social Sciences

B.S., University of Minnesota, 1945; M.S., Illinois State Normal University, 1949; Ed.D., University of California, Los Angeles, 1959.

Experience: Recreation director, instructor, Washington Park High School, Racine, Wisconsin, Lincoln College, Western Illinois State College, San Bernardino city schools; counselor, San Bernardino-Valley College; California certified psychologist.

TURNER, FRANKLIN R. (1964)

Physical Sciences

B.S., University of California, 1957; M.S., Purdue University, 1959; Ph.D., University of California, 1964.

Experience: Graduate research micrometeorologist, Purdue University; research chemist, University of California.

TUUL, JOHANNES (1965)

Physical Sciences

B.S., University of Sweden, Stockholm, 1955; M.A., 1956; Sc.M., Brown University, 1957; Ph.D., 1960.

Experience: Instructor, Stockholm Technical Institute, Sweden, Pasadena City College; engineer, L. M. Ericsson Telephone Company, Sweden; research engineer, Electrical Prospecting Company, Sweden; research assistant and research associate, Brown University; research physicist, American Cyanamid Company; senior research physicist, Bell & Howell Research Center.

URCIA, INGEBORG O. (1966)

Language Arts

B.A., University of Washington, 1955; M.A., 1956; Ph.D., 1960.

Experience: Teaching assistant, University of Washington; instructor in English and German, Yakima Valley College; assistant professor, English, Nevada Southern University.

VIERICH, RICHARD (1966)

Library

B.A., University of Redlands, 1952; M.S.L.S., University of Southern California, 1964; additional graduate study, University of California, Los Angeles; Claremont Graduate School.

Experience: Library administrative assistant, Pomona Public Library.

VOLLMAR, ARNULF (1965)

Physical Sciences

Vordiplom, University of Tubingen, 1951; graduate study, University of Innsbruck; Diplomexamen, Ph.D., University of Heidelberg, 1957; additional graduate study, University of California, Los Angeles.

Experience: Research chemist, California Research Corporation.

VOLSKI, CHESTER A. (1962)

Landscape Architecture

B.S., Michigan State University, 1956; M.L.A., Harvard University, 1957.

Experience: Landscape architect, Milton Baron, Lansing, Michigan, Chambers & Moreice, Cambridge, Massachusetts, A. Carl Stelling Associates, New York City; site planner, Michigan State University; planner and landscape architect, The Architects Collaborative, Cambridge, Massachusetts and Colorado Springs, Colorado; urban planner, U.S. Air Force, Ramstein, Germany.

VOUGHT, ELDON J. (1961)

Mathematics

B.A., Manchester College, 1957; M.A., University of Michigan, 1958; additional graduate study, University of Michigan, University of California.

Experience: Instructor, Pomona College.

WAGNER, GERALD E. (1966)

Business Management

B.A., State College of Iowa, 1960; M.A., 1963; additional graduate study, U.S. Army Personnel Management School, U.S. Army Machine Accounting School, Pepperdine College, and University of California, Los Angeles.

Experience: Data processing equipment operator and systems analyst, U.S. Army; programmer, systems analyst, and computer operations supervisor, Rath Packing Company; consultant, L. M. Cox Corporation and J. R. Davies Construction Company; data processing instructor, Fullerton Junior College; director of education, Data Processing Management Association; certificate in data processing.

WANG, MARTIN I. (1959)

Audio Visual

B.A., University of Southern California, 1949; M.S., 1950; additional graduate study, University of Southern California.

Experience: Instructor, Torrance, Long Beach, El Camino College; teaching assistant and instructor, audio-visual education, University of Southern California.

Faculty

WARHURST, DONALD E. (1957)

Physical Education

A.B., University of California, 1943; M.S., University of Southern California, 1951; additional graduate study, San Francisco State College, University of Nevada, University of California, Fresno State College.

Experience: Teacher, Piedmont High School, Santa Ana High School; coach, Santa Ana High School, San Bernardino Valley College, Modesto High School.

WASSEL, GUSTAV N. (1961)

Electronics Engineering

B.S.E.E., California Institute of Technology, 1960; M.S.E.E., 1962.

Experience: Systems engineer, Space Science Department, Consolidated Systems Corp.; graduate research assistant, California Institute of Technology; development engineer, Nordon Division United Aircraft; machinist, Reuland Electric Corp.; electrical draftsman, U.S. Electric Motors Corp.; instructor, electrical systems, U.S. Air Force; registered professional engineer, California.

WEEKS, LOWELL K. (1947)

Chairman, Music Department

B.A., University of New Mexico, 1938; graduate study, University of New Mexico, University of Southern California, Claremont Graduate School.

Experience: Music and English teacher, Los Lunas, New Mexico; Air Force band leader, U.S. Army at Albuquerque, Palm Springs, and Long Beach.

WEISSBUCH, THEODORE N.

(1962)

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; instructor, 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, Campbell, California; 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; junior librarian, Fresno State College.

WHITE, MILTON R. (1959)

Placement Officer

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, California Wool Growers Association; sales representative, General Mills, Inc., Larrowe; U.S. Marine Corps.

WHITLEY, MARY E. (1961)

Business Management

B.S., Northeastern State College, 1946; M.S., Oklahoma State University, 1954; additional graduate study, University of Hawaii.

Experience: Secretary to superintendent of schools; instructor, College-High School; secretary, Department of Vocational Education; chairman of business department, Central High School.

WHITNEY, WALTER R. (1965)

Language Arts

B.S., Bowdoin College, 1923; M.A., Harvard University, 1935.

Experience: Instructor, professor, University of Maine, Loyola University, New Orleans, Louisiana; Fresno State College.

WILKINSON, CHARLES D. (1965)

Physical Education

B.A., University of Redlands, 1961; M.S., University of Southern California, 1965.

Experience: Recreation leader, West Covina Department of Recreation; recreation supervisor, coach, Mt. San Antonio College; instructor, Edgewood High School.

WILLIAMS, EDWIN H. (1960)

Mechanical Engineering

B.S.M.E., University of California, Berkeley, 1949; graduate study, University of Southern California.

Experience: Mechanical engineer, City and County of San Francisco; design engineer, California Packing Corporation, San Francisco; development engineer, Fraser and Johnston Company, San Francisco; assistant test engineer, Pacific Gas and Electric Company, San Francisco; engineering and sciences extension instructor, University of California, Berkeley; registered professional engineer, California.

WILSON, BRUCE E. (1963)

Social Sciences

B.A., University of Miami, 1960; M.A., Claremont Graduate School, 1966; additional graduate study, Claremont Graduate School.

Experience: U.S. Army; newspaper editor; announcer, program director, radio station WWPF; sports play-by-play, WWPF, WFOY, WHOO, WGGG; manager, WSDX, WPRY; music director and *Good Music* magazine editor, WVCG; instructor, University of Miami (Florida), Mt. San Antonio College.

WILSON, H. THOMAS (1963)

Landscape Architecture

B. of Arch., Massachusetts Institute of Technology, 1950.

Experience: Architect, Perkins and Will, Chicago; Kistner, Wright, and Wright, Neutra and Alexander, Los Angeles; instructor, Pasadena City College, Extended Day; private practice.

WILSON, HARRY A. (1960)

Mathematics

B.S., University of Southern California, 1953; M.B.A., 1954.

Experience: Owner-manager, Growell Shoes; lecturer, University of Southern California; U.S. Army and Air Force.

WILSON, JOHN J. (1959)

Economics

B.S., Middlebury College, 1926; M.A., Claremont Graduate School, 1959; additional graduate study, George Washington University, U.S. Army Command and General Staff School, U.S. Air Force Staff School.

Experience: Director of procurement and production, and comptroller in U.S. Air Force.

WILSON, THOMAS C. (1966)

Social Sciences

B.A., University of California, Santa Barbara, 1953; M.A., California State College at Los Angeles, 1961; additional graduate study, San Diego State College, University of California Extension, San Diego, and University of Southern California.

Experience: Teacher in social sciences, Monrovia Unified School District, Azusa Unified School District, La Canada Unified School District, Pasadena City College; department chairman in social sciences, Gladstone High School, Azusa, and La Canada High School.

WINSLOW, DOROTHY V. (1959)

Physical Sciences

B.A., University of California, Berkeley, 1957; Ph.D., 1965.

Experience: Research biochemist, University of California Medical School, San Francisco.

Faculty

WINTERBOURNE, ROBERT J. (1953)

Counselor

B.S., California State Polytechnic College, 1950; M.A., 1952; additional graduate study, University of California, Los Angeles.

Experience: Agricultural instructor, Shandon High School; director of vocational agriculture, Moorpark and Ventura High Schools; vice principal, Moorpark High School; Associate Dean, California State Polytechnic College.

WOLF, HARRY K. (1942)

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 teaching, electronics instructor for the Signal Corps, National Bureau of Standards, electronic engineer.

WOOTTON, WILLIAM T. (1963)

Electronics Engineering

B.S., United States Naval Academy, 1943; B.S.E.E., United States Naval Postgraduate School, 1952; S.M., Massachusetts Institute of Technology, 1953; additional graduate study, University of Minnesota, Armed Forces Staff College.

Experience: Assistant professor, Rice Institute; director, research and development, weapon and missile systems, United States Navy Department; fleet command, U.S. Navy; commander (retired) U.S. Navy.

WORLEY, G. DOW (1964)

Business Management

B.B.A., North Texas State University, 1950; M.B.A., 1954; additional graduate study, University of Southern California.

Experience: Instructor, mechanics, U.S. Air Force; production planner, Convair Aircraft Corporation; industrial engineer, Texas Aircraft Corporation; director, radiological section, U.S. Army Reserve; mathematics teacher, Texas Public Schools; instructor,

tor, Texas Wesleyan College, Baylor University; assistant professor, California State College at Los Angeles; counselor, Business Administration Advisement Office, University of Southern California; computer programmer and systems analyst, Graduate School of Business Administration Computer Project, University of Southern California.

WRIGHT, J. GARRARD (1962)

Industrial Engineering

B.S., Oregon State University, 1954; M.B.A., University of Washington, 1966.

Experience: Quality control engineer, Consolidated Electrodynamics, Pasadena; industrial engineer, General Dynamics, Pomona; tool engineer, Douglas Aircraft Co., Santa Monica; instructor, San Bernardino Valley College; industrial engineer, Norton A.F.B., Boeing Airplane Company, Seattle; plans and methods engineer, Western Union Telegraph Company, New York City.

WU, JIA-HSI (1966)

Biological Sciences

B.A., Taiwan University, Formosa, 1950; M.A., Cornell University, 1952; Ph.D., Washington University, St. Louis, 1958.

Experience: Post-doctoral research associate, University of Wisconsin; assistant botanist, University of California, Los Angeles; assistant biologist, University of California, San Diego; assistant professor, Texas Technological College.

WYMER, JOSEPH P. (1961)

Head, Industrial Engineering Department

B.S.I.E., Virginia Polytechnic Institute, 1947.

Experience: Industrial engineer, Boeing Airplane Company, Seattle; chief industrial engineer, Micamold Corp., Tazewell, Virginia; chief industrial engineer, O'Sullivan Rubber Corp., Winchester; manufacturing engineer, Convair, Fort Worth; senior industrial engineer, RCA Victor, Pulaski; motion and time study engineer, Brunswick, Marion; instructor, Virginia Polytechnic Institute.

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