

CALIFORNIA STATE POLYTECHNIC COLLEGE *BULLETIN*

1969-70
CATALOG

CALIFORNIA STATE POLYTECHNIC COLLEGE
SAN LUIS OBISPO



GUIDE TO ACADEMIC PROGRAMS

- AERONAUTICAL ENGINEERING B.S., 144.
- AGRICULTURE M.S., 60.
(Soil Conservation, International Agriculture)
- AGRICULTURAL BUSINESS MANAGEMENT B.S., 68.
- AGRICULTURAL ENGINEERING B.S., 64.
- ANIMAL HUSBANDRY B.S., 71.
- ARCHITECTURE B. Arch., 137.
- ARCHITECTURAL ENGINEERING B.S., 139.
- BIOCHEMISTRY B.S., 123.
- BIOLOGICAL SCIENCES B.S., 118.
(Biology, Botany, Field Biology, Marine Biology, Medical Laboratory Technology, Microbiology, Plant Pathology, Entomology, Zoology)
- BIOLOGICAL SCIENCES M.S., 120.
- BUSINESS ADMINISTRATION B.S., 91.
(Accounting, Finance and Property Management, Industrial Relations, Management, Marketing, Economics)
- CHEMISTRY B.S., 121.
- CHILD DEVELOPMENT B.S., 94.
- CITY AND REGIONAL PLANNING, B.S., 140.
- COMPUTER SCIENCE B.S., 124.
- CROPS PRODUCTION B.S., 73.
(Agronomy, Vegetable Crop Production)
- DAIRY B.S., 77.
(Husbandry, Manufacturing)
- EDUCATION M.A., 96.
(Agriculture, Education, Physical Sciences, Social Sciences)
- ELECTRICAL ENGINEERING B.S., 146.
- ELECTRONIC ENGINEERING B.S., 148.
- ENGINEERING TECHNOLOGY B.S., 151.
(Air Conditioning-Refrigeration, Electronic, Manufacturing Processes, Mechanical, Welding)
- ENGLISH B.A., 97.
- ENGLISH M.A., 98.
- ENVIRONMENTAL ENGINEERING B.S., 156.
(Air Pollution Control, Air Conditioning-Refrigeration)
- FARM MANAGEMENT B.S., 68.
- FOOD PROCESSING B.S., 79.
(Management, Meats)
- FRUIT PRODUCTION B.S., 73.
- HISTORY B.A., 132
- HOME ECONOMICS B.S., 101.
(Home Economics Education, Food Administration—Dietetics)
- HOME ECONOMICS M.S., 103.
- INDUSTRIAL ENGINEERING B.S., 158.
- INDUSTRIAL TECHNOLOGY B.S., 160.
(Industrial Sales and Technology, Industrial Education)
- JOURNALISM B.S., 104.
(Agricultural, Community, Business and Industrial, Home Economics)
- MATHEMATICS B.S., 124.
(Applied Mathematics, Mathematics Teaching, Computer Sciences, Statistics)
- MATHEMATICS M.S., M.A., 127.
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- MECHANIZED AGRICULTURE B.S., 66.
- METALLURGICAL ENGINEERING B.S., 165.
- NATURAL RESOURCES MANAGEMENT B.S., 87.
- ORNAMENTAL HORTICULTURE B.S., 81.
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- PHYSICAL EDUCATION M.S., 109.
- PHYSICS B.S., 130.
- POULTRY INDUSTRY B.S., 83.
- PRINTING TECHNOLOGY AND MANAGEMENT B.S., 110.
(Printing Management, Printing Education)
- SOCIAL SCIENCES B.S., 132.
(Social Services, Social Sciences, Government Service)
- SOIL SCIENCE B.S., 85.
- SPEECH B.A., 113.



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SAN LUIS OBISPO

**1969-70
CATALOG**

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AERIAL VIEW —
SAN LUIS OBISPO
CAMPUS

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ACADEMIC CALENDAR—1969-70

1969

JUNE

S	M	T	W	T	F	S
1	2	3	4	5	6	7
8	9	10	11	12	13	14
15	16	17	18	19	20	21
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29	30					

JULY

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27	28	29	30	31		

AUGUST

S	M	T	W	T	F	S
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31						

SEPTEMBER

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28	29	30				

Classes
Examinations

Summer Quarter, 1969

- June 6.....Last day for receipt of completed application for admission to summer quarter
- June 16.....Registration of all students
Beginning of college year
Beginning of summer quarter
- June 17.....Classes begin for all students
- June 24.....Last day to enroll for summer quarter
Last day to add courses
- July 1.....Last day to withdraw from classes without penalty
- July 4.....Independence Day — academic holiday
- August 1.....Last day for receipt of completed application for admission to fall quarter

- August 5.....End of seventh week
- August 26-29.....Final examinations
- August 29.....End of summer quarter
- August 30-
September 13.....Academic holiday

Fall Quarter, 1969

- September 15.....Beginning of fall quarter for faculty
- September 18-19.....Registration of all students
- September 22.....Classes begin for all students
- September 29.....Last day to enroll for fall quarter
Last day to add courses

OCTOBER

S	M	T	W	T	F	S
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NOVEMBER

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DECEMBER

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1970

JANUARY

S	M	T	W	T	F	S
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31						

FEBRUARY

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22	23	24	25	26	27	28

**Classes
Examinations**

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

November 10.....End of seventh week

November 11.....Veteran's Day—academic holiday

November 26–29.....Thanksgiving—academic holiday begins at 1 p.m.

December 8–11.....Final examinations

December 11.....End of fall quarter
Last day for receipt of completed application for admission to winter quarter

December 12–

January 2.....Christmas—academic holiday ends at 12 noon

Winter Quarter, 1970

January 2–3.....Registration of all students begins at noon
Beginning of winter quarter

January 5.....Classes begin for all students

January 12.....Last day to enroll for winter quarter

January 19.....Last day to add courses
Last day to withdraw from classes without penalty

February 23.....End of seventh week

MARCH

S	M	T	W	T	F	S
1	2	3	4	5	6	7
8	9	10	11	12	13	14
15	16	17	18	19	20	21
22	23	24	25	26	27	28
29	30	31				

- March 6..... Last day for receipt of completed application for admission to spring quarter
- March 12-17..... Final examinations
- March 17..... End of winter quarter
- March 18-22..... Academic holiday

Spring Quarter, 1970

- March 23..... Registration of all students not previously registered
Beginning of spring quarter
- March 24..... Classes begin for all students
- March 27..... Good Friday — academic holiday begins at 1 p.m.

APRIL

S	M	T	W	T	F	S
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- April 1..... Last day to enroll for spring quarter
Last day to add courses
- April 7..... Last day to withdraw from classes without penalty
- April 17..... Last day to apply for June commencement
- May 12..... End of seventh week

MAY

S	M	T	W	T	F	S
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17	18	19	20	21	22	23
24	25	26	27	28	29	30
31						

- June 2-5..... Final examinations
- June 5..... Last day for receipt of completed application for admission to summer quarter
- June 6..... Commencement
End of spring quarter
End of college year for faculty
- June 7-14..... Academic holiday

**Classes
Examinations**

JULY

S	M	T	W	T	F	S
			1	2	3	4
5	6	7	8	9	10	11
12	13	14	15	16	17	18
19	20	21	22	23	24	25
26	27	28	29	30	31	

AUGUST

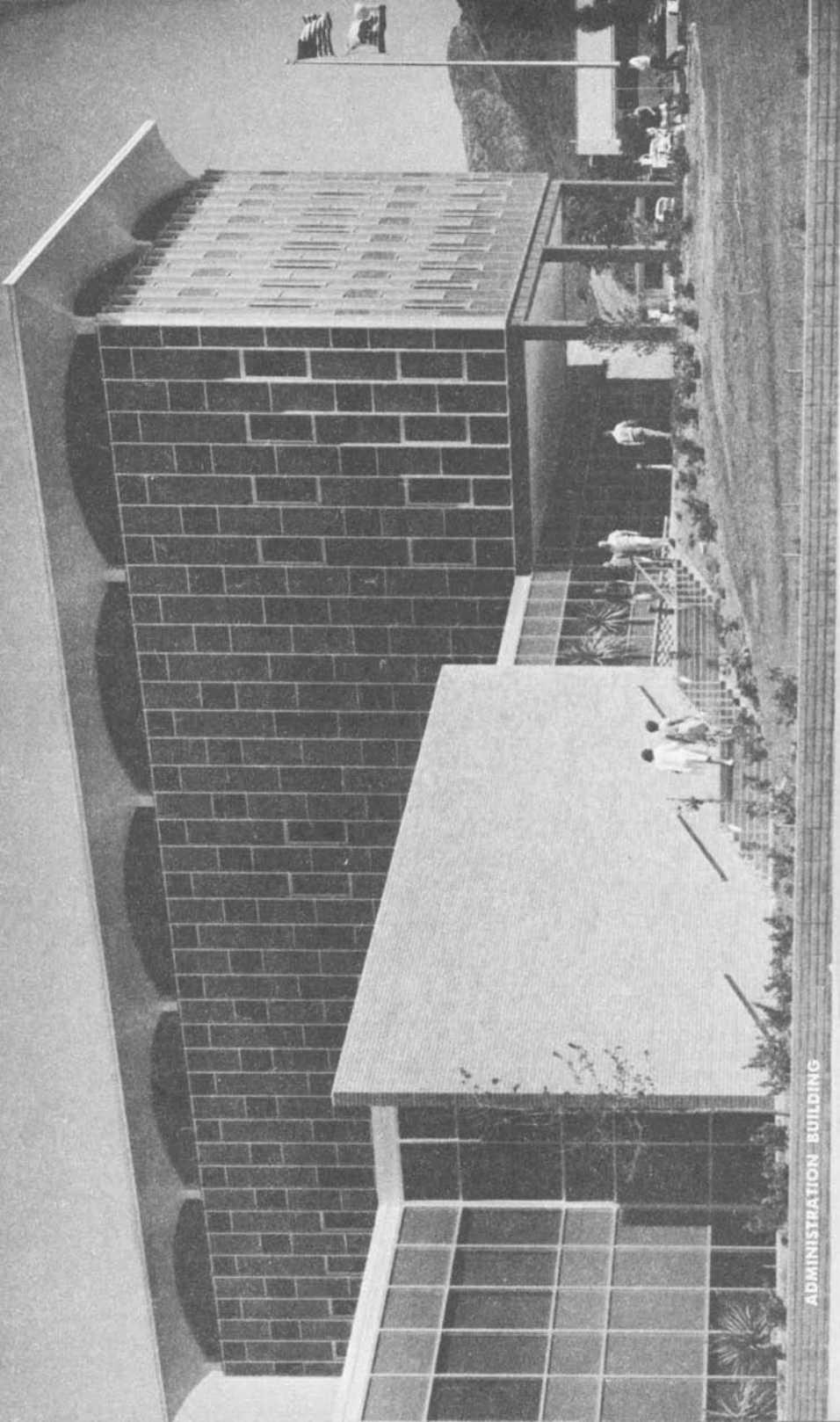
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23	24	25	26	27	28	29
30	31					

**Classes
Examinations**

Tentative Summer Quarter, 1970

- June 15.....Registration of all students
Beginning of college year
Beginning of summer
quarter
- June 16.....Classes begin for all students
- June 23.....Last day to enroll for summer quarter
Last day to add courses
- June 30.....Last day to withdraw from
classes without penalty

- August 4.....End of seventh week
- August 25-28.....Final examinations
- August 28.....End of summer quarter



ADMINISTRATION BUILDING

GENERAL INFORMATION

ADMINISTRATION OF THE CALIFORNIA STATE COLLEGES

EX OFFICIO TRUSTEES

Ronald Reagan, A.B.	State Capitol, Sacramento 95814
Governor of California and President of the Trustees	
Ed Reinecke, B.S.	State Capitol, Sacramento 95814
Lieutenant Governor of California	
Robert T. Monagan, B.A.	State Capitol, Sacramento 95814
Speaker of the Assembly	
Max Rafferty, A.B., M.A., Ed.D.	721 Capitol Mall, Sacramento 95814
State Superintendent of Public Instruction	
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 and expire March 1 of the years indicated in parentheses. Names are listed in order of accession to the board.

Charles Luckman, LL.D., A.F.D. (1974)	9220 Sunset Blvd., Los Angeles 90069
Theodore Meriam, A.B. (1971)	P.O. Box 370, Chico 95927
Albert J. Ruffo, LL.B., B.S. in E.E. (1971)	675 N. First Street, Suite 1200, San Jose 95112
Mrs. Philip Conley, B.A. (1972)	3729 Huntington Blvd., Fresno 93702
E. Guy Warren, B.A. (1973)	P.O. Box 59, Hayward 94541
Daniel H. Ridder, B.A. (1975)	604 Pine Ave., Long Beach 90801
George D. Hart, A.B. (1975)	111 Sutter St., San Francisco 94104
James F. Thacher, A.B., LL.B. (1970)	310 Sansome St., San Francisco 94104
Alec L. Cory, B.A., LL.B. (1973)	1900 First National Bank Bldg., San Diego 92101
William A. Norris, A.B., LL.B. (1972)	609 So. Grand, Los Angeles 90017
Edward O. Lee, B.A. (1974)	595 16th St., Oakland 94612
Earle M. Jorgensen (1970)	10650 So. Alameda, Los Angeles 90054
Dudley Swim, A.B., M.A. (1976)	P.O. Box 1590, Monterey 93940
Karl L. Wente, M.S. (1976)	5565 Tesla Rd., Livermore 94550
E. Litton Bivans (1977)	2431 Dallas St., Los Angeles 90031
William O. Weissich, B.S., LL.B. (1977)	1299 Fourth St., San Rafael 94901

OFFICERS OF THE TRUSTEES

Governor Ronald Reagan
President
Daniel Ridder
Vice-Chairman

Theodore Meriam
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
Russell G. Whitesel	Vice Chancellor, Academic Affairs
Harry E. Brakebill	Vice Chancellor, Business Affairs
C. Mansel Keene	Assistant Chancellor, Faculty and Staff Affairs

THE CALIFORNIA STATE COLLEGES

(Listed in order of founding)

- San Jose State College (1857).....Robert D. Clark, President
125 South Seventh Street, San Jose, California 95114
- Chico State College (1887).....Robert E. Hill, President
First and Normal Streets, Chico, California 95926
- San Diego State College (1897).....Malcolm A. Love, President
5402 College Avenue, San Diego, California 92115
- San Francisco State College (1899).....S. I. Hayakawa, Acting President
1600 Holloway Avenue, San Francisco, California 94132
- California State Polytechnic College,
San Luis Obispo (1901).....Robert E. Kennedy, President
San Luis Obispo, California 93401
- Fresno State College (1910).....Frederic W. Ness, President
Shaw and Cedar Avenues, Fresno, California 93726
- Humboldt State College (1913).....Cornelius H. Siemens, President
Arcata, California 95521
- California State Polytechnic College,
Kellogg-Voorhis (1938).....Robert C. Kramer, President
3801 West Temple Avenue, Pomona, California 91766
- California State College, Los Angeles (1947).....John A. Greenlee, President
5151 State College Drive, Los Angeles, California 90032
- Sacramento State College (1947).....Robert Johns, President
6000 Jay Street, Sacramento, California 95819
- California State College, Long Beach (1949).....Carl W. McIntosh, President
6101 East 7th Street, Long Beach, California 90804
- California State College, Fullerton (1957).....William B. Langsdorf, President
800 North State College Boulevard, Fullerton, California 92631
- California State College, Hayward (1957).....Ellis E. McCune, Interim President
25800 Hillary Street, Hayward, California 94542
- San Fernando Valley State College (1958).....James W. Cleary, President
18111 Nordhoff Street, Northridge, California 91324
- Stanislaus State College (1959).....Alexander Capurso, President
800 Monte Vista Avenue, Turlock, California 95380
- Sonoma State College (1960).....Ambrose R. Nichols, President
1801 East Cotati Avenue, Rohnert Park, California 94928
- California State College, Dominguez Hills (1960).....Leo F. Cain, President
809 E. Victoria Street, Dominguez Hills, California 90247
- California State College, San Bernardino (1960).....John M. Pfau, President
5500 State College Parkway, San Bernardino, California 92407
- California State College, Bakersfield (1967).....Paul F. Romberg, President
615 California Avenue, Bakersfield, California 93304



THE CALIFORNIA STATE COLLEGE SYSTEM

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

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

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

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

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

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

CALIFORNIA STATE POLYTECHNIC COLLEGE, SAN LUIS OBISPO

President.....	Robert E. Kennedy
Assistant to the President.....	Chester G. Young
Academic Vice President.....	Dale W. Andrews
Associate Dean, Curriculum and Instruction.....	David W. Cook
Associate Dean, Educational Services.....	Donald M. Coats
Associate Dean, Graduate Studies.....	Arthur G. Butzbach
Associate Dean, Special Programs.....	George C. Beatie
Director, Institutional Studies.....	Lowell H. Dunigan
Director, International Education.....	Howard West
Director, Research and Development.....	George G. Clucas
Administrative Vice President.....	Harold O. Wilson
Associate Dean, Facility Planning.....	E. Douglas Gerard
Director, Alumni and Community Affairs.....	Leslie J. Vanoncini
Director, Information Services.....	Lachlan P. MacDonald
Director, Personnel Relations.....	Larry R. Voss
Dean, School of Agriculture.....	J. Cordner Gibson
Associate Dean, School of Agriculture.....	John W. West
Dean, School of Applied Arts.....	Carl C. Cummins
Associate Dean, School of Applied Arts.....	James E. Simmons
Director of Athletics.....	Richard R. "Joe" Harper
Director, Instructional Materials Program.....	Clyde Hostetter
Dean, School of Applied Sciences.....	Clyde P. Fisher
Associate Dean, School of Applied Sciences.....	Vance D. Lewis
College Librarian.....	L. Harry Strauss
Dean, School of Architecture.....	George J. Hasslein
Dean, School of Engineering.....	Archie Higdon
Associate Dean, School of Engineering.....	Charles R. Russell
Dean of Students.....	Everett M. Chandler
Associate Dean, Activities.....	J. Dan Lawson
Associate Dean, Admissions and Records.....	C. Paul Winner
Associate Dean, Counseling and Testing.....	George Mulder
Associate Dean, Women.....	Lorraine H. Howard
Admissions Officer.....	George R. Davies, II
Business Manager, Associated Students, Inc.....	Roy Gersten
Director, Health Services.....	Billy W. Mounts, M.D.
Director, Housing.....	Robert M. Bostrom
Director, Placement.....	Eugene A. Rittenhouse
Financial Aid Counselor.....	Mary F. Eyler
Foreign Student Adviser.....	Glenn W. Rich
Registrar.....	F. Jerald Holley
Director, Business Affairs.....	Donald S. Nelson
Associate Director, Budgeting and Business Affairs.....	James R. Landreth
Accounting Officer.....	Robert J. Miller
Business Service Officer.....	Ray Morton
Chief of Plant Operation.....	Robert R. Adams, Jr.
Chief Security Officer.....	George W. Cockriel
Supervisor of General Office.....	Lucy Schmidt
Supervising Groundsman.....	Fred J. Blanck
Supervisor of Transportation.....	Robert M. Matheny
Foundation Manager.....	Gene E. Brendlin
Assistant Foundation Manager.....	James A. Neal

**ENROLLMENT AT CALIFORNIA STATE POLYTECHNIC COLLEGE
SAN LUIS OBISPO, FALL QUARTER 1968-69**

Major Curriculum	Men	Women	Total
School of Agriculture			
Ag. Business Management.....	330	48	378
Ag. Engineering.....	104	0	104
Animal Husbandry.....	322	147	469
Crops.....	132	3	135
Dairy.....	90	3	93
Farm Management.....	153	0	153
Food Processing.....	56	6	62
Fruit Production.....	27	1	28
Mechanized Ag.....	122	0	122
Natural Resources Mgt.....	20	1	21
Ornamental Horticulture.....	126	31	157
Poultry Industry.....	35	1	36
Soil Science.....	64	4	68
Totals.....	1,581	245	1,826
School of Applied Arts			
Business Administration.....	542	142	684
Child Development.....	2	44	46
English.....	46	335	381
Home Economics.....	4	729	733
Journalism.....	53	67	120
Physical Education.....	169	168	337
Printing.....	119	0	119
Totals.....	935	1,485	2,420
School of Applied Sciences			
Biochemistry.....	34	16	50
Biological Sciences.....	230	144	374
Chemistry.....	63	13	76
Mathematics.....	280	126	406
Physics.....	62	2	64
Social Sciences.....	207	429	636
Totals.....	876	730	1,606
School of Architecture			
Architecture.....	1,116	33	1,149
Architectural Engineering.....	112	0	112
City-Regional Planning.....	18	2	20
Totals.....	1,246	35	1,281
School of Engineering			
Aeronautical.....	284	2	286
Electrical.....	139	0	139
Electronic.....	566	2	568
Environmental.....	147	1	148
Industrial.....	100	3	103
Industrial Technology.....	285	5	290
Mechanical.....	410	1	411
Metallurgical.....	41	1	42
Totals.....	1,972	15	1,987
Graduates (Education).....	305	286	591
College totals.....	6,915	2,796	9,711

EDUCATION AT CAL POLY

As one of the 19 colleges in the State College System, California State Polytechnic College, San Luis Obispo, offers educational programs in agriculture, applied arts, applied sciences, architecture, engineering, and preparation for elementary and secondary school teaching. Historically, Cal Poly's method of education and dedication to occupational-centered curricula has created for the College a distinctive role in higher education in California. The College is particularly noted for its emphasis on agriculture, business, engineering, and home economics, together with the closely-related supporting fields of natural sciences, physical sciences, and mathematics.

Although the basic purpose of the College is to prepare students to meet the requirements of specific occupations, it is also dedicated to helping the individual to achieve his or her maximum personal development. Each student pursues a program of required general education courses, and through an extensive co-curricular program receives an opportunity to combine specialized instruction with preparation for citizenship, leadership, and constructive community living. Students are also encouraged to obtain actual experience through individual and group projects, work-study programs, and internships. Faculty members, who are selected on the basis of academic qualifications, professional experience, and teaching ability, are encouraged to maintain a constant interplay between general principles and practical applications in all instruction, whether in the laboratory, classroom or field study.

In each program in the College, the student begins work in the major field of his choice during the freshman year. A concurrent sequence of general education and elective courses assists the student in relating this chosen area of study to other fields of knowledge. Practical educational experiences in the major field prepare the student for specific occupations and professions or advanced study. Additional details of curricula appear in the sections describing each school and department. Student and faculty participation in the development and improvement of both curricular and co-curricular programs characterizes the College's mode of operation.

HISTORICAL DEVELOPMENT

California State Polytechnic College began with the establishment in 1901 by the State Legislature of a vocational high school at San Luis Obispo. The institution served as a forerunner in vocational education for agriculture and industry in California. In 1921 its Board of Trustees was dissolved and the State Board of Education administered the school until July 1, 1961 when administration passed to the Trustees of the California State Colleges.

Cal Poly began offering junior college courses in 1927, and became a two- and three-year institution in 1933. In 1936 a degree transfer program was added, and in 1940 the first bachelor of science degrees were authorized.

The first baccalaureate exercises were held in 1942. Approval to grant the master of arts degree in education was received in 1949, and to grant the master of science degree in 1967.

From 1933 until his retirement in 1966, the late Dr. Julian A. McPhee was chief administrator of Cal Poly. On May 1, 1967 the Trustees of the California State Colleges named Dr. Robert E. Kennedy as president of Cal Poly.

During the past year over 9,700 students were enrolled in the College in some 50 academic programs. Included were men and women students from 58 of 59 California counties, 42 of the 50 states, and 65 foreign countries.

The future growth of the College to an enrollment of 12,000 is provided for by master plans for both academic and physical development approved by the Trustees. Support of the College by the people of California through the Legislature and the Trustees insures the continuation of a distinctive polytechnic program in higher education.

The Campus

THE CAMPUS

The Cal Poly campus consists of over 5,000 acres adjacent to San Luis Obispo, a community of 30,000 located on U.S. Highway 101, midway between San Francisco and Los Angeles, and 12 miles from the beaches and marine facilities of California's Central Coast.

Due to the varied nature of the College's curricula, instructional facilities are diverse and suited to the up-to-date demands of modern technology. In addition to faculty offices, classrooms, and laboratories for instructional use, the College is served by several specialized facilities, particularly in agriculture, architecture, engineering, and the sciences.

Cal Poly has long been known as a friendly college which welcomes visitors to its campus. Maps suitable for a self-conducted tour are available from the information desk of the Administration Building for interested prospective students and parents and others. In addition, the College provides three educational tours for which printed guides are available. These include a campus tree walk, dairy tour, and a tour of the unique Shakespeare Press Museum. Arrangements for group visits to the campus may be made by contacting the Associate Dean, Special Programs and/or the office of the dean of the respective academic school.

AGRICULTURE

The outstanding agricultural programs of the College utilize such facilities as the Alan A. Erhart Agriculture building (which includes modern laboratories for animal husbandry, accounting, crops, dairy, farm management, and ornamental horticulture); several Agricultural Engineering shops (including farm mechanics, farm machinery, farm power, hydrology, rural electricity); the Food Processing building (which includes a creamery, meat laboratory, canning and freezing laboratories, and an instructional retail facility); soil science and veterinary science laboratories in the Science building; and an unexcelled complex of agricultural production units which are utilized instructionally in the College's student enterprise projects. These agriculture units include the following:

Beef Unit

Two project steer feeding barns, capacity 150 steers; commercial project feeding barn, capacity 200 steers; three barns for breeding beef cattle; 3,800 acres range and pasture; judging pavilion. Residence facilities for 12 students.

Central Feed Mill and Storage

Complete feed mill for grinding, mixing, and processing feeds; bulk storage for 1,500 tons of grain; hay barn, 600 tons capacity; hay grinder unit; sack storage for 250 tons concentrates and 25 tons bulk storage bins for mixed feeds.

Crops Unit

Fruit and vegetable washing, grading and packing areas; beekeeping laboratory; seed cleaning and treating laboratory. Thirty acres of fruit and vine crops plus 750 acres of vegetable and field crops provide materials for processing.

Dairy Unit

Thirty-unit milking barn; two shelter feed barns for 100 cows, judging pavilion, young stock barn, bull barn, and complete creamery building. Student project unit: milk barn, feed shelter barn for 80 head of student-owned projects, and calf sheds; 300 acres of pasture and alfalfa for chopping. Three dormitories for 36 students.

Horse Unit

Thoroughbred and quarter horse barns, paddocks, and pasture.

Ornamental Horticulture Unit

Propagation and storage building; glasshouses, lathhouses, and other propagation units; 10 acres for storage and growing area; 100 acres of landscaped campus.

Poultry Unit

Central egghouse, slaughter plant, battery brooder and incubation building; laying trap nest cage units and colony houses to handle 5,000 laying hens, 10,000 fattening birds, and 500 turkeys.

Sheep Unit

Central lambing barn; project feeding barn, capacity 400 lambs; 500 acres range and pasture.

Slaughterhouse

Modern slaughterhouse, coolers, and meat cutting room.

Soils Unit

Three soils laboratories, two special preparation labs, lathhouse and glasshouse. Cropland and range area for fertilizer trials.

Swine Unit

Fourteen-unit central farrowing house; 18 double-unit colony houses; five boar units; 16 project feeder units; 30 acres of pasture. Yearly capacity, 800 head.

APPLIED ARTS

Facilities utilized primarily by the School of Applied Arts include the Business Administration and Education building, which houses audio-visual production and service facilities and an art laboratory; the English building, which includes lecture rooms; home economics and child development facilities, including a live-in home management house and home economics laboratories; the language laboratory in the Library; the Graphic Arts building, which houses unique instructional facilities for printing technology and management and for journalism; the Music Speech and Drama building, including a 500-seat theatre and music rooms.

In addition, the school includes a variety of physical education facilities. The men's gymnasium provides boxing, wrestling, and gymnastic rooms in addition to the main floor which contains three full-length cross-court basketball courts and seats 4,000 persons for athletic contests. Handball and tennis courts are adjacent to the gymnasium, along with a large playing field area for intramural sports and physical education classes. Two heated swimming pools are used both for physical education classes and for varsity water polo and swimming. The football stadium has a grandstand and bleachers seating 5,500 persons. There is also a spacious baseball field with permanent seating, and a new quarter-mile track with a 220-yard straightaway. There is also a women's physical education building utilized for minor sports as well as for special women's physical education requirements.

APPLIED SCIENCES

The School of Applied Sciences utilizes several specialized facilities including the Computer Science building (shared with the School of Architecture); the Mathematics building; the Science building containing 12 general classrooms and 32 fully-equipped laboratories devoted to instruction in bacteriology, botany, chemistry, entomology, physics, microbiology, plant pathology, and zoology; and the new Science North building, which contains additional laboratories primarily for instruction in biological sciences, including marine biology. The military science facilities are located in a section of the Library building; social science classes and offices utilize a section of the Erhart Agricultural building.

ENGINEERING

The School of Engineering facilities include the Aeronautical Engineering building, hangar and aeronautical laboratories adjacent to the College's own flight strip; Engineering East building utilized chiefly for electronic and electrical engineering

The Campus

instruction; Engineering West, the largest campus building, serving aeronautical, and environmental engineering and industrial technology; the Air Conditioning and Refrigeration building serving both environmental and metallurgical engineering; the Mechanical Engineering Laboratory building; machine shop; welding shop; and the industrial engineering section of the Graphic Arts building.

ARCHITECTURE

The School of Architecture utilizes primarily the facilities of the multi-storied Engineering West building and the Computer Science building, as well as a unique canyon area for full-scale development of student construction projects in architecture. A distinctive contribution of the school is a student-developed patio courtyard in Engineering West.

GENERAL FACILITIES

The College's new four-story Administration building, Julian A. McPhee College Union (under construction), and Library serve all college personnel. A library addition, completed in 1962, more than doubled the size of the Walter F. Dexter Library. The enlarged facility offers 1,650 reader stations and book storage space for 150,000 volumes on four floors of stacks. Group study rooms, faculty reading room, typing rooms, a large curriculum library, and a browsing area for recreational reading are provided. Bookstacks throughout the Library are open to all readers, and professionally-trained librarians assist students and faculty in the use of library materials.

STUDENT SERVICES FACILITIES

On-campus Housing

Approximately 2,150 students are housed in twelve permanent residence halls. About one-third of these spaces are for women students. The newer halls provide space for study areas, recreation, television lounges, and laundry facilities.

Family Housing

The Housing Office maintains lists of available apartments, houses, and facilities in the area suitable for married students.

Dining Hall

A modern dining hall provides a variety of food services consisting of complete meals, an a la carte cafeteria, a snack bar, and vending service.

Health Center

The student Health Center is a well-equipped clinic and infirmary.

College Union

The Julian A. McPhee College Union is the center of campus social, cultural, and recreational activities. It includes restful lounges, conference and work rooms, student council chambers, program planning offices, billiards and bowling, craft shops, and food service. It also adjoins the new El Corral Bookstore and post office.

ACCREDITATION

The College is fully approved as a four-year degree-granting institution by the Western Association of Schools and Colleges (formerly Western College Association). In addition the College holds associate membership in the Northwest Association of Secondary and Higher Schools.

The Chemistry Department is fully approved and accredited by the American Chemical Society and students completing the appropriate curriculum are eligible for certification by the Society. The five-year curriculum leading to the Bachelor of Architecture degree in the School of Architecture is fully accredited by the National Architectural Accrediting Board.

SPECIAL INSTRUCTIONAL SERVICES

INSERVICE TRAINING IN AGRICULTURE

The College plays an active role in the inservice training of teachers of vocational agriculture by providing instructional staff and facilities for workshops and training programs co-operatively sponsored by the College and the State Bureau of Agricultural Education.

The College provides an annual one-week summer skills program. The content varies, depending upon the needs and desires of the teachers as these are expressed through the Bureau of Agricultural Education. College staff members provide up-to-date training in the technical phases of agriculture and also contribute to the professional improvement of teachers by offering instruction in teaching methods.

The annual summer conference of the California Agricultural Teachers Association is held at the College with an attendance of 400-500 persons. Facilities, special speakers, exhibits, and other services are provided by the College.

SERVICES TO VOCATIONAL AGRICULTURE

Services to vocational agriculture departments in the secondary schools of California are provided by the College staff through such activities as: visiting vocational agriculture departments to discuss with teachers and students dairy, animal husbandry, deciduous and citrus fruits, field and truck crops, poultry, farm mechanics, farm management, and other problems; writing for agricultural magazines; assisting high school vocational agriculture departments to solve educational and agricultural problems through correspondence; judging of livestock, poultry, crops and other products at fairs; furnishing of breeding stock and hatching eggs to improve herds and flocks owned by Future Farmers throughout the State; and preparing a variety of teaching aids.

These services are provided by the College through a co-operative arrangement with the Bureau of Agricultural Education. Offices of the Bureau's supervisor for this region are located on the campus.

Other services to vocational agriculture are rendered by the Instructional Materials Program sponsored by the College to create a variety of visual aids for educational use.

SHORT COURSE AND WORKSHOP PROGRAMS

The College makes its facilities and instructional staff available for a number of professional short courses, workshop programs, and conferences such as: Physical Education Workshop, California Nurserymen's Refresher Course, California Hereford Breeders Association, Livestock Judging Conference, Soil Conservation Service Special Courses, California Conference on Science and Mathematics in Public Schools, Grange Youth Conference, American Association of Physics Teachers, FFA Conference.

INTERNATIONAL PROGRAMS

California State Polytechnic College students who qualify may participate in academic year programs of study at a number of distinguished universities abroad. In 1969-70 the cooperating universities are: University of Aix-Marseille, France; Free University of Berlin and University of Heidelberg, Germany; The Hebrew University of Jerusalem and Tel Aviv University, Israel; 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 its regulations.

A selection of 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;

Foundation/Alumni

- 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 1969-70 these costs are: France, Germany, Spain, \$2,300; Italy, Japan, Sweden, \$2,500; Israel, Taiwan, \$2,000. Payments may be scheduled throughout the year.

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

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

THE FOUNDATION

In 1940 a nonprofit corporation known as the California State Polytechnic College Foundation was organized. With faculty and administrative personnel as directors, the foundation has assumed the responsibility for financing and recording the project operations, operating and managing the cafeterias and housing facilities, and providing other services to students.

The foundation operates under lease agreements made with the Trustees of the California State Colleges and approved by the State Department of Finance. The provisions of these leases define the activities of the foundation and the use of its funds. The accounts are audited by the Department of Finance.

Through the foundation there is available a revolving fund from which students may borrow to finance their projects. No cosigner is required for a student to borrow from the foundation, but he must present a working plan, a budget, and a signed contract with the foundation before starting a project. Each student contributes a share from his earnings towards the project fund. Any losses in student projects are covered by the foundation from the fund contributed by project operators.

Typical agricultural projects include: Fattening steers, lambs, or swine; raising and breeding cattle, both beef and dairy, for a start towards future herds; growing crop projects, such as tomatoes, sweet corn, hay, and sugar beets; raising poultry, both meat birds and laying hens, and operating the hatchery; growing and marketing ornamental horticulture projects.

Engineering departments also conduct group projects.

THE ALUMNI ASSOCIATION

California State Polytechnic College San Luis Obispo, is the official headquarters of the Alumni Association, comprised of 2,200 former students and graduates as life members of the Association and an additional 1,000 annual members. The governing board of the Association consists of 16 sectional directors who provide representation throughout the State of California. In addition to the board of directors, a president and two vice presidents elected from among the directors serve two-year terms. Vice presidents direct the activities of northern and southern regions of the state, respectively. Other officers are the secretary-treasurer and the alumni director.

The Alumni Association strives to work for the best interest of the College in areas needing support. In addition, the Association maintains a graduate mailing list and supports the College in publishing a quarterly newspaper for graduates.

The Cal Poly Alumni Association also grants yearly scholarships to worthy students and provides a short term loan fund for those needing temporary assistance.

ADMISSIONS AND REGISTRATION



Central Campus Looking toward San Luis Obispo Mountain

ADMISSION REQUIREMENTS

Admission to California State Polytechnic College is open to qualified graduates of any high school and to other applicants who, in the judgment of the appropriate college authorities, possess equivalent preparation. Admission is limited to those students for whom adequate staff and facilities are available.

Guidance tests which are completed by incoming students are a part of the registration procedure and are given for the purpose of providing information for the student, his departmental adviser, and the counseling center. The departmental adviser uses guidance test results to assist in determining the courses most suited to the student's needs. These tests are not entrance examinations.

At the time of admission to the College all students are accepted into a specific major field of study. To conform to admission requirements, every student must submit an application for admission and two copies each of transcripts of previous high school and college training, including available test data. See also under "Matriculation."

Transcripts and records presented for admission or evaluation will remain in the student's folder as a part of his permanent record upon completion of registration.

Transfer Credit and Residence Requirements

Persons who have attended junior colleges or four-year colleges will be given full credit for such college level courses as may be applicable to the pattern of course work in the California State Polytechnic College curriculum followed, and in general elective credit for those not so applicable.

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

A maximum of 36 quarter units of extension course credit may be applied toward the bachelor's degree. Not more than 18 quarter units of this may be transferred from another institution.

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 of the various curricula with less than three full quarters of residence, two of which immediately precede graduation, nor with less than 50 quarter units of work received in residence at California State Polytechnic College.

Individuals transferring from colleges or universities will be considered for admission only on a conditional basis at California State Polytechnic College if they have been on probation at the college or university last attended.

Evaluation of in-service military training will be made on the basis of American Council on Education recommendations.

REQUIREMENTS FOR ADMISSION AS AN UNDERGRADUATE STUDENT

Requirements for admission to California State Polytechnic College are in accordance with Title 5, Chapter 5, Subchapter 2 of the California Administrative Code. A prospective applicant who is unsure of his status under these requirements is encouraged to consult with a school or college counselor or contact the College admissions office. Students registered for six units or less are subject to the same admission requirements as regular students. See also under "Matriculation."

Admissions

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, applicants for admission should complete and submit the results of the College Entrance Examination Board Scholastic Aptitude Test (SAT). Scores on the American College Test (ACT) will also be accepted but the former test is preferred.

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 appropriate aptitude test which results in an eligibility index* placing him among the upper one-third of California high school graduates. The grade point average is based upon all high school work taken, excluding work completed in the freshman year as well as any courses in physical education or military science. The table below does not cover every case, but gives several examples of the test score needed with a given grade point average to be eligible for admission. The minimum eligibility index is SAT-3072 or ACT-741.

<i>Grade Point Average</i>	<i>Minimum SAT Score</i>	<i>Minimum ACT Score</i>
3.21 and above.....	Eligible with any score	
2.80	832	19
2.40	1,152	27
2.00	1,472	35
1.99 and below	Not eligible	

Non-Residents Graduated from High Schools in Other States or Possessions

An applicant who is a non-resident for tuition purposes and who is a graduate of a high school in another state or a U.S. possession must have an eligibility index* which would place him among the upper one-sixth of California high school graduates. The minimum required eligibility index is SAT-3402 or ACT-826.

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 only those with promise of academic success equivalent to that of eligible California high school graduates will be admitted. Such applicants are not required to take the SAT or ACT test.

Non-High School Graduates

An applicant who is over 21 years of age, but 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.

Admission to Two-Year Technical Curricula in Agriculture

A two-year technical certificate program is available in each major agricultural department. Admission to these two-year technical curricula is available to high school graduates whose preparation and educational objectives are appropriate to the programs offered as determined by appropriate college authorities.

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 action.

* The eligibility index is computed by multiplying the grade point average by 800 and adding it to the total SAT score or by multiplying the grade point average by 200 and adding it to 10 times the composite ACT score.

Recommended Preparation

Overall excellence of performance in high school subjects and evidence of academic potential provide the basis for admission to California State Polytechnic College. While no course pattern is required, the applicant to be properly prepared to undertake a full program of studies and to pursue the required program in general education is strongly encouraged to include the following subjects as minimally adequate background for college work:

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 applicant who has attempted college work will be considered for admission under one of the following provisions. Applicants for admission who have not completed 60 semester units (90 quarter units) with a 2.0 (C) grade average should complete and submit the results of either the College Entrance Examination Board Scholastic Aptitude Test (SAT) or 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 will be admitted if he has achieved a grade point average of 2.0 (C) on all acceptable college work attempted and he was in good standing at the last college attended. High school transcript and SAT or ACT results not required.

Applicants with Fewer Than 60 Semester Units (90 Quarter Units)

An applicant who has completed fewer than 60 semester units or the equivalent may be admitted if he meets the above scholarship and good standing requirements and 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, he meets the requirements in effect for first-time freshmen at the time of his high school graduation. Requires submission of high school transcript and either SAT or ACT results.

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.
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 that degree objective.

Other Applicants

Only under the most unusual circumstances will an applicant not meeting either of the above provisions be considered for admission. Permission is granted by special college action.

Admissions

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 other admissions. All application papers should be submitted to the Admissions Office at least three months before the opening of the quarter in which the applicant hopes to gain admittance. This early application is designed to allow 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.

REQUIREMENTS FOR ADMISSION AS A GRADUATE STUDENT

All students desiring to do graduate work must file for admission at the Admissions Office. This applies not only to graduates of other colleges, but to students at the California State Polytechnic College. Graduates of this college must reapply for admission as graduate students.

For admission as an Unclassified Graduate Student, a student shall have completed a four-year course and hold an acceptable baccalaureate degree from an accredited institution; or shall have completed an equivalent academic preparation as determined by the College. Two copies of each transcript of all undergraduate and graduate studies undertaken must be submitted.

An Unclassified Graduate Student may, upon application, be admitted to an authorized master's degree curriculum of the College in Classified Graduate Status upon completion of the requirements as specified by the College for the particular master's degree program.

See the Graduate Study Bulletin for further details.

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 baccalaureate degree.

MATRICULATION

Matriculation refers to the complete process of being admitted to the college as a candidate for a certificate, degree, or credential and requires that the student who applies for admission as an undergraduate present a completed application for admission, college aptitude test results, statement of residence, and transcripts of his previous academic training including transcripts from high school and/or college. Applicants for admission as graduate students must present satisfactory evidence of their qualifications to enroll including two copies of transcript certifying graduation from an accredited college or university.

All students must complete the matriculation process.

REGISTRATION PROCEDURES

All students must complete Form SC-50, Statement of Residence, in advance so that their residence status can be determined prior to registration.

All students are required to register as majors in a specific department of the College.

The schedule for registration and payment of fees is published in the "Class Schedule and Instructions for Registration" which is sold prior to the start of each quarter. Students should consult this booklet for detailed registration procedures.

Credit for course work completed is given only when the student is properly registered. A student is not properly registered unless his completed quarter registration forms, listing the program approved by his adviser, are on file in the Registrar's Office. Individuals are not admitted to courses unless they are registered as students at the College.

CHANGES IN CURRICULUM

Students who find that they are preparing for a profession which does not provide the type of education for which they have the greatest aptitude are encouraged to transfer to another curriculum as soon as the condition becomes apparent. Students should contact their adviser and the college Counseling Center for assistance in making curriculum changes. Approval by the Veterans Administration must be obtained by students enrolled under certain laws before the major curriculum can be changed.

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

Upon transfer from a degree to a technical curriculum, at the College, a student's record is evaluated in terms of the technical curriculum. Courses completed prior to transfer which are applicable to the required courses in the technical curriculum will be transferred intact. The remaining courses completed prior to transfer must apply as electives up to, but not in excess of, the number of elective units specified in the technical curriculum. In the case of an excess of elective units, the student may choose which units shall apply. For purposes of computing the grade point average for graduation, only those courses transferred as outlined above and those taken subsequent to transfer will be used.

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.

CURRICULUM DEVIATION

Although the College has specified a curriculum for each major, under certain conditions a student may be permitted some deviation from the established curriculum. Detailed instructions for applying for a curriculum deviation may be obtained from the Registrar's Office.

CHANGE OF PROGRAM

The student is held responsible for every course appearing on his official program card. Each change must be made on or before the applicable last date as published in the academic calendar and must be filed with the Registrar's Office on the proper form. During the first two weeks of each quarter students make program changes by presenting their Change of Program cards to instructors. Changes are not made on forms issued at the Registrar's Office during this period.

Changes which must be made on or before the last day to add courses include adding a class, increasing units in a course, changing from audit to credit. Changes which must be made on or before the last day for dropping classes without penalty include dropping a class (no penalty), reducing units in a course, changing a section of a course, changing from credit to audit. After the 7th calendar day, forms for the change of program may be obtained from the Registrar's Office.

The last day to drop classes without penalty during the regular quarters is the 14th calendar day following the day on which classes begin. After this day a student may withdraw from a course in which he is enrolled for credit only by accepting a grade based upon his standing in the course at the time of withdrawal. After the 14th calendar day, forms for withdrawing from class may be obtained from the Registrar's Office. The instructor will indicate on the form whether the student is to receive a grade of F (failure) or W (withdrew) for the course. The grade of W indicates that the student is passing (Grade A to D) in the course at the time of withdrawal. Except for college-recognized emergencies, no withdrawals from a course will be permitted after the end of the seventh week of instruction.

A special provision, applicable only to students in their first quarter at the College, permits the substitution, without prejudice, of a prerequisite course in a sequence of courses for a later course in the sequence through the end of the fourth week. Only the substituted course appears on the transcript and the grade is based on performance after the change.

Students who withdraw from college prior to the end of the quarter will receive a W or a WF grade in each course depending upon whether passing or failing work has been accomplished up to the time of withdrawal.

DEGREES AND SCHOLASTIC REQUIREMENTS

Degrees

DEGREES OFFERED

<i>Schools and Departments</i>	<i>Curricula with Options/Concentrations</i>	<i>Degrees</i>
School of Agriculture		
	Agriculture	M.S.
	International Agriculture	
	Soil Conservation	
Agricultural Management Department	Agricultural Business Management	B.S.
	Farm Management	B.S.
Agricultural Education Department		
Agricultural Engineering Department	Agricultural Engineering	B.S.
	Mechanized Agriculture	B.S.
Animal Husbandry Department	Animal Husbandry	B.S.
Crops Department	Crops Production	B.S.
	Agronomy	
	Vegetable Crop	
	Fruit Production	B.S.
Dairy Department	Dairy	B.S.
	Husbandry, Manufacturing	
Food Processing Department	Food Processing	B.S.
	Management, Meats	
Ornamental Horticulture Department	Ornamental Horticulture	B.S.
Poultry Industry Department	Poultry Industry	B.S.
Soil Science Department	Natural Resources Management	B.S.
	Soil Science	B.S.
Veterinary Science Department		
School of Applied Arts		
Business Administration Department	Business Administration	B.S.
	Accounting, Economics, Finance	
	and Property Management, Industrial	
	Relations, Management, Marketing	
Education Department	Education	M.A.
	Agriculture, Education,	
	Physical Sciences, Social Sciences	
English Department	English	B.A., M.A.

<i>Schools and Departments</i>	<i>Curricula with Options/Concentrations</i>	Degrees
Home Economics Department	Home Economics Food Administration—Dietetics, Home Economics Education	B.S., M.S.
Interdisciplinary	Child Development	B.S.
Journalism Department	Journalism Agricultural, Business and Industrial, Community, Home Economics	B.S.
Music Department		
Physical Education Department	Physical Education	B.S., M.S.
Printing Technology and Management Department	Printing Technology and Management Printing Education Printing Management	B.S.
Speech Department	Speech	B.A.

School of Applied Sciences

Biological Sciences Department	Biological Sciences Biology, Botany, Field Biology, Marine Biology, Medical Laboratory Technology, Microbiology, Plant Pathology/Entomology, Zoology	B.S., M.S.
Chemistry Department	Biochemistry Chemistry	B.S. B.S.
Mathematical Sciences Department	Computer Science Mathematics Applied Mathematics, Computer Sciences, Mathematics Teaching, Statistics	B.S. B.S., M.S., M.A.
Military Science Department		
Physics Department	Physics	B.S.
Social Sciences Department	Social Sciences Government Service Social Sciences, Social Services History	B.S. B.A.

Degrees

<i>Schools and Departments</i>	<i>Curricula with Options/Concentrations</i>	<i>Degrees</i>
School of Architecture	Architecture Architectural Engineering City and Regional Planning	B.Arch. B.S. B.S.
School of Engineering		
Aeronautical Engineering Department	Aeronautical Engineering	B.S.
Electrical Engineering Department	Electrical Engineering	B.S.
Electronic Engineering Department	Electronic Engineering	B.S.
Engineering Technology Department	Engineering Technology Air Conditioning-Refrigeration, Electronic, Manufacturing Processes, Mechanical, Welding	B.S.
Environmental Engineering Department	Environmental Engineering Air Conditioning-Refrigeration Air Pollution Control	B.S.
Industrial Engineering Department	Industrial Engineering	B.S.
Industrial Technology Department	Industrial Technology Industrial Education, Industrial Sales and Technology	B.S.
Mechanical Engineering Department	Mechanical Engineering	B.S.
Metallurgical Engineering Department	Metallurgical Engineering	B.S.

REQUIREMENTS FOR A DEGREE

Curricula leading to graduation with the degree of bachelor of science are offered in agriculture, engineering, applied arts, applied sciences and architecture. Occupational majors in these fields are described under the corresponding sections of this catalog. In addition, the College offers the following degrees: master of science, master of arts, master of arts in education, bachelor of architecture, bachelor of arts, bachelor of vocational education. It also offers the two-year technical certificate in agriculture. Programs leading to teaching credentials authorizing service in the public schools are described under the heading "Teacher Preparation Programs".

APPLICATION FOR GRADUATION

Students shall file application for graduation in the Registrar's Office prior to the last date for filing such applications, as shown in the college calendar. Application forms and evaluations for graduation are available in the Evaluations Office.

DOUBLE MAJORS

The student will normally meet graduation requirements for a degree in one of the major curricula.

It is permissible for a student to be granted a bachelor's degree with two majors if the complete requirements of both major curricula have been met.

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

SECOND BACHELOR'S DEGREE

A qualified student who holds a bachelor's degree from this College or from another accredited institution may be awarded a second bachelor's degree in a different major when all requirements have been met and providing a minimum of 36 units of course work have been completed in residence after the requirements for the first degree have been fulfilled.

BACHELOR'S DEGREES

GENERAL REQUIREMENTS FOR GRADUATION

All candidates for the bachelor of science degree and the bachelor of arts degree shall have completed the requirements in one of the listed four-year curricula with a minimum "C" grade average for all units in the major, shall have spent not less than three quarters in residence (two quarters immediately preceding graduation), shall have earned not less than 50 quarter units in residence, and shall have earned a total number of grade points at least equal to twice the number of units attempted. Transfer students, in their work taken at this college, must earn a number of grade points at least equal to twice the number of units attempted at this college.

Candidates for the bachelor of science degree from the School of Engineering must present a minimum of 192 to 210 quarter units of credit for graduation depending on the major. Candidates for the bachelor of science degree from the School of Agriculture (except agricultural engineering which requires 210 quarter units) must present a minimum of 198 units of credit for graduation.

Candidates from the School of Applied Arts and the School of Applied Sciences must present a minimum of 198 quarter units of credit for the bachelor of science degree and 186 quarter units for the bachelor of arts degree. A minor may be required for the bachelor of arts degree. Available fields include those designed for teaching credential purposes.

General Education

Candidates from the School of Architecture must present a minimum of 255 units for the bachelor of architecture degree, 210 units for the bachelor of science degree in Architectural Engineering and 198 units for the bachelor of science in City and Regional Planning.

GENERAL EDUCATION BREADTH REQUIREMENT

All candidates for the bachelor's degree must complete a minimum of 65 quarter units of general education as specified below. The curriculum for each major published in this catalog is designed to satisfy the general education breadth requirement. The requirement is met in different ways depending on the particular major. The student planning to transfer from another college should therefore consult the published curriculum for his major and plan his course work accordingly.

No course shall be used for this purpose if it has a prerequisite unless such prerequisite is also counted as general education. Only degree credit courses in the 100, 200, and 300 series may be counted as general education. No more than six units in the major academic discipline of the student may be counted as fulfilling the general education requirement.

Natural Sciences

At least 15 units chosen from courses in Bact, Bio, Bot, Chem, Cons, Ent, PSc, Phys, Zoo, with no more than three courses having the same prefix and with at least one course in life science and at least one course in physical science. Maximum 24 units.

Social Sciences

At least 15 units chosen from courses in Ant, Ec, Geog, Hist, Pol Sc, Psy, Soc Sc, Soc. All students must take Hist 304, Hist 305 and Pol Sc 301.¹ No more than two courses having the same prefix may be counted in this category. Maximum 21 units.

Humanities

At least 9 units chosen from Art, Dr, Literature (Eng), Mu, and Phil, including at least two courses in literature and philosophy, but no more than 3 units each in Art, Drama and Mu. Maximum 18 units.

Basic Subjects

Mathematical sciences (CSc, Math, Stat) (at least a 3-unit course), written communication (Eng) (one course), oral (Sp) or written communication (at least one course). Minimum 12 units, maximum 16 units.

Other Subjects

Physical education (5 units, including at least 2 units of health education and 3 units of physical education activity).²

Any course outside the student's major with not more than 3 units in one department. Minimum 5 units, maximum 11 units.

¹ These courses are required to satisfy Section 40404 of the Administrative Code, but the units may also be counted as general education (Section 40405). Transfer students, certified as having completed the general education requirement, will have to complete this requirement separately if they have not already done so. (Social sciences and history majors will take an equivalent sequence.)

² The President may designate another course as a substitute for health education upon receipt of a statement of contrary religious belief. The President may exempt a student from physical education activity upon receipt of medical authority and may exempt persons over 25 years of age. Any student may claim military service as a substitution for the physical education activity requirement.

MASTER'S DEGREES

The College offers graduate programs leading to the master's degree in several areas. Curricula for the master's degrees are briefly outlined in the appropriate departmental sections of this catalog. For complete requirements for graduate study and for the master's degrees consult the *Graduate Study Bulletin*.

TEACHER PREPARATION PROGRAMS

California State Polytechnic College is accredited by the State Board of Education to recommend for the following credentials:

Standard Teaching Credential with Specialization in Elementary Teaching
Standard Teaching Credential with Specialization in Secondary Teaching

Recommended majors are:

Agriculture, Biological Sciences, Chemistry, English, Home Economics, Industrial Technology (Industrial Arts), Mathematics, Physical Education (for men and women), Physics, and Social Sciences.

Recommended minors are:

Art, Biological Sciences, Chemistry, English, History, Home Economics, Industrial Arts, Journalism, Mathematics, Music, Physical Education, Physical Sciences, Physics, Political Science, Speech, and (for the secondary credential only) Agricultural Science and Social Sciences.

For teaching credential requirements and procedures for entering the teacher education program consult the Education Department.

ADMISSION TO CANDIDACY FOR TEACHING CREDENTIAL

The selection of candidates to prepare for teaching is accomplished through a three-step process, involving teacher education committees. These committees determine policies for the teacher education program, review the qualifications of all candidates, and hear appeals where rejection of candidates has occurred. The three steps leading to the final completion of the credential are:

Step 1. Approval to enter the teacher education program

Step 2. Approval to participate in student teaching

Step 3. Final approval for a teaching credential

A student who enters the college with the intention of earning a teaching credential must be approved as a candidate for the particular credential which he is seeking.

Admission to the college is not equivalent to being accepted for the teacher education program.

Requirements and procedures for qualifying for acceptance of candidacy may be secured in the Education Department Office. Prompt attention to the college's procedures is necessary since approval for candidacy is prerequisite to certain professional courses and student teaching.

Evaluation of the student's qualification is based on the following factors:

1. *Academic Aptitude.* The candidate shall demonstrate academic aptitude by showing a satisfactory score on a college aptitude test or by demonstrating compensating strength in other qualities.

2. *Scholarship.* Satisfactory scholarship on all work accepted by the College must be in evidence before approval of candidacy for the teaching credential.

Elementary credential—grade point average of 2.25

Secondary credential—grade point average of 2.50

Master's degree—grade point average of 2.75

3. *Professional Aptitude.* The candidate must demonstrate suitable aptitude and fitness for teaching and for adjusting to public school conditions. These qualities are evaluated by committees and are based on evidence provided through tests, interviews, and personal contacts.

Academic Policies

4. *Physical Fitness.* Evidence of good physical health must be shown before the time of student teaching.
5. *Fundamental Skills.* The candidate must demonstrate proficiency in the fundamental skills, as determined by observation, written tests, and individual examinations. Fundamental skills may include oral and written language and mathematics.
6. *Personality and Character.* The candidate is expected to possess personality and character traits in keeping with the standards of the teaching profession. Qualifications are evaluated by committees and are based on tests, observations, and interviews.
7. *Many-sided Interests.* The candidate must demonstrate diverse and well-balanced interests. He must be able to understand and interpret his major interest and field of study in suitable relationship to all others.

TWO-YEAR TECHNICAL CURRICULA

All candidates for a technical certificate shall have completed 98 quarter units of courses approved by the department granting the certificate, shall have been in residence at least two quarters immediately preceding graduation, shall have earned not less than 32 quarter units in residence, and shall have earned a total number of grade points at least equal to twice the number of units attempted.

ACADEMIC POLICIES

Academic Obligations

Each student enrolled at California State Polytechnic College is enjoined to pursue aggressively the course of study which he has undertaken, in order that both he and the State will receive maximum benefit from the educational opportunities provided.

Students are expected to satisfy the academic demands required by their instructors in such ways as they may set forth, in order to satisfy the instructor that they are performing their assignments in a proper manner.

An instructor, with the President's approval, may at any time exclude from his course any student guilty of unbecoming or disorderly conduct toward the instructor or the class. A student thus excluded will be recorded as having failed in that course unless the college determines otherwise.

Class Attendance

Students are expected to be regular in attendance to keep the quality and quantity of work high. Absence from classes is regarded as serious, and no excuses for work missed are provided.

An excused absence can be allowed only by the instructor in charge of the class upon consideration of the evidence justifying 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.

Minimum Scholarship Requirements

Uniform minimum standards for academic probation or disqualification are in effect at all California State Colleges. Students at California State Polytechnic College will be placed on academic probation or will be 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 academic work attempted or for all such 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 academic work attempted and for all such work attempted at this college.

3. A student on probation *may* be disqualified when his cumulative grade point average for all academic work attempted or for all such work attempted at this college is 7 or more grade points below 2.0 (C average). Such a student *will* be disqualified when his academic record, as indicated in the sentence above, falls below the following standards:

- a. If a freshman or sophomore student (less than 90 quarter units of college work completed) is $2\frac{1}{2}$ or more grade points below a 2.0 (C average).
 - b. If a junior student (90 to 134 quarter units of college work completed) is $1\frac{1}{2}$ or more grade points below a 2.0 (C average).
 - c. If a senior student (135 or more quarter units of college work completed) is 9 or more grade points below a 2.0 (C average).
4. A student to be disqualified will be so notified as soon as possible following the end of the quarter in which his achievement fails to meet conditions prescribed in No. 3, above. In any case, disqualification is to be effected by the close of the next 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 failure to maintain satisfactory academic progress 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.

ACADEMIC PROBATION

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. This includes, but is not limited to, such groups as: athletic teams, debate teams, drama casts, judging teams, drill teams, Model U.N. delegation, rifle team, ASI councils, boards and committees. Such students may not hold an office in a student organization, nor may they be editors, managers, or hold similar positions on student publications. Students on academic probation may participate in such activities as club membership, intramurals, and music, that do not include travel and the official representation of the College.

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

ELIGIBILITY FOR INTERCOLLEGIATE ATHLETICS

Eligibility for competition in intercollegiate athletics is regulated in general by the rules of the National College 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 "C" (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 or basketball.
5. Transfer students from four-year colleges in order to be eligible must have a calendar year of residence at the campus where they will participate.
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.

Academic Policies

Grading System

The following grading system is in effect:

A--Superior	E--Incomplete
B--Better than average	F--Failure
C--Average	P--Passing (workshops only)
D--Barely passing	W--Withdrew from course without failure
	WF--Withdrew from course failing

Grade points are assigned to the various grades (except grades P and E) 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 F or WF—0 point

Passing grades are marked A, B, C, D. Grade E indicates incomplete work. Grade E may be given to a student for either of the following reasons:

1. Passing in classwork, but unable to take final examination.
2. Passing in classwork completed and in final examination, but some assigned work not completed.

Grade E may be removed within one year from the time it is recorded by completing all unfinished work as the instructor may determine. The removal of grade E entitles the student to the number of units and grade points assigned to his completed grade. 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.

No units or grade points will be assigned for the course in which grade E is assigned unless and until the grade is changed.

A student may repeat a course in which he has received a grade lower than C under the following condition: 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 enroll in (except as an auditor) or receive credit by examination for any course in which he has received a grade of C or higher.

Course Numbering System

The numbering system used is a three-digit system. Courses are grouped first into number series indicating the college level at which they are normally taught as follows:

1- 9--Preparatory courses	300-399--Junior courses
10- 99--Special program courses	400-499--Senior courses
100-199--Freshman courses	500-599--Graduate courses
200-299--Sophomore courses	600-699--Professional courses

The first digit indicates the level or year in which the courses are normally taught.

The second digit 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 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

NOTE: Courses numbered 1-9 carry no credit toward meeting degree requirements in any of the curricula. Courses numbered 10-99 are either non-degree credit short-courses or courses offered for foreign students under contract with the U.S. Agency for International Development. 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.

Maximum and Minimum Loads

The maximum load for regular students is 20 quarter units of work including audited courses and concurrent work at other colleges; the only exceptions are made with the advance approval of the student's major department head and completion of a petition to carry excess load which is available at the Registrar's Office. Regular credit will not be given for a course completed in any quarter unless the course appears on the student's approved program card for that quarter. Maximum load requirements may be waived only on presentation of evidence of ability to carry successfully such a group of courses. Maximum load for graduate students is 16 units per quarter.

RECORDS PROCEDURES

Holding of Records

Student records may be placed in a "Hold" status because of financial or other obligations to the college. While the student's records are so held, he will not be issued a "permit to register" nor will transcripts of his credits be released to anyone. The student's records will be held until the obligation is cleared to the satisfaction of the office or department placing the "Hold."

Transfer to Other Colleges

Students who plan to transfer from the California State Polytechnic College to another college or university should, at the earliest possible date, request that their transcript of record be forwarded by the Registrar's Office. Any evaluation of transcripts presented to another college or university will be made by the new institution in terms of its established policies.

Honorable Dismissal

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

CREDIT POLICY

Credit by Examination

A student enrolled either as a regular or limited 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.

Academic Policies

Advanced Placement

The College offers credit and advanced placement for those students who achieve scores of 3, 4, or 5, on the College Entrance Board advanced placement examinations. A maximum of nine quarter units of lower division elective credit will normally be granted for such achievement upon submission of the examination results to the Associate Dean, Admissions and Records.

Students who wish advanced placement (credit for a particular subject) on the basis of such examination results may petition for such credit in lieu of elective credit on a form provided by the Registrar's Office. Granting of advanced placement is at the discretion of the dean of the school and department head involved.

Auditing of Courses

An auditor is a student who is attending courses for no credit. He must be registered with fees paid for the quarter in which the course he desires to audit is offered. Audited courses must be included on the student's study list with the designation "AUD" in the "units" column along with the number of units. A student may enroll to audit a course during the first week of instruction and no later than the last day to add a course. The deadline to change from audit to credit is the same as the last day to add a course. A student may change from credit to audit no later than the last day to drop a course without penalty.

In cases where class sections must be limited in enrollment, preference will be given to students enrolling for credit.

The materials and service fee and non-resident tuition fee are determined on the basis of the total units for which the student is enrolled including courses audited.

Credit for Military Service

Nine quarter units of elective credit will be allowed toward graduation to any student with honorable discharge submitting evidence of satisfactory completion of one year of training in the military service of the United States.

In addition to the nine quarter units, $13\frac{1}{2}$ 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.

In allowing for credit for inservice training, California State Polytechnic College follows the recommendations of the American Council on Education in terms of units allowed and subject matter covered.

HONORS

Candidates for bachelor's degrees are eligible for "Graduation with Honors" if at the end of winter quarter preceding commencement they have earned a 3.1 or better cumulative grade point average, including all college level work attempted at Cal Poly and all college level work accepted from other institutions.

The "President's Honors List" is compiled at the end of each academic year to honor those undergraduate students who have demonstrated consistent achievement, as represented by a grade point average of 3.0 or better for completion at Cal Poly of 12 or more units during each of the fall, winter, and spring quarters.

The "Dean's Honors List" is compiled at the end of each regular quarter to honor students who have completed 12 or more units during the quarter with a 3.0 or better grade point average.

Entering freshmen who rank in the top five percent of high school graduates are granted "Honors at Entrance."

STUDENT SERVICES AND ACTIVITIES



Community and students get acquainted at student-sponsored pancake breakfast during Poly Royal open house.

STUDENT ORGANIZATIONS AND ACTIVITIES

The College provides an integrated program of classroom and laboratory instruction, gainful employment, and co-curricular activities. The latter are under the direction of the Associate Dean, Activities, who is responsible for initiating and coordinating a well-rounded program of activities designed to develop leadership qualities in all students.

STUDENT GOVERNMENT

All students are members of the student association known as the Associated Students of California State Polytechnic College at San Luis Obispo, Inc. The government of student affairs and the control of property are vested in the Student Affairs Council, the members of which are selected according to regulations established in the study body bylaws. In addition, there are boards established to oversee publications, athletics, music, College Union program, and Poly Royal. All interested students have an opportunity to participate in student government.

ATHLETICS

Intercollegiate competition is held under the rules and auspices of the National Collegiate Athletic Association. Conference competition is maintained in most sports as a member of the California Collegiate Athletic Association. A full program of intercollegiate competition is offered in football, basketball, baseball, track, wrestling, gymnastics, swimming, water polo, golf, and cross country, all of which are major sports. Awards are given to letter winners. Freshman competition is offered in sports where competition is available and sufficient interest warrants it.

The Physical Education Department offers physical activities designed to provide a sound program of recreation, education in physical skills, and the give-and-take of games. Varsity teams in the intercollegiate sports offer opportunity for the more skilled. Intramural teams provide year-round competition in a dozen sports at an easier level of play to all who wish to enter. Trophies are awarded winners in touch football, track, horseshoes, basketball, volleyball, swimming, wrestling, badminton, softball, tennis and golf. For eligibility rules see ELIGIBILITY FOR INTERCOLLEGIATE ATHLETICS.

COLLEGE UNION PROGRAM

Most of the social programming on the campus is done by the College Union Program Board and its 11 committees. The board is affiliated with the Association of College Unions and it functions within policies and budgets of the Student Affairs Council. Committee membership is open to all interested students. The committees cover assemblies, dance, drama, films, fine arts, games and hobbies, outings, personnel, public relations, social, and special events.

PUBLICATIONS

Publications of the student body at the California State Polytechnic College, San Luis Obispo, are not only written and edited by students, but are also printed in the college's printing department as laboratory work for students majoring in printing. Editorial and photographic work for publications is handled primarily by students of the journalism classes. *Mustang Daily* is the official newspaper of the associated students. *El Rodeo* is the College yearbook. Miscellaneous publications include the *California Future Farmer* magazine, a monthly magazine supported by and mailed to 19,000 Future Farmers of America members in nearly 200 California high schools; and the *Mustang Handbook*.

Student Activities

POLY ROYAL

Each year during the spring the College has an open house exhibition and show conducted primarily by the Associated Students. This event is known as Poly Royal, "A Country Fair on a College Campus." Its purpose is to display work accomplished during the year by students. Each department of the college prepares displays that reflect the curriculum within that department and its relation to employment, as well as the activities and success of the graduates. Besides the shows and exhibits there are many entertainment features such as intercollegiate baseball, swimming, and rodeo. Other special events include dramatic presentations, aquacade, carnival, various judging contests that involve adult visitors, and a mathematics contest featuring students from high schools throughout the State.

CAMPUS ORGANIZATIONS

Clubs and organizations cover all departments and activities, and the opportunity exists for every student to take an active part in club life. There are departmental and professional organizations, hobby-interest clubs and many others serving the areas of honor societies, service clubs, residence groups, ethnic groups, and religious faith groups. 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.

STUDENT SERVICES

The College provides a number of services designed to help the student in his college work. Some of the services are directed toward group activities and experiences, others toward helping students overcome individual problems.

Counseling and Testing

The Counseling Center, under the direction of the Associate Dean, Counseling and Testing offers service in vocational, educational, and personal counseling in accordance with the needs of the student. A well-equipped test center, under the direction of the Test Officer, is available to assist the students and counselors.

Advising

Each new student is assigned an adviser in his major department when he enrolls at college. This adviser helps the new student solve problems involved in becoming oriented to college life and helps to arrange a sound course of study for him. Returning students and college transfers are also assigned an adviser who helps the student arrange his instructional program.

Health Services

The staff and facilities of the Student Health Center are dedicated to the ideals of preventive, diagnostic and therapeutic medicine. These services are offered with an emphasis on health education. In general, the same approach as that of the student's own family physician is provided. The Health Center staff has several full-time physicians, registered nurses, and medical technologists. The Health Center is comprised of two units: a thirty-bed, fully-accredited hospital and an outpatient department. It provides a well-equipped clinic and hospital with facilities for minor surgery, pharmacy, laboratory, physical therapy, medical records, and diagnostic X-ray facilities.

The health program is financed by the student in three steps. For complete medical coverage, each regular student should participate in all three:

- 1) The materials and service fee allows limited outpatient care from 8 a.m. to 5 p.m., Monday through Friday.

Student Housing

- 2) An optional local health fee of \$24 per academic year or \$9 per individual quarter entitles the student to campus hospitalization and 24-hour emergency care by a college physician. Additional services under this program are physical therapy and prescription service in the campus pharmacy. Any full-time student, even without this prepaid campus health plan, may still avail himself of these benefits by paying a fee for service.
- 3) Supplementary major medical and hospital insurance is offered through the A.S.I. to cover major surgery and emergency expenses incurred away from campus.

A health statement on a form provided by the College is required of each student; the physical examination is optional. Chest X-rays and tetanus immunizations recommended for each new student are provided by the Health Center.

Foreign Student Services

Advisers are available to assist foreign students in making academic, personal and cultural adjustments to the campus and the community. It is required that every student from another country upon his arrival at the college present himself with his passport to the Foreign Student Office.

Student Housing and Dining Services

ON-CAMPUS HOUSING

On-campus residence hall facilities are available for both men and women students.

The College believes a stimulating intellectual and social environment in housing units is an important part of the student's education. Study is encouraged through the observance of regular quiet hours. Residents also have ample opportunity to participate in intramural activities, discussion groups, and social events with other halls. This environment also is recommended for foreign students to facilitate social, educational, and cultural adjustments. Each hall is staffed with professional personnel.

New students who wish to live in the residence halls should request on-campus housing when they apply to the College for admission. Assignment to available on-campus housing is made according to the date of acceptance for admission to the College.

Notification of the availability, or the unavailability, of on-campus housing after acceptance for admission to the College is normally made shortly after June 1 for the Fall Quarter.

Housing licenses are mailed to students accepted for on-campus housing. Signed licenses, accompanied by the required payment, must be returned by the deadline stated in the license. Failure to comply with the license stipulations automatically results in loss of housing assignment.

OFF-CAMPUS HOUSING

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 advance written parental permission is filed with the Associate Dean, Women, prior to registration.

Inquiries about off-campus housing should be made in person at the Housing Office.

FAMILY HOUSING

The Housing Office maintains a card file of apartments and rooms available to married students. It does not inspect or approve the facilities listed. Inquiries about the file should be made in person at the Housing Office.

Placement/Employment

DINING HALL

The Dining Hall is a modern facility which includes two dining rooms. The west dining room is used for students who wish to purchase a quarterly meal ticket. These meal tickets are limited in number and entitle the holder to 15 meals per week, three meals daily, Monday through Friday. Quarterly meal tickets are not used in the a la carte cafeteria or snack bar. Meals are prepared from menus reviewed by an American Dietetics Association consultant. Saturday and Sunday meals may be purchased through an a la carte cafeteria.

The east dining room is designed as an a la carte cafeteria, with multiple choice entrees, salads, vegetables, desserts, etc; and is open 7 days per week, exclusive of academic holidays.

A snack bar is available which offers a wide range of sandwiches, snacks, salads, desserts and fountain items.

A vending service adjacent to the east dining room provides hot and cold sandwiches, beverages, and miscellaneous snacks 24 hours a day.

Placement

A centralized placement service is available to all students and alumni of the college. The Placement Office and instructional departments work together in assisting students to obtain the most suitable employment consistent with their preparation and experience.

A followup program conducted by the Placement Office includes contacting both the graduate and employer to appraise the effectiveness of the instructional programs in light of employer needs, and the satisfaction of employer and employee.

Teacher Placement

Every candidate for a credential should register with the Placement Office before or during the last 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 which is sent by the Placement Office to school administrators who are considering the candidate for a teaching position. 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 most effective service.

Summer Employment

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

The Placement Office receives many summer job listings. Ranchers and businessmen visit the campus in person and large business concerns send recruiters to interview undergraduates for summer employment.

Part-time Employment

In addition to off-campus employment and opportunities for students to earn money through project activities, the College has established a policy of giving a maximum number of students experience by employing them to assist in the operations of the entire campus and farm. The number of campus jobs is greater than in the typical college where regular full-time employees do much more of the work.

Work Study Program

The College is participating in the Work Study Program which provides students who are eligible the opportunity of employment as set forth under the Economic Opportunity Act. Employment provisions under this program are parallel to those of other student employment on campus. Rates of pay vary depending on the job requirements and the skills of the worker. Information and applications may be obtained from the Financial Aid Counselor, Administration 213.

FINANCIAL AIDS AND CAREER PLACEMENT

Financial Aid

The College has a variety of loan funds, scholarships, awards, and part-time employment opportunities designed to assist students financially. Students who must have assistance in order to complete their college work should read this section carefully. Additional information and applications may be obtained by writing to the Financial Aid Counselor.

SCHOLARSHIPS AND AWARDS

General Information

Scholarships awarded by the College are available to both entering and enrolled students who meet the scholastic and financial need requirements of the College scholarship funds. These scholarships are made available from various sources, usually corporations, individuals, or interested groups outside the campus. Approximately 225 scholarships are awarded yearly.

How to Apply

To be considered for a scholarship, a student or prospective student must complete a scholarship application blank. Scholarship application blanks are available October 1st of each year and must be completed and returned before April 1st. Applications may be obtained by writing to the Financial Aid Counselor.

Selection Criteria

Applicants are judged upon their need, scholastic ability, character and participation in school and community affairs. In addition, certain scholarships require special conditions concerning field of study, residence, and other similar factors.

Generally, students must have at least a "B" average to place high enough in the scholarship ratings to be granted an award. However, there are scholarships which are granted to students with a lesser grade average. In some cases need, special qualifications, or a specific field of study will compensate for a lower grade average. It is recommended that a student apply if in doubt.

Additional Information

More information on scholarships available is included in the booklet "Financial Aid for Students" published by the College which may be obtained on request from the Financial Aid Counselor.

Freshman Scholarships

AGRICULTURE

Dairy Manufacturing

Challenge Creamery Scholarship, \$200.

Th. R. and Valley Knudsen Foundation Scholarship, \$500.

Ornamental Horticulture

Agnese Davey Scholarship, \$300.

Miscellaneous

California State Grange Scholarships, \$250 (2).

General Foods Funds Scholarships, \$400 (5).

The E. C. Loomis and Sons Scholarships, \$100.

San Luis Obispo Cowbells Scholarship, \$200.

Leopold Edward Wrasse Scholarships, \$500 (95).

ENGINEERING

All Engineering Majors

Walter Wells, Sr., Memorial Scholarship, \$500 (10).

Electrical Engineering

U. S. Electrical Motors Division of Emerson Electrical Manufacturing Company Scholarship, \$100.

Financial Aid

Lulu G. Bumphrey Scholarship, \$200.
California State Employees' Association
Scholarships, \$150 (4).
California State Firemen's Association
Scholarship, \$300.
Dorman/Munselle Associates Scholarship,
\$1,000.

Advanced Student Scholarships

GENERAL

ROTC Scholarships, fees, books, plus \$50
monthly retainer fee.
San Luis Obispo Cowbelles Scholarship, \$200.
Sears, Roebuck Foundation Home Economics
Scholarship Awards, \$300 (3)
Soroptimist Scholarship, \$400.

AGRICULTURE

Agriculture or Agricultural Journalism
Hearst Foundation Scholarships, \$500.
Agricultural Engineering
Tractor and Implement Group of Southern
California Scholarship, \$500.
Agricultural Management
Western Fairs Association, \$500 (2).
Agricultural Management, Food
Processing or Crops
Lloyd Ackerman Memorial Scholarship,
\$500.
George Lievere Memorial Scholarship, \$500.
Animal Husbandry
L. L. Bennion Scholarship, \$250.
George A. Smith, Jr., Scholarship, \$200.
Crops
Western Agricultural Chemicals Association
Scholarship, \$500.
Crops or Soil Science
California Fertilizer Association, \$100 (2).
Dairy
California Dairy Industries Association
Scholarship, \$600.
Th. R. and Valley M. Knudsen Foundation
Scholarship, \$500.

Farm Management
Carl Beck Scholarship Awards, \$50 (2).
Emer Tribe Award.
Ornamental Horticulture
Agnes Davey Scholarship, \$300.
California Association of Nurserymen's
Scholarship, \$150.
California Association of Nurserymen,
Central Chapter, \$100.
Menlo Park Kiwanis Club Scholarship,
\$150.
Harry E. Rosedale Memorial Scholarship,
\$100.
Santa Barbara County Horticulture Society
Scholarship, \$100.
Wellington Davey Scholarship, \$300.
Poultry Industry
Olson Brothers Poultry Scholarship, \$500.
Poultrymen's Cooperative Association of
Southern California Scholarship, \$300.
Miscellaneous
Group Seven California Bankers
Association, \$500.
Kings River Prune and Apricot Scholarship,
\$200.
Leopold Edward Wrasse Scholarship,
\$500 (95).

APPLIED ARTS

Athletics
Interfraternity Council Athletic
Scholarship, \$300.
Education
Delta Kappa Gamma Recruitment Grant,
\$100.
John and Dorothy Manning Scholarship,
\$200.
Parent-Teachers Scholarships, \$500 (3).

Journalism
John Healey Sigma Delta Chi Scholarship,
\$100.
Printing
Page Memorial Scholarship, \$500.
Crown Zellerbach Foundation Scholarship,
\$500.

ARCHITECTURE

Richard Dobell Award, \$100.
Dorman/Munselle Associates Scholarship,
\$1,000.
Falk and Booth Scholastic Award, \$150.
Dr. Albert Gazin Award, \$100.
Graham Paint Store Award, \$50.
Leisure Arts Award, \$50 (3)

Low Litzie Award, \$100.
Santa Barbara Chapter—AIA Award, \$100.
Southern Counties Gas Company and
Southern California Gas Company, \$300
(2); \$400.
Fredrick Peter Young Scholarship, \$150.

ENGINEERING

- Aeronautical Engineering
 - Aero Alumni Scholarship, \$100.
- Electrical Engineering
 - Poly Phase Award
 - U. S. Electrical Motors Division of Emerson Electric Manufacturing Company Scholarships, \$300 (3).
- Electronic Engineering
 - Hewlett-Packard-Alumni Scholarship.
 - Clarence Radius Memorial Scholarship, \$350.
- Electrical or Electronic Engineering
 - Institute of Electrical and Electronic Engineers, Santa Barbara Section Scholarship, \$175.
- Electrical or Electronic Engineering or Physics
 - Hewlett-Packard/Neely Sales Division Scholarships, \$250 (2).
- Environmental Engineering
 - Air Condition/Refrigeration Center of Los Angeles Scholarship, \$400.
 - Lillard Company Scholarship, \$350.
 - North American Heating and Air Conditioning Wholesalers Association, \$350.
- Industrial Technology
 - Lee Epperson Memorial Scholarship, \$500.
- Mechanical Engineering
 - Larry Reid Scholarship, \$250.
- Mechanical or Industrial Engineering or Welding and Metallurgy
 - Solar, Division of International Harvester Co., Awards, \$100 (5); \$500.
- Metallurgical Engineering
 - Metallurgical Consultants, Inc. Scholarships, \$150 (2).
- Welding
 - American Welding Society Scholarship, Santa Clara Valley Section, \$100 (2).
- Welding or Metallurgy
 - American Welding Society, San Diego Section Scholarship, \$250.
- Miscellaneous
 - American Society of Heating, Refrigeration and Air Conditioning Engineers Scholarship, \$250.
 - Minnesota Mining and Manufacturing Scholarships, \$400 (3).
 - Walter Wells, Sr. Memorial Scholarship, \$500 (10)
 - Western Electrical Fund, \$400.

GENERAL

- California State Polytechnic College Women's Club, \$50 (4).
- California State Employee's Association Scholarships, \$150 (4).
- California State Firemen's Association Scholarship, \$300.
- Julian A. McPhee Award.
- ROTC Scholarships, fees, books, plus \$50 monthly retainer fee.
- Soroptimist Club of San Luis Obispo, \$400.

OTHER SCHOLARSHIPS

Bank of America, N. T. & S. A. Scholarships

Four annual \$200 scholarships are awarded at the Grand National Junior Livestock Exposition on the basis of excellence of performance in the farm home program in the production of livestock. Applicants are limited to those participating in this special event. These scholarships may be used at the California State Polytechnic College.

Business and Professional Women's Club of San Luis Obispo

The Business and Professional Women's Club of San Luis Obispo provides one annual \$250 advanced scholarship for a woman student who is a resident of San Luis Obispo County and who will enroll at the California State Polytechnic College after the completion of two years of college work, either at Cal Poly or at another four-year college or junior college. Prospective applicants should contact the club secretary.

California Seed Association Scholarship

One annual scholarship of \$150 is offered to a Future Farmers of America member in California by the California Seed Association. The applicant must have an outstanding home farming program in truck crops or seed production, or an outstanding record in crops judging; and must enroll in crops production at certain California agricultural colleges including California State Polytechnic College. Application forms are available from high school FFA chapter advisers.

Financial Aid

Union Pacific Railroad Scholarships

Four \$200 scholarships are made available by the Union Pacific Railroad, Omaha, Nebraska. Applicants must have completed two or more years of vocational agriculture, or 4-H club work, including commendable projects. One scholarship is to be awarded to one resident in each of the following counties: Los Angeles, Riverside, San Bernardino, and Orange. Scholarships may be used at California State Polytechnic College, University of California, or Chaffey Junior College. All applications, however, must be submitted not later than April 15. Scholarships shall be used within the calendar year after the date of graduation from high school. All project books, a picture of the applicant, and, if possible, pictures of his project must accompany the application.

Safeway Stores, Inc., Scholarships

Two annual \$200 scholarships are awarded at the Grand National Junior Livestock Exposition on the basis of excellence of performance in the farm home program in the production of livestock. Applicants are limited to those participating in this special event. The scholarship awarded to a Future Farmer must be used at California State Polytechnic College.

Santa Fe Scholarship

One annual scholarship of \$250 is offered to a Future Farmers of America member in California by the A. T. and S. F. Railway. The scholarship may be used at certain agricultural colleges within the State, including California State Polytechnic College. Application forms are available from high school FFA chapter advisers.

South San Francisco and Stockton Union Stockyards Company Scholarships

Two annual \$100 scholarships are awarded at the Grand National Junior Livestock Exposition on the basis of excellence of performance in the farm home program in the production of livestock. Applicants are limited to those participating in this special event. The scholarship award to a Future Farmer must be used at California State Polytechnic College.

Standard Oil Company of California Scholarships

Thirty annual scholarships of \$300 each are offered by the Standard Oil Company of California to members of the Future Farmers of America and members of 4-H clubs in California. Any of these scholarships may be used at California State Polytechnic College or other colleges. Future Farmers should apply through their agriculture teachers, 4-H club members through their club leaders and county club advisers.

NATIONAL DEFENSE STUDENT LOAN PROGRAM

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

Entering freshmen as well as students in advanced standing in any field of study are eligible, although the law provides that special consideration 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. Cal Poly has programs in all of these fields of learning.

The maximum loan to one individual is \$1,000 in any one academic year, and no more than \$5,000 total. Loans must be repaid with 3 per cent interest over a period of 10 years beginning one year after the individual ceases to be a full-time student at an institution of higher education. However, a borrower may have 10 per cent of the loan, and the interest thereon, cancelled for each full year of full-time public elementary or secondary school teaching, up to a maximum of 5 years and 50 per cent of the loan.

The deadline for submitting National Defense Student Loan Applications for the following school year is June 1.

STUDENT LOAN FUNDS

Student loan funds are available to provide temporary assistance to worthy students. 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 loan fund. Applications may be obtained from the Financial Aid Counselor, Administration 213.

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

Agricultural Engineering Society Loan Fund
 Alpha Zeta Loan Fund
 Alumni Association Loan Fund
 American Society of Heating, Refrigerating
 and Air Conditioning Engineers Loan Fund
 Pete Bachino Memorial Loan Fund
 Baer-Beck Fund
 Edgar E. Bilodeau Loan Fund
 Jed S. Blake Memorial Loan Fund
 California Association of Refrigeration Service
 Engineers Loan Fund
 California Association of Soil Conservation
 Districts Loan Fund
 California Polytechnic Memorial Loan Fund
 California Retired Teachers' Loan Fund
 The California State Polytechnic Women's
 Club Fund
 W. B. Camp Revolving Scholarships in
 Agricultural Journalism
 W. B. Camp Educational Loan Fund
 Margaret Chase Memorial Loan Fund

Harlan Diedrichson Fund
 Court Evergreen, Independent Order of
 Foresters Loan Fund
 Ralph Hoover Memorial Loan Fund
 Horseshoeing and Animal Husbandry Loan
 Fund
 Chris Jespersen Fund
 Kema Fund
 Lee Gird Levering Memorial Loan Fund
 Lynn T. Lobaugh Memorial Loan Fund
 William Mercer Memorial Loan Fund
 1960 Football Team Memorial Fund
 The Rotary Club Fund
 Sears Roebuck Foundation Loan Fund for
 Foreign Students
 George Sehmeyer Memorial Fund
 Student Accommodation Loan Fund
 Telegram Tribune Loan Fund
 Todd Farm Bureau Emergency Loan Grant
 Wilder Memorial Loan Fund
 The Wrasse Fund

UNITED STUDENT AID FUND

United Student Aid Fund is a private non-profit corporation which endorses low-cost 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 who have completed their freshmen year may borrow from a bank up to \$1,000 a year at 7 percent simple interest with repayment beginning after graduation or separation from college. For a student who qualifies under federal law, the federal government will pay all the interest until payments are due to begin and one-half of the interest while the student is repaying the loan.

Other organizations and funds also have provided matching amounts which make possible recommendation of additional student loans, some of them to specified categories of students. These organizations and funds (many of which also make student loans directly) are:

Alpha Zeta Loan Fund
 Alumni Association Loan Fund
 Architecture (A.I.A.) Fund
 California Cowbells, Inc.
 California State Polytechnic College
 Foundation
 Joseph Cardani Memorial Loan Fund
 Class of 1964 Loan Fund
 Thomas W. Flower Memorial Fund

Green and Gold BBQ Fund
 Jack Bertram and John Lee Loan Fund
 Roy F. Metz Memorial Loan Fund
 Clarence Radius Memorial Fund
 Larry Reid Loan Fund
 James Ritchie Loan Fund
 Norman Sharpe Fund
 Lester Whitney Memorial Fund
 The California State Polytechnic Women's
 Club Fund

Fees

STUDENT GUARANTEED LOAN PROGRAM

Federal-sponsored long-term loan programs with largely the same terms as the National Defense Student Loan Program, but with no teacher cancellation provisions. For families with annual income under \$15,000, an agency of the federal government will pay all of the interest (7%) while the student is in school and one-half after the student terminates his schooling.

EDUCATIONAL OPPORTUNITY GRANT PROGRAM

A grant-in-aid program intended to assist students who, without substantial aid such as this, could not attend college. Eligibility is restricted to students from families with very low income. The aid must be matched by a National Defense Loan or similar aid.

Educational Opportunity Grant applicants must submit a Parents' Confidential Statement of Finances.

FEEES AND EXPENSES

STATE FEES

Materials and service fee (quarter)	
Each student enrolled for six units or less.....	\$17.00
Each student enrolled for over six units	34.00
Nonresident tuition—U.S. (\$1,187 annual maximum):	
Each student enrolled for 14½ units or more (per quarter).....	297.00
Each student enrolled for less than 14½ units (per quarter per unit or fraction of unit).....	20.00
Nonresident tuition—Foreign (\$340 annual maximum):	
Each student enrolled for 14½ units or more (per quarter).....	85.00
Each student enrolled for less than 14½ units(per quarter per unit or fraction of unit).....	5.75
Late registration fee	5.00
Transcript of record (no charge for first copy)	1.00
Course credit by special examination fee (per unit)	1.00
Summer session fee (per quarter unit)	15.00
Extension course fee (per quarter unit):	
Lecture and discussion courses.....	12.00
Activity courses	15.50
Laboratory courses	24.00
Conference, Short Course or Institute, per person	Estimated Cost
Application fee (not refundable)	10.00
Change of program fee	1.00
Failure to meet administratively required appointment or time limit	2.00
Library fees	See schedule in library
Check returned for any cause	2.00
† 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 or sessions of one week or more, per week.....	1.00

NOTE: Fees for summer quarter are the same as for the other quarters.

Fees are subject to change upon approval by the Trustees of the California State Colleges.

† Proportionate fees apply during summer session.

OTHER FEES
(Subject to change)

Associated student card fee	
Each student enrolled for over six units	
Summer quarter	\$5.00
Fall quarter	10.00
Winter and spring quarters, each	5.00
Each student enrolled for six units or less	
Summer quarter	3.50
Fall quarter	4.50
Winter and spring quarters, each	3.50
College union fee	
Each student enrolled for over six units	
Fall quarter	6.00
Winter and spring quarters, each	5.00
Summer quarter	4.00
Each student enrolled for six units or less	
Fall quarter	3.00
Winter and spring quarters, each	2.50
Summer quarter	2.00
Optional medical fee (per quarter)	9.00
Graduation fee	
Bachelor's degree	10.00
Master's degree	12.50

NOTE 1: The graduation fee includes diploma charges when diploma is ordered for June graduation. The diploma fee for orders at other times is \$2.50. The fee for an additional diploma insert (for double majors) is \$3.50.

**LIVING EXPENSES FOR STUDENTS LIVING IN
CAMPUS RESIDENCE HALLS**

(Subject to change)

Room and Board	
Room, per quarter, annual license required	\$158.00
Board, per quarter (optional)	165.00
Housing security deposit (payable prior to occupancy)	20.00

Room payable in advance. Arrangements to pay in installments may be made upon application for campus housing. A service fee of \$4.00 per quarter shall be charged for the right to make installment payments.

Students are required to furnish blankets, bed spreads, and study lamps.

Optional meal tickets are available. The meal tickets cost \$150.00 per quarter and entitle the holder to 15 meals per week: three meals daily, Monday through Friday.

Expenses/Student Conduct

TYPICAL STUDENT EXPENSES

Following is an estimate of typical expenses per quarter for the average California resident student living in campus residence halls. Non-resident students should be prepared to pay additional tuition fees. Of the total amount, the student should be prepared to pay from \$340 to \$390, depending upon his major, at the time of fall quarter registration and approximately the same amount at the time of registration for other quarters.*

Associated student card (fall quarter, \$10.00, winter and spring quarters, \$5.00 each)	\$10.00
College union fee (fall quarter, \$6.00, winter and spring quarters, \$5.00 each)	6.00
Medical fee—optional (per quarter).....	9.00
Materials and service fee (per quarter)	34.00
Room and board with optional meal ticket.....	323.00
Books and supplies (estimated).....	50.00 †
Weekend meals (estimated \$25 to \$30 per month)	90.00
Laundry (estimated \$10 per month).....	30.00
Estimated total per quarter (approximately 3 months).....	\$552.00

STUDENT CONDUCT

It is expected that all California State Polytechnic College students are enrolled for serious educational pursuits and that they will conduct themselves so as to preserve an appropriate atmosphere of learning. It is also expected that all students who enroll at the College are willing 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 those whose conduct is inimical to the aims of an institution of higher education.

Student Discipline Procedure

If the conduct or behavior of a student reaches a point where he is in violation of local, state, or federal laws or college regulations, he is referred to the office of the Dean of Students. An investigation of the facts surrounding the situation is made. The student in question will be given an oral or written report on the facts to which each witness testifies. The student is confronted with the evidence against him. He is given an opportunity to state his case with reasons for his action and to present his own defense against the charges. He may question the evidence directly and produce either oral testimony or written affidavits of witnesses in his behalf. After hearing the case, the Dean of Students, or his designated representative, may take one of the following actions: (1) dismiss the case, (2) give the student an official warning, (3) process a formal probation, suspension, or expulsion action according to provisions of the California Administrative Code, Title 5, Sections 41302 and 41303, or 41304.

The period for which the student may be placed on probation or suspended shall not exceed 12 months, except that suspensions pursuant to Section 41404 of the California Administrative Code, Title 5, may exceed one year. No fees paid by or for such student for the quarter or term in which he is suspended shall be refunded. If the student is readmitted before the close of the quarter or term in which he is suspended, no additional fees shall be required of the student on account of his suspension.

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

† Beginning engineering and architecture students should be prepared to pay up to \$100 in their first quarter.

Causes for Disciplinary Action

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

- 1) Disorderly, unethical, vicious, or immoral conduct.
- 2) Misuse, abuse, theft 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: disruption of college activities through force or violence or the threat of force or violence; the bringing or drinking of alcoholic beverages on campus; being intoxicated on campus; being arrested for cause by a public law enforcement agency; possession or use on campus of unauthorized firearms, ammunition, fireworks, or explosives; possession, use, or selling of illicit drugs; 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. A student may be suspended, dismissed or otherwise disciplined if he is found to have disrupted or to have attempted to disrupt, by force or violence, or by the threat of force or violence any part of the College's instructional program, or any meeting, recruiting interview or other activity authorized to be held or conducted at the College. 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 not participate on intercollegiate teams nor may they hold positions of leadership in student organizations or student government groups. This includes but is not limited to such groups as: athletic teams, debate teams, drama casts, judging teams, drill teams, Model U.N. delegation, rifle team, ASI councils, boards and committees. Such students may not hold an office in a student organization nor may they be editors, managers, or hold similar positions on student publications.



Students Herding Beef Cattle on the College Ranch

THE SCHOOL OF AGRICULTURE

CHART OF RECOMMENDED JUNIOR COLLEGE PREPARATION FOR AGRICULTURE MAJOR CURRICULA

Approximate units		CAL POLY AGRICULTURE MAJORS REQUIRING VARIOUS COURSES ¹													
		Qtr.	Sem.	Ag. Bus. Mgmt.	Ag. Engr.	Animal Husb.	Crops & Fruit	Dairy	Farm Mgmt.	Food Proc.	Mech. Ag.	Nat. Res. Mgmt.	Orn. Hort.	Poultry	Soil Sci.
Recommended J.C. Preparation in Terms of Cal Poly Courses															
<i>Biological Sciences</i>															
	Bio 110, Applied Biology.....	3	2		X									X	X
	Bot 121, General Botany.....	4	3			X								X	X
	Ent 126, Entomology.....	4	3			X								X	X
	Zoo 131, General Zoology.....	4	3			X								X	X
	Zoo 132, General Zoology.....	4	3			X								X	X
	Bact 221, Bacteriology.....	4	3						X						
	Life Science.....	7	5		X										
<i>Physical Sciences</i>															
	Phys 104, Introductory Physics.....	4	3												
	Phys 121-5-3, Physics.....	12	8												
	Phys 131-5-3, Physics for Engrs.....	12	8		X										
	Chem 121-2, 226, Inorganic & Organic.....	12	8		X										
	Chem 121-2, Inorganic.....	8	5		X										
<i>Mathematics</i>															
	Math 100-200, Basic Math.....	6	4												
	Math 102-3, Ag. Math, or 113-14.....	6	4		X										
	Math 113-14, Algebra & Trig.....	6	4												
	Math 117-141, Anal. Geo. & Calc.....	9	6		X										
<i>Agriculture & Supporting Courses</i>															
	AE 121-2, Ag. Mechanics.....	4	3		X										
	AE 142, Ag. Power & Machinery.....	4	3		X										
	SS 121, Soils.....	4	4		X										
	Ec 201 or 211, Economics.....	3	2		X										
	Actg 131-3, Basic Accounting.....	6	4		X										
	Ag Major or Related Courses.....	18	12		X										
Subtotals (Semester Units).....					41	44	44	41	42	39	43	41	45	44	41
General Education Courses ²					29	26	26	29	28	31	27	29	25	26	29
Maximum Transfer Units.....		105	70		70	70	70	70	70	70	70	70	70	70	70

¹ The prospective transfer student should consult the curriculum requirements specified in this catalog for his particular major, including possible options and concentrations.

² Recommended courses include English, American History, American Government, Psychology, Speech, Literature, Physical Education and Health, etc.

THE SCHOOL OF AGRICULTURE

J. Cordner Gibson, Dean
John W. West, Associate Dean

The School of Agriculture of the College prepares students in the field of agriculture with the main objective of giving them a full and broad understanding of basic factors involved in production, management, processing, distribution, marketing, sales and services in the fields of related business, to make efficient operators and managers. While the school stresses production techniques and basic management to benefit to the fullest extent those returning to the farm or entering employment in agricultural fields upon leaving college, it also requires a core of basic sciences related to the production courses of the major and a substantial block of general education subjects necessary to prepare the student to take his rightful place in a democratic society.

This preparation also provides the sound basis necessary for the student desiring to become a teacher of agriculture in California's secondary schools.

Curricula in the School of Agriculture are arranged so that a student receives a maximum of production courses in his major field early in the program. This means that even if a student terminates his formal education at any time prior to his graduation, he has acquired a background of fundamentals which makes him immediately employable in the occupational field of his choice. This system of taking production courses early in the curriculum makes it possible for the student to determine in a short time whether or not he is fitted for the curriculum he has selected. In addition, the early acquisition by the student of practical "doing" types of activities provides him with the incentive to learn the basic scientific explanations.

The School of Agriculture uses the California State Polytechnic College Foundation program of student projects to provide additional experience and practice to supplement regular production courses. This practical experience leads to the understanding of production and managerial problems that are important in the overall training of a student in agriculture.

Admission to the School of Agriculture requires high school graduation, with appropriate test scores and grades, but does not require a specific pattern of courses taken in high school. However, a student who anticipates enrolling in the School of Agriculture will find a strong background in mathematics and physical and biological sciences advantageous.

Curricula are offered in the following majors in the School of Agriculture: agricultural business management, agricultural engineering, animal husbandry, crops production, dairy, farm management, food processing, fruit production, mechanized agriculture, natural resources management, ornamental horticulture, poultry industry, and soil sciences.

The Agricultural Education Department provides an additional program of courses required of prospective secondary agriculture teachers.

The Veterinary Science Department offers courses which support the animal production majors.

The courses offered in each agricultural curriculum may be grouped into four areas as follows:

1. Major agriculture—The required sequence of courses offered by the department in which the student expects to graduate. These courses constitute the core instruction leading to specific preparation for the production field of the student's choice.
2. Related agriculture—Supporting courses in agriculture selected from closely allied fields. They supplement the major agriculture block in (1).
3. Science and mathematics—Courses selected from scientific fields which provide basic biological, physical and social science, and mathematical background and support to the agricultural block in (1) and (2) above.
4. Humanistic-social—Courses which provide cultural background for intelligent living in a complex world society.

Agriculture

MASTER OF SCIENCE IN AGRICULTURE

The School of Agriculture offers a program of graduate study leading to the degree of Master of Science in Agriculture. This broadly-based program is designed to develop professional competencies for positions in agriculture and related industries, business, and government work which now require levels of preparation beyond the baccalaureate degree. Concentrations are currently available in the areas of International Agriculture and Soil Conservation.

CURRICULUM FOR THE MASTER OF SCIENCE IN AGRICULTURE DEGREE WITH A CONCENTRATION IN INTERNATIONAL AGRICULTURE

(For complete requirements see the *Graduate Study Bulletin*)

A. Courses in the area of concentration:		<i>Units</i>
ABM 515	International Agricultural Marketing	3
ABM 516	Communication for Change in Developing Countries.....	3
FM 520	World Agricultural Development	3
Courses at the 500 level selected from the following in at least 6 units:		6
AE 520	Special Problems and Topics (1-3)	
AH 580	Graduate Seminar in Animal Nutrition (3)	
AgEd 522	Group Study in Agricultural Mechanics (3)	
VS 522	Seminar in Foreign Livestock Disease Problems. (2)	
581 series	Graduate Seminar in Agriculture (3)	
Courses in agriculture to be chosen from the 300 level or above.....		9 24
B. Courses outside the area of concentration:		
AgEd 580	Special Problems in Agricultural Education.....	3
SocSc 590	Seminar in Social Sciences	3
Courses selected from the following:		
Geography, Political Science and History of one selected world regional area (Latin America, Africa south of the Sahara, North Africa and the Middle East, or Asia and the Far East), 300 or 400 level courses as approved by the student's graduate committee. (The student must demonstrate competence in a language in com- mon usage in his declared region of world study interest.).....		
		9 15
C. Electives from 300, 400, and 500 level courses		6
		45

CURRICULUM FOR THE MASTER OF SCIENCE IN AGRICULTURE DEGREE WITH A CONCENTRATION IN SOIL CONSERVATION

(For complete requirements see the *Graduate Study Bulletin*)

A. Courses in the area of concentration:		<i>Units</i>
NRM 502	Resource Conservation	3
SS 508	Conservation Legislation	3
SS 521	Soil Morphology	3
SS 581	Graduate Seminar in Soils	3
SS 582	Graduate Seminar in Land Management	3
SS 599	Thesis or Internship	9
		24
B. Courses other than in the area of concentration:		
Courses to be selected from the 300-400-500 series outside the area of concentration and approved by the student's graduate committee. At least 6 units must be in 500 level courses.....		
		15
C. Electives from 300, 400, and 500 level courses		6
		45

TECHNICAL CURRICULA IN AGRICULTURE

In keeping with the collegewide policy of offering major courses which lead to occupational competency from the beginning of the first year of the four-year sequence, it is essential to provide opportunity for students who may find it impossible to complete four-year programs; to obtain as early as possible a concentration of production courses with a minimum of supporting material.

A technical two-year curriculum is available in each of the following agriculture areas: agricultural business management, mechanized agriculture, animal husbandry, dairy husbandry and manufacturing, farm management, crops production, fruit production, food processing, ornamental horticulture, poultry industry, and soil science. These curricula include a smaller number of units of related and general education courses than are included in the degree programs. This permits the student to acquire the basic fundamentals in the major of his selection and a greater freedom of choice of subjects in agricultural production courses. A student not wishing to enroll in a degree curriculum will find that a two-year curriculum offers a maximum opportunity to select courses which will greatly assist him in agriculture after graduation. For admission requirements see "Requirements for Admission as an Undergraduate Student."

Upon completion of 98 selected units, a student may receive a technical certificate in the field of his major.

A student enrolled in the technical program will not be allowed to enroll for credit in any 300 or 400 series courses except when prior approval has been obtained by petition for special consideration.

The following is the two-year technical curriculum for animal husbandry. Other majors follow a similar pattern. Detailed curriculum information is available from the Dean of the School of Agriculture and department heads.

Freshman	F	W	S
Feeds and Feeding (AH 101)	4		
Market Beef Production (AH 121)	4		
Elements of Swine Production (AH 122)		4	
Elements of Sheep Production (AH 123)			4
Agricultural Mechanics (AE 121, 122)		2	2
* Applied English Composition (Eng 100)	3		
Agricultural Math (Math 102)		3	
Physical Education (PE 141)	½	½	½
* Agricultural Biology (Bio 100)		3	
Soils (SS 121)			4
Electives	5	4	6
	16½	16½	16½

* These courses are taken in place of the required courses in the same subject matter fields listed in the degree curricula in the first two years and may not be used as credit toward a degree. VS 100 is replaced by CP 100 for plant majors.

All two-year technical students are required to take Math 102. Students in Mechanized Agriculture are required to take Math 102 and 103.

Agriculture

Sophomore	F	W	S
Sheep Husbandry (AH 221).....	4		
Commercial Beef Production (AH 222).....		4	
Swine Management (AH 223).....			4
Agricultural Power and Machinery Management (AE 142)....	4		
* Prin. of Livestock Hygiene and Sanitation (VS 100).....		5	
Forage Crops (CP 123).....			4
* Farm Records and Farm Mgt. Practice (FM 102)	4		
Health Education (PE 107).....			2
Sports Education (PE 241).....	½	½	½
* U.S. Hist. and Government (Pol Sc 100).....		3	
Farm Management or ABM Elective.....	3		
Electives	1	4	5
	16½	16½	15½

A student enrolled in the technical program may not transfer to a degree program except by following the approved college procedure for such transfers.

HORSESHOEING

The Animal Husbandry Department offers a 12-week course in horseshoeing in the fall and spring quarters.

AGRICULTURAL ENTERPRISE PROJECT FACILITIES

The entire farm with its equipment, buildings, and livestock is available to students for their use in conducting a wide variety of agricultural enterprise projects.

The college foundation has some of the best breeding flocks and herds of livestock in the State. Many show champions have come from the beef herd, which includes Herefords, Angus, and Shorthorns, offsprings of which are sold to the students. All necessary equipment for beef cattle production—barns, dehorning and loading chutes, corrals, stock horses, etc., is available.

The college foundation swine herd consists of three major breeds—Poland Chinas, Yorkshires, and Hampshires. The facilities include a 12-unit farrowing house and outside lots and pastures for the brood sows. In addition there are 20 feeder units for student projects having a capacity of approximately 20 market hogs per unit. Student projects market between 700 and 800 fat market hogs each year.

The foundation breeding flock of sheep is made up of four breeds—Hampshire, Suffolk, Corriedale, Southdown. From 20 to 40 breeding ewes are maintained in each of the breeds, giving the students an opportunity of carrying on typical purebred breeding operations. There are student project facilities for approximately 400 to 500 market lambs that are fed for market each year. Students also have the opportunity of learning shearing and care of wool as well as lamb production.

The dairy herd includes purebred Jerseys, Guernseys, and Holsteins. Equipment includes all the necessary facilities for feeding and milking, care of calves and bulls, artificial insemination, milk testing, bottling, separating, and creamery operations. Students conducting dairy projects carry out their operations on a separate part of the college farm.

* These courses are taken in place of the required courses in the same subject matter fields listed in the degree curricula in the first two years and may not be used as credit toward a degree. VS 100 is replaced by CP 100 for plant majors.

All two-year technical students are required to take Math 102. Students in Mechanized Agriculture are required to take Math 102 and 103.

The poultry flock consists of between 3,500 and 4,000 birds. The equipment includes a modern incubator, egg-handling facilities, brooders and brooder houses, pens for trap-nesting and pedigree work, and related devices. A student assistant and the students themselves care for every operation under the supervision of the department head.

The Ornamental Horticultural Department occupies a unit consisting of four greenhouses and three lath houses together with a sales unit and two large labs used for nursery instruction. Student projects are operated in all phases of nursery work. Equipment includes all of the essential machinery necessary for operation of a modern unit.

The Crops Department is well equipped with all types of machinery found on mechanized farms in California. All of the farming operations are carried on by students under the supervision of the Crops and Farm Departments through project class work or paid student labor. Orchards, vineyards, crop land, fruit and vegetable packing facilities and marketing outlets are available for instructional purposes.

The Agricultural Engineering Department operating and servicing all of the mechanized equipment at the college has many opportunities for students to learn practical farm machinery maintenance and repair. The major part of the maintenance work is handled by students under faculty supervision.

AGRICULTURAL EDUCATION DEPARTMENT

Department Head, H. H. Burlingham

Osmund S. Gilbertson

Delbert Shirley

The primary function of the Agricultural Education Department is to provide for the preparation of teachers of agriculture for the public secondary schools of California. Specialized pre-professional and professional courses are offered for undergraduate and graduate students. The basic technological, scientific, and broad general education course work for agriculture teaching candidates is offered throughout the School of Agriculture and other schools of the college.

Undergraduate students interested in preparing to become teachers of agriculture must enroll in an agriculture major and obtain a B.S. degree in agriculture. The undergraduate major may be selected in any of the agricultural science, production or management fields. Graduate students will enroll as majors in agricultural education.

Undergraduate agriculture teacher candidates will need to use judiciously the elective time available in the major curriculum to complete courses additionally required for the teaching credential which are not normally specified in the undergraduate major. A teaching minor in a single academic subject must be selected from those available at the college. Course work toward the minor should be started in the first or second year in order to incorporate these courses in the total curriculum of the student. Information on available minors may be obtained from the Agricultural Education office. Undergraduate students preparing for the teaching of agriculture will be advised primarily by an adviser in the selected agriculture major. They may pursue a program in agricultural education with the assistance and approval of their major department adviser in course planning and scheduling. Curriculum sheets showing such programs for each of the majors are available from department advisers and the Agricultural Education Office.

Guidance in course selection to meet teaching credential requirements in agricultural education is available through advisers in the Agricultural Education Office.

Candidates for the Standard Teaching Credential with a Specialization in Secondary Teaching will apply for admission to the teacher education program in agriculture according to the procedures outlined under the section **ADMISSION TO CANDIDACY FOR TEACHING CREDENTIALS** of this catalog.

Information relative to the purposes, requirements, and procedures for the Master of Arts Degree in Education with a concentration in Agriculture may be found under the heading **MASTER'S DEGREES** in this catalog.

See **COURSES OF INSTRUCTION** section of this catalog for description of courses in Agricultural Education and other subjects.

AGRICULTURAL ENGINEERING DEPARTMENT

Department Head, Lloyd H. Lamouria

James Bermann
Edgar J. Carnegie
Vaclav Cervinka
Frank G. Coyes
John E. Dunn

Robin R. Grinnell
William M. Kirkpatrick
Willard H. Loper
Robert M. Matheny
John L. Merriam

Clive O. Remund
Glenn W. Salo
James P. Webster
Gerald L. Westesen
James B. Zetzsche, Jr.

A student in this department may choose one of two majors.

Agricultural Engineering. This major prepares students for engineering positions with farm machinery and equipment companies, manufacturers and distributors of irrigation equipment, government agencies such as the Soil Conservation Service and other positions requiring technical training in Agricultural Engineering.

Concentration of study will be directed either toward Power and Machinery or Soil and Water.

Mechanized Agriculture. This major gives the student broad agricultural training with emphasis on the applied mechanical phases of agriculture. This curriculum is intended for the student who plans to own or manage a farm, teach vocational agriculture with emphasis on farm mechanics, or do sales and service work (manufacturing, wholesale or retail) in the farm machinery and equipment field.

This department also gives training in the mechanical and engineering phases of agriculture to students majoring in other departments of the School of Agriculture.

Two buildings containing eight shops and laboratories and two classrooms, together with a large modern farm machinery and equipment building provide excellent facilities. A wide variety of makes, models, and types of tractors and farm machinery is available for class use and students are provided with ample opportunity for the application of mechanical and engineering know-how to practical production problems in using thousands of acres of college farm as a laboratory.

The curriculum in agricultural engineering is recognized as a professional curriculum by the American Society of Agricultural Engineers. The student branch of the ASAE offers an active program of professional and extra-curricular events. Enterprise project activity is also available and encouraged.

Students interested in the two-year technical certificate in Mechanized Agriculture should refer to the introductory statement for the School of Agriculture which describes this program. Detailed curriculum information is available from the department head.

CURRICULAR CONCENTRATIONS

Power and Machinery

A combination of engineering and agricultural courses designed to provide graduates with a technical and practical background for employment in the agricultural-utility power and equipment field. Opportunities are available in such diverse areas as prime movers, soil conditioning and moving equipment, utility equipment, harvesting and product handling equipment, as well as agricultural structures and products processing.

Soil and Water

A combination of engineering and agricultural courses designed to provide graduates with a technical and practical background for employment in the field of soil and water. Water management opportunities are available in such areas as irrigation, drainage, hydrology, flood control, research, and administration.

Agricultural Engineering

CURRICULUM IN AGRICULTURAL ENGINEERING

Freshman	F	W	S
Introduction to Agricultural Engineering (AE 100).....	1		
Agricultural Mechanics (AE 128).....		2	
Agricultural Power and Machinery Management (AE 142)....			4
Analytic Geometry and Calculus (Math 141, 142, 143).....	4	4	4
Freshman Composition (Eng 104, 105).....	3	3	
Engineering Drafting (ET 141, 142, 246).....	2	2	2
Manufacturing Processes (MP 151, 141, 142).....	1	1	1
Manufacturing Processes (WM 141, 142).....	1	1	
Plant production elective	4		
Soils (SS 121).....			4
Engineering Surveying (AE 237).....			2
Health Education (PE 107).....		2	
Physical Education (PE 141).....	½	½	½
† Electives		2	
	<hr/>	<hr/>	<hr/>
	16½	17½	17½
Sophomore			
Agricultural Power Transmission (AE 234).....	3		
Agricultural Power (AE 235).....		3	
Principles of Irrigation (AE 236).....	4		
Engineering Surveying (AE 238).....	2		
Applied Biology (Bio 110).....			3
Analytic Geometry and Calculus (Math 241).....	4		
Differential Equations (Math 242).....		4	
General Physics (Phys 131, 132, 133).....	4	4	4
Engineering Mechanics (ME 211, 212).....		3	3
Public Speaking (Sp 201).....			2
Soil Conservation (SS 202).....		3	
Report Writing (Eng 218).....			3
Economics (Ec 201 or 211).....			3
Sports Education (PE 241).....	½	½	½
	<hr/>	<hr/>	<hr/>
	17½	17½	18½
Junior			
Hydraulics (AE 312).....	4		
Dynamic Measurement (AE 338).....		3	
Principles of Agricultural Machinery (AE 322).....		3	
Principles of Agricultural Electrification (AE 324).....	3		
Agricultural Electric Power and Controls (AE 325).....			3
Agricultural Building Planning (AE 332).....			3
Engineering Properties of Agricultural Materials (AE 333)....			3
American Government (Pol Sc 301).....			3
Strength of Materials (Aero 207).....	5		
General Inorganic Chemistry (Chem 121, 122).....		4	4
* Humanities elective		3	
† Electives	6	6	
	<hr/>	<hr/>	<hr/>
	18	19	16

* To be selected in accordance with the General Education requirement.

† At least 19 units shall be selected with the approval of the adviser. An additional 8 units must be selected from courses in the School of Agriculture.

Agricultural Engineering

Senior	F	W	S
Agricultural Structures Design (AE 433).....	3		
Senior Project (AE 461, 462).....	2	2	
Undergraduate Seminar (AE 463).....			2
Animal Production elective.....	4		
Growth of American Democracy (Hist 304).....		3	
U.S. in World Affairs (Hist 305).....			3
* Literature or Philosophy.....	3	3	3
* Social Science elective (other than history).....			3
† Electives.....	6	9	6
	<hr/>	<hr/>	<hr/>
	18	17	17

CURRICULUM IN MECHANIZED AGRICULTURE

Freshman			
Introduction to Agricultural Engineering (AE 100).....	1		
Agricultural Mechanics (AE 128).....		2	
Agricultural Tractors and Equipment (AE 141).....	2		
Agricultural Power and Machinery Management (AE 142).....			4
Agricultural Mathematics (Math 113).....	3		
College Algebra for Agriculture (Math 114).....		3	
Trigonometry for Agriculture (Math 115).....			3
Freshman Composition (Eng 104, 105).....	3	3	
Health Education (PE 107).....	2		
Engineering Drafting (ET 151).....			2
Manufacturing Processes (MP 151, 141, 142).....	1	1	1
Manufacturing Processes (WM 141, 142).....		1	1
Fundamentals of Metallic Arc Welding (WM 155).....			1
Plant production elective.....	4		
Soils (SS 121).....		4	
Animal production elective.....			4
Physical Education (PE 141).....	½	½	½
†† Electives.....		3	
	<hr/>	<hr/>	<hr/>
	16½	17½	16½
Sophomore			
Agricultural Building Construction (AE 231).....	3		
Agricultural Power Transmission (AE 234).....	3		
Agricultural Power (AE 235).....		3	
Engineering Surveying (AE 237, 238).....		2	2
College Physics (Phys 121, 122, 123).....	4	4	4
General Botany (Bot 121).....		4	
* Humanities elective.....	3		
Public Speaking (Sp 201).....			2
Sports Education (PE 241).....	½	½	½
†† Electives.....	4	4	8
	<hr/>	<hr/>	<hr/>
	17½	17½	16½

* To be selected in accordance with the General Education requirement.

† At least 19 units shall be selected with the approval of the adviser. An additional 8 units must be selected from courses in the School of Agriculture.

†† At least 25 units shall be selected with the approval of the adviser. An additional 8 units must be selected from courses in the School of Agriculture.

Agricultural Engineering

Junior	F	W	S
Agricultural Equipment Projects (AE 344).....		3	
Agricultural Products Handling (AE 323).....			3
Agricultural Building Planning (AE 332).....			3
Principles of Agricultural Machinery (AE 322).....		3	
Irrigation (AE 340).....	4		
General Inorganic Chemistry (Chem 121, 122).....	4	4	
General Psychology (Psy 202).....		3	
Report Writing (Eng 218).....			3
Business Law Survey (Bus 301).....			3
Economics (Ec 201 or 211).....	3		
Farm Records (FM 321).....	3		
†† Electives	2	3	4
	16	16	16
Senior			
Agricultural Equipment Industry Management (AE 321).....		4	
Principles of Agricultural Electrification (AE 324).....	3		
Agricultural Electric Power and Controls (AE 325).....			3
Senior Project (AE 461, 462).....	2	2	
Undergraduate Seminar (AE 463).....			2
American Government (Pol Sc 301).....	3		
Growth of American Democracy (Hist 304).....		3	
U.S. in World Affairs (Hist 305).....			3
* Literature or philosophy.....	3	3	
†† Electives	5	4	8
	16	16	16

See COURSES OF INSTRUCTION section of this catalog for descriptions of courses in Agricultural Engineering and other subjects.

* To be selected in accordance with the General Education requirement.

†† At least 25 units shall be selected with the approval of the adviser. An additional 8 units must be selected from courses in the School of Agriculture.

AGRICULTURAL MANAGEMENT DEPARTMENT

Department Head, Chase C. Wilson

Alfred W. Amaral
Daniel C. Chase
Gaylord J. Chizek
Arthur C. Duarte

Warren S. Farrell
George J. Gomes
Edgar A. Hyer
Harold D. Morris

John A. Rogalla
Jack F. Scott
Duane O. Seaberg

Two major curricula are offered by the Agricultural Management Department and are designed to prepare students for careers in agricultural business management or farm management.

Graduates in both the Agricultural Business Management and Farm Management majors have entered the fields of vocational agriculture teaching and agricultural extension service as well as government employment and agricultural industry.

Both majors are based upon a firm foundation in production agriculture as a basis for sound management preparation. Each program combines the agricultural and business training required for success in farm-related business careers or in farm management careers. The modern farmer is primarily a specialist who confines his operations largely to the production and management of crops and livestock. He depends upon farm-related businesses for increasing amounts of fertilizer, insecticides, machinery and equipment, commercial feeds, capital, and production supplies.

These two majors provide a large number of elective units so that a student may select a specific area of study to obtain either a broad background in agriculture or technical skills in specialized agricultural fields according to his interest and needs.

Interwoven throughout the curricula are general education courses in English, Economics, History, Mathematics, and Political Science which provide the basis for better citizenship and understanding of society.

AGRICULTURAL BUSINESS MANAGEMENT MAJOR

The Agricultural Business Management major prepares students for the many farm-related agricultural businesses and government agencies serving the farmer. Farm-related business functions involving agricultural products provide excellent career opportunities for those who are prepared in the business principles and procedures necessary for organizing, managing and representing the expanding farm-related businesses and industry.

FARM MANAGEMENT MAJOR

The Farm Management major prepares the student to operate and manage a farm or ranch. While the management of a farm should be the primary purpose of most students taking the curriculum, students also may plan to engage in allied work such as farm credit and farm appraisal or in management positions with agricultural enterprises.

CURRICULUM IN AGRICULTURAL BUSINESS MANAGEMENT

Freshman	F	W	S
Introduction to Agricultural Business Mgt. (ABM 101).....	3		
Agricultural Marketing Programs in California (ABM 102)....		3	
Agricultural Business Organization (ABM 103).....			3
Agricultural Mathematics (Math 102, 103 or 113, 114).....		3	3
Agricultural Mechanics (AE 121)	2		
Freshman Composition (Eng 104, 105, 106)	3	3	3
Physical Education (PE 141).....	½	½	½
Health Education (PE 107).....			2
* Life Science	4		
** Electives	4	7	5
	16½	16½	16½

* To be selected in accordance with the General Education requirement.

** At least 36 units shall be chosen with the approval of the adviser from other fields of agriculture. Twelve of the 36 units must be in a single agriculture major.

Agricultural Management

Sophomore	F	W	S
Agricultural Business Sales and Service (ABM 201).....	3		
Agricultural Cooperative Organization and Management (ABM 202).....		3	
Agricultural Business Credit and Finance (ABM 203).....			3
Agricultural Business Machines Practice (ABM 241).....		1	
Principles of Accounting (Actg 221, 222)	4	4	
Principles of Economics (Ec 211)	3		
Agricultural Marketing (FM 304).....		3	
* Humanities elective	3		
Public Speaking (Sp 201)	2		
Report Writing (Eng 218)			3
Sports Education (PE 241).....	½	½	½
* Life Science.....			4
Elementary Probability and Statistics (Stat 211)		3	
Statistical Methods (Stat 212)			3
** Electives		3	3
	15½	17½	16½
Junior			
Agricultural Business Management and Government Policy (ABM 301).....	3		
Agricultural Business Sales Management (ABM 302).....		3	
Agricultural Property Management and Sales (ABM 321).....	4		
Advanced Agricultural Business Management (ABM 322, 323) General Psychology (Psy 202).....		4	4
Advanced Public Speaking (Sp 202)		3	
General Inorganic Chemistry (Chem 121, 122)	4	4	
Organic Chemistry (Chem 226).....			4
American Government (Pol Sc 301).....	3		
** Electives	3	3	6
	17	17	16
Senior			
Agricultural Labor Relations and Personnel Management (ABM 403).....			3
Agricultural Business Operations Analysis (ABM 421).....	4		
Wholesaling and Retailing Agricultural Commodities (ABM 412)		3	
Agricultural Business Communication (ABM 402).....		3	
Senior Project (ABM 461, 462).....	2	2	
Undergraduate Seminar (ABM 463).....			2
* Literature or Philosophy		3	3
Business Law Survey (Bus 301).....	3		
Growth of American Democracy (Hist 304).....	3		
U.S. in World Affairs (Hist 305).....			3
** Electives	5	5	5
	17	16	16

* To be selected in accordance with the General Education requirement.

** At least 36 units shall be chosen with the approval of the adviser from other fields of agriculture. Twelve of the 36 units must be in a single agriculture major.

Agricultural Management

CURRICULUM IN FARM MANAGEMENT

	F	W	S
Freshman			
Introduction to Farm Management (FM 104, 105, 106).....	1	1	1
Agricultural Mechanics (AE 121)	2		
Agricultural Mathematics (Math 113, 114).....		3	3
Freshman Composition (Eng 104, 105).....	3	3	
Public Speaking (Sp 201).....			2
Physical Education (PE 141).....	½	½	½
Health Education (PE 107).....			2
**Life Science	4	4	
* Electives	6	5	8
	<hr/>	<hr/>	<hr/>
	16½	16½	16½
Sophomore			
Agricultural Economic Analysis (FM 203).....			3
Agricultural Marketing (FM 304).....			3
Agricultural Resources (FM 305).....		3	
Farm Records (FM 321).....	3		
Soils (SS 121).....	4		
Soils Management (SS 122).....		4	
Principles of Economics (Ec 211, 212)	3	3	
*Literature, Philosophy	3		3
Report Writing (Eng 218)			3
Principles of Accounting (Actg 221, 222)	4	4	
Sports Education (PE 241).....	½	½	½
* Electives		2	3
	<hr/>	<hr/>	<hr/>
	17½	16½	15½
Junior			
Farm Credit (FM 310).....			3
Principles of Farm Management (FM 322).....	4		
California Agriculture (FM 325)		3	
Farm Appraisal (FM 326).....			3
Agricultural Price Analysis (FM 333)			3
Crop Management Problems (FM 421).....			3
General Psychology (Psy 202).....		3	
General Inorganic Chemistry (Chem 121, 122)	4	4	
Organic Chemistry (Chem 226)			4
Elementary Probability and Statistics (Stat 211).....	3		
Statistical Methods (Stat 212)		3	
Business Law Survey (Bus 301).....	3		
* Electives	3	4	
	<hr/>	<hr/>	<hr/>
	17	17	16
Senior			
Agricultural Prices and Policy (FM 403)		3	
Linear Programming in Agriculture (FM 405)		3	
Farm Management Problems (FM 424, or FM 425, or FM 426).....	3		
Large Farm Accounting (FM 431).....	3		
Senior Project (FM 461, 462).....	2	2	
Undergraduate Seminar (FM 463).....			2
** Humanities elective			3
American Government (Pol Sc 301).....	3		
Growth of American Democracy (Hist 304).....		3	
U.S. in World Affairs (Hist 305).....			3
* Electives	6	5	8
	<hr/>	<hr/>	<hr/>
	17	16	16

See COURSES OF INSTRUCTION section of this catalog for descriptions of courses in Agricultural Business Management, Farm Management and other subjects.

* At least 40 units shall be chosen with the approval of the adviser from other fields of Agriculture.

** To be selected in accordance with the General Education requirement.

ANIMAL HUSBANDRY DEPARTMENT

Department Head, Richard F. Johnson

Russell K. Anderson	Frank W. Fox, Jr.	Robert D. Hooks
Richard J. Birkett	William R. Gibford	James W. Jacobs
Emmett A. Bloom	Robert E. Hadley	Gregg H. Macy
L. LaVerne Bucy	Michael C. Hall	John V. Stechman
James R. Flanagan	Robert M. Harris	Robert R. Wheeler

The objective of the Animal Husbandry Department is to educate men for the occupation of farming where beef cattle, sheep, and swine enterprises are an important part of the industry. The majority of graduates from the department are engaged in the livestock and farming business or are employed as ranch foremen or managers.

Livestock feeding yards, feed mills, stockyard companies, meat packers, commission firms, and other organizations servicing the livestock industry are sources of employment for graduates. Other employment fields include agricultural teaching, agricultural extension work, and agricultural research.

Further aims and objectives of the Animal Husbandry Department are to give students practical training in livestock farming and range management. The department maintains herds of three breeds of beef cattle, four breeds of sheep, three breeds of swine, and Thoroughbred and Quarter horses. These are used for laboratory and field study of management, feeding, breeding, and marketing.

Students are encouraged to carry on a project program of feeding, management, and marketing livestock through facilities furnished by the California State Polytechnic College Foundation. Approximately 900 hogs, 400 beef cattle, and 800 sheep are fed and marketed by students each year. An abattoir provides facilities for training in slaughtering of meat animals and cutting, curing, and grading of meats. Students interested in the two-year technical certificates should refer to the introductory statement for the School of Agriculture which describes this program. Detailed curriculum information is available from the department head.

CURRICULUM IN ANIMAL HUSBANDRY

Freshman	F	W	S
Feeds and Feeding (AH 101).....	4		
Market Beef Production (AH 121).....		4	
Elements of Swine Production (AH 122).....	4		
Elements of Sheep Production (AH 123).....			4
Agricultural Mechanics (AE 121 or 122).....	2		
Freshman Composition (Eng 104, 105).....	3	3	
* Agricultural Mathematics (Math 113, 114).....	3	3	
Physical Education (PE 141).....	½	½	½
General Zoology (Zoo 131, 132).....		4	4
Health Education (PE 107).....			2
Public Speaking (Sp 201).....			2
Electives		2	4
	16½	16½	16½

* Math 102, 103 may be substituted for Math 113 with approval of adviser.

Animal Husbandry

	F	W	S
Sophomore			
† Animal Husbandry electives.....	4	3	
Agricultural Engineering electives (AE 131, 133, 138, 141, 142, 335)	2	2	
Anatomy and Physiology (VS 123).....		3	
Soil Science (SS 121).....			4
General Inorganic Chemistry (Chem 121, 122)	4	4	
Organic Chemistry (Chem 226).....			4
General Bacteriology (Bact 221).....	4		
Sports Education (PE 241).....	½	½	½
General Botany (Bot 121).....		4	
Forage Crops (CP 123).....			4
Electives	2		3
	<hr/>	<hr/>	<hr/>
	16½	16½	15½
Junior			
Applied Animal Nutrition (AH 302).....		3	
Livestock Hygiene and Sanitation (VS 202).....	3		
Animal Parasitology (VS 203).....		3	
† Animal Husbandry electives.....			4
American Government (Pol Sc 301).....	3		
General Psychology (Psy 202).....			3
Genetics (Bio 303).....		3	
Economics (Ec 201 or 211).....	3		
Farm Records (FM 321).....		3	
Farm Management (FM 322).....			4
Biochemistry (Chem 328).....			4
Approved Business course.....	3		
Electives	4	5	2
	<hr/>	<hr/>	<hr/>
	16	17	17
Senior			
Animal Breeding (AH 304).....		3	
Reproductive Physiology (AH 401).....	3		
Animal Nutrition (AH 402).....		4	
Senior Project (AH 461, 462).....	2	2	
Undergraduate Seminar (AH 463).....			2
* Literature, Philosophy	3	3	
* Humanities elective			3
U. S. World Affairs (Hist 305).....			3
Growth of American Democracy (Hist 304).....	3		
† Animal Husbandry electives.....			4
†† Management elective		3	
Electives	5	2	5
	<hr/>	<hr/>	<hr/>
	16	17	17

See COURSES OF INSTRUCTION section of this catalog for descriptions of courses in Animal Husbandry and other subjects.

* To be selected in accordance with the General Education requirement.

† Minimum of 15 units to be selected from 200-300 series courses in AH.

†† To be selected from any 300-400 series course in ABM or FM.

CROPS DEPARTMENT

Department Head, Corwin M. Johnson

H. Paul Fountain

James T. Hallett

James A. Klaustermeyer

Reynold H. Lonborg

Oscar E. Reece

Howard Rhoads

Frank P. Thrasher

William R. Troutner

Gordon Van DeVanter

Ralph M. Vorhies

Two major curricula are offered by the Crops Department and are designed to prepare students for field, fruit, or vegetable crops production.

Graduates in both the fruit production and crop production majors have entered the vocational agriculture teaching and agriculture extension service fields as well as governmental employment in agronomy, horticulture, agricultural instruction, and crop grading. Positions in private industry are increasing and the demand for graduates with a practical knowledge of agriculture skills and techniques combined with the sciences and humanities provides placement of crop graduates in positions of responsibility and opportunities.

The department has 30 acres of deciduous and citrus orchard and vineyard with 100 varieties represented. Additional non-bearing acreage is available for class use and new plantings are under way. About 170 acres are devoted to student production enterprises in vegetable crops and in field crops. With an additional 500 acres of college farm cropland also available, there is ample opportunity to gain experience through part-time employment or profitable production projects. All departmental majors are encouraged to carry a project.

The use of packing and grading equipment has greatly enhanced the technological phases of instruction. Field trips are extensively used to supplement instruction concerning crops not common to the San Luis Obispo area.

Students interested in the two-year technical certificate should refer to the School of Agriculture introductory statement. Details of the program are available through the department head.

CROP PRODUCTION MAJOR

A student majoring in the crop production major may elect to specialize in either agronomy or vegetable crops in his junior and senior year. The concentrations allow the student to select course work that is more specific to his major interests:

Agronomy Concentration

Placement opportunities include sales and service in weed, fertilizer, and pest control; production fieldmen; private or corporation crop production and management; and governmental employment in agronomy.

Vegetable Crop Concentration

This concentration is designed to prepare the student for employment as a vegetable crop fieldman and in vegetable shipping and processing. Private and corporate vegetable crops production is a major employment opportunity as is sales and service in weed and pest control.

FRUIT PRODUCTION MAJOR

The fruit production major qualifies graduates for orchard and vineyard management and for related employment such as cannery or packing house fieldmen or fruit inspectors. Deciduous fruits, nut crops, citrus, avocados, grapes, berries, and less common fruit species are studied.

Crops

CURRICULUM IN CROPS PRODUCTION

	F	W	S
Freshman			
Concepts of Crop Production (CP 131).....	4		
Combine Harvest Crops (CP 132).....		4	
Row Crops (CP 133).....			4
Agricultural Power and Machinery Management (AE 142).....	4		
Agricultural Mechanics (AE 121).....		2	
General Botany (Bot 121, 122).....	4	4	
General Entomology (Ent 126).....			4
Freshman Composition (Eng 104, 105).....		3	3
* Agricultural Mathematics (Math 102, 103, 114).....	3	3	3
Health Education (PE 107).....	2		
Physical Education (PE 141).....	½	½	½
Electives.....			3
	<hr/>	<hr/>	<hr/>
Sophomore	17½	16½	17½
Weed Control (CP 221).....	4		
Commercial Seed Production and Processing (CP 231).....		4	
Vegetable Crops Production (VC 232).....			4
Agricultural Surveying (AE 131).....	2		
General Inorganic Chemistry (Chem 121, 122).....	4	4	
Organic Chemistry (Chem 226).....			4
Soils (SS 121).....	4		
Soil Management (SS 122).....		4	
Fertilizers (SS 221).....			3
Public Speaking (Sp 201).....			2
General Psychology (Psy 202).....	3		
Economics (Ec 201 or 211).....		3	
Sports Education (PE 241).....	½	½	½
Electives.....			4
	<hr/>	<hr/>	<hr/>
Junior	17½	15½	17½
General Bacteriology (Bact 221).....	4		
Crop Technology (CP 322).....		4	
Farm Records (FM 321).....	3		
Principles of Farm Management (FM 322).....		4	
Biochemistry (Chem 328).....	4		
Irrigation (AE 340).....			4
Plant Pathology (Bot 323).....			4
American Government (Pol Sc 301).....	3		
Growth of American Democracy (Hist 304).....		3	
U.S. in World Affairs (Hist 305).....			3
*** Electives and courses to complete major.....	3	4	6
	<hr/>	<hr/>	<hr/>
Senior	17	15	17
Plant Breeding (CP 304).....			4
Senior Project (CP 461, 462).....	2	2	
Undergraduate Seminar (CP 463).....			2
Genetics (Bio 303).....	3		
†† Management Elective.....		3	
Principles of Pest Control (CP 311).....	4		
** Literature, Philosophy.....	3	3	
** Humanities elective.....			3
California Fruit Growing (FP 230).....		4	
*** Electives and courses to complete major.....	4	4	6
	<hr/>	<hr/>	<hr/>
	16	16	15

* Math 113 may be substituted for Math 102 and 103 with adviser approval.

** To be selected in accordance with the General Education requirement.

*** 18 of the elective units in the junior and senior years must be chosen with the approval of the adviser.

†† To be selected from any 300-400 series course in ABM or FM.

CURRICULUM IN FRUIT PRODUCTION

	F	W	S
Freshman			
Pomology (FP 131, 132, 133).....	4	4	4
*Agricultural Mathematics (Math 102, 103, 114).....	3	3	3
Agricultural Mechanics (AE 121).....	2		
Freshman Composition (Eng 104, 105).....	3	3	
Health Education (PE 107).....		2	
General Botany (Bot 121, 122).....	4	4	
General Entomology (Ent 126).....			4
Agricultural Power and Machinery Management (AE 142).....			4
Physical Education (PE 141).....	½	½	½
Electives			2
	<hr/>	<hr/>	<hr/>
	16½	16½	17½
Sophomore			
Viticulture (FP 231).....	4		
Fruit Plant Propagation (FP 232).....		4	
General Inorganic Chemistry (Chem 121, 122)	4	4	
Organic Chemistry (Chem 226)			4
Soils (SS 121).....	4		
Soil Management (SS 122).....		4	
Plant Pathology (Bot 323).....			4
Weed Control (CP 221).....			4
Public Speaking (Sp 201).....	2		
Agricultural Surveying (AE 131).....	2		
Economics (Ec 201 or 211)		3	
Sports Education (PE 241).....	½	½	½
Electives		2	4
	<hr/>	<hr/>	<hr/>
	16½	17½	16½
Junior			
Fruit Production (FP 331 or 332).....		4	
General Bacteriology (Bact 221).....		4	
Principles of Pest Control (CP 311).....	4		
Agricultural Code of California (CP 303)			3
Biochemistry (Chem 328).....		4	
Genetics (Bio 303).....	3		
Fertilizers (SS 221).....			3
Farm Records (FM 321).....	3		
Principles of Farm Management (FM 322).....			4
Irrigation (AE 340).....			4
General Psychology (Psy 202).....	3		
Electives	4	3	3
	<hr/>	<hr/>	<hr/>
	17	15	17

* Math 113 may be substituted for Math 102 and 103 with adviser approval.

Crops

Senior	F	W	S
Advanced Pomology (FP 421).....	3		
Plant Breeding (CP 304).....	4		
Senior Project (CP 461, 462).....	2	2	
Undergraduate Seminar (CP 463).....			2
Orchard Management (FP 436).....			4
General Field Crops (CP 230).....		4	
* Management Elective.....			3
American Government (Pol Sc 301).....	3		
Growth of American Democracy (Hist 304).....		3	
U.S. in World Affairs (Hist 305).....			3
†† Literature, Philosophy.....	3	3	
†† Humanities elective.....			3
Electives.....	1	4	1
	16	16	16

See COURSES OF INSTRUCTION section of this catalog for descriptions of courses in Crops Production, Fruit Production, Vegetable Crop Production, and other subjects.

* To be selected from any 300-400 series course in ABM or FM.

†† To be selected in accordance with the General Education requirement.

DAIRY DEPARTMENT

Department Head, Harmon B. Toone

Harry G. Markos

Carl F. Moy

Gary D. Reif

Herman E. Rickard

The dairy curriculum is designed to prepare students for employment in the various phases of the dairy industry, including husbandry and manufacturing, as well as the related and allied fields. The basic curriculum is arranged to serve all students within the major with further courses included in the two options of husbandry and manufacturing to provide depth of instruction in either field.

The curriculum provides adequate elective units under either option for students to select additional courses in the sciences, business, education, or other areas of their choice to prepare them for advanced degrees in the field, teaching, or the business world of the dairy industry. Recommendations in these various areas will be given by staff advisers.

Excellent facilities are provided for students selecting either of the options. The dairy herd includes purebred Jerseys, Guernseys, and Holsteins, located on a well-planned unit, where feeding, milking, calf raising, artificial insemination, and management are carried out. The college creamery is a new and modern plant, well equipped with the most modern processing equipment. Students are employed on a part-time basis to work in both the production and processing areas. A separate dairy located on campus provides an opportunity for students with dairy projects. This farm accommodates 80-100 head of project cattle owned and cared for by students. There are two 12-unit dormitories at this project farm.

CURRICULAR OPTIONS

Husbandry

The Dairy Husbandry Option emphasizes the preparation of students in production and management areas of the industry, including the selection, management, feeding and breeding of dairy cattle, and efficient, economical milk production.

Manufacturing

The Dairy Manufacturing Option emphasizes preparation for participation in the processing and distribution field, including sales, quality control, field work and dairy inspection.

CURRICULUM IN DAIRY

Freshman	F	W	S
Elements of Dairying (DH 121).....	4		
Dairy Feeds and Feeding (DH 101).....	2		
Feeding Dairy Cattle (DH 102).....		2	
Market Milk (DM 133).....			4
Freshman Composition (Eng 104, 105).....	3	3	
Agricultural Math (Math 102, 103 or 113, 114)		3	3
General Zoology (Zoo 131).....		4	
General Botany (Bot 121).....	4		
Health Education (PE 107).....			2
Physical Education (PE 141).....	½	½	½
Electives and courses to complete major.....	4	4	7
	17½	16½	16½

Dairy

	F	W	S
Sophomore			
Milk Production (DH 221).....	4		
Dairy Products Judging (DM 233).....			2
Economics (Ec 201 or 211).....		3	
Public Speaking (Sp 201).....			2
* Literature philosophy.....	3	3	
* Humanities elective.....			3
General Bacteriology (Bact 221).....	4		
General Psychology (Psy 202).....			3
Sports Education (PE 241).....	½	½	½
Electives and courses to complete major.....	6	10	6
	<u>17½</u>	<u>16½</u>	<u>16½</u>
Junior			
Dairy Inspection (DM 332).....		2	
Dairy Product Merchandising (DM 303).....			2
General Inorganic Chemistry (Chem 121, 122).....	4	4	
Organic Chemistry (Chem 226).....			4
Report Writing (Eng 218).....			3
American Government (Pol Sc 301).....	3		
Electives and courses to complete major.....	10	10	7
	<u>17</u>	<u>16</u>	<u>16</u>
Senior			
Senior Project (DH 461, 462).....	2	2	
Undergraduate Seminar (DH 463).....			2
Biochemistry (Chem 328).....	4		
Growth of American Democracy (Hist 304).....		3	
U. S. in World Affairs (Hist 305).....			3
† Management elective.....		3	
Electives and courses to complete major.....	10	8	11
	<u>16</u>	<u>16</u>	<u>16</u>

HUSBANDRY OPTION (ADD COURSES BELOW TO BASIC CURRICULUM)

Freshman		Junior	
DH 142 Dairy Cattle Judging..... (2)		DH 301 Advanced Dairy Cattle Feeding..... (2)	
SS 121 Soils..... (4)		DH 323 History of Dairy Breeds and Pedigrees..... (4)	
Sophomore		Bio 303 Genetics..... (3)	
DH 222 Commercial Dairy Herd Management..... (4)		FM 321 Farm Records..... (3)	
VS 123 Anatomy and Physiology (3)		Senior	
VS 202 Livestock Hygiene and Sanitation..... (3)		DH 422 Breed and Selection of Dairy Cattle..... (4)	
		AH 402 Animal Nutrition..... (4)	
		FM 322 Farm Management..... (4)	

MANUFACTURING OPTION (ADD COURSES BELOW TO BASIC CURRICULUM)

Freshman		Junior	
DH 132 Ice Cream Making..... (4)		DM 331 Condensed and Dry Milk (4)	
Sophomore		FM 304 Agricultural Marketing... (3)	
DM 232 Cheese Making..... (4)		Mgt 311 Industrial Management..... (3)	
DM 236 Butter Making..... (4)		Senior	
Bact 322 Dairy Bacteriology..... (4)		DM 431 Dairy Plant Management (4)	
		Actg 221 Principles of Accounting (4)	
		Actg 222 Principles of Accounting (4)	

See COURSES OF INSTRUCTION section of this catalog for descriptions of courses in Dairy Husbandry, Dairy Manufacturing and other subjects.

* To be selected in accordance with the General Education requirement.

† To be selected from 300-400 series courses in ABM or FM.

FOOD PROCESSING DEPARTMENT

Department Head, DeWitt F. Sampson

Earl J. Cosma
Thomas M. Lukes

Thomas O. Meyer
F. Raymond Steele

The Food Processing curriculum is designed to prepare students for employment in the various phases of the food processing and related industries. Instruction in the field qualifies students for careers in production, management and marketing operations of the industry. This curriculum does not prepare students for the specialized field of food technology and research.

The curriculum provides applied knowledge of the technology of the industry that will enable the graduate to accomplish doing and management jobs connected with operations of the industry from field to market. Skills acquired in the production aspects of the processing business are coordinated with studies in science, business, and humanities.

The departmental laboratories include complete facilities for small scale commercial production of canned, frozen, dehydrated and concentrated fruit and vegetable products. Meats laboratories provide for complete processing of meat including slaughtering, cutting, curing, smoking and sausage manufacture.

CURRICULAR OPTIONS

Management

The Management Option emphasizes preparation for participation in production and management aspects of the industry.

Meats

The Meats Option provides experience in meat packing and processing operations correlated with related science and business aspects of the industry.

CURRICULUM IN FOOD PROCESSING

	F	W	S
Freshman			
Survey of Food Industry (FI 101).....	2		
Food Processing Machinery (FI 122).....		3	
Elements of Food Preservation (FI 123).....			3
Freshman Composition (Eng 104, 105).....	3	3	
Introduction to Literature (Eng 207).....			3
* Mathematics for General Education (Math 100, 200).....	3	3	3
* Finite Mathematics for Business (Math 210).....			3
Basic Accounting (Actg 131, 132).....	3	3	
Physical Education (PE 141).....	½	½	½
Health Education (PE 107).....			2
Electives and courses to complete major.....	4	4	4
	15½	16½	15½
Sophomore			
Food Processing Operations (FI 221, 222, 223).....	3	3	3
Processed Food Inspection (FI 233).....			3
Introductory Physics (Phys 104).....	4		
Refrigeration in Agriculture (EnvE 238, 239).....		2	2
General Bacteriology (Bact 221).....		4	
General Inorganic Chemistry (Chem 121, 122).....	4	4	
Organic Chemistry (Chem 226).....			4
Public Speaking (Sp 201).....	2		
Sports Education (PE 241).....	½	½	½
Electives and courses to complete major.....	3	4	4
	16½	17½	16½

* Math 114, 115 and 141 may be substituted for Math 100, 200, and 210.

Food Processing

	F	W	S
Junior			
Food Plant Quality Control (FI 321).....	3		
Statistical Quality Control (FI 332).....		3	
Packaging (FI 336)			4
Sanitation and Waste Disposal (FI 232).....	3		
Food Microbiology (Bact 421).....	4		
Industrial Relations (IR 214).....		3	
Biochemistry (Chem 328).....	4		
Economics (Ec 201 or 211).....			3
American Government (Pol Sc 301).....		3	
General Psychology (Psy 202).....		3	
Growth of American Democracy (Hist 304).....			3
Electives and courses to complete major.....	3	4	7
	<hr/>	<hr/>	<hr/>
	17	16	17
Senior			
Food Production Control (FI 433).....			4
Senior Project (FI 461, 462).....	2	2	
Undergraduate Seminar (FI 463).....			2
U. S. in World Affairs (Hist 305).....	3		
Report Writing (Eng 218).....		3	
* Literature or Philosophy.....	3		3
Electives and courses to complete major.....	9	12	7
	<hr/>	<hr/>	<hr/>
	17	17	16

MANAGEMENT OPTION (ADD COURSES BELOW TO BASIC CURRICULUM)

Freshman		Junior	
** FP 230 Calif. Fruit Growing (4)		Actg 223 Cost Accounting and Analysis.....	(4)
** VC 230 General Vegetable Crops..... (4)		Bus 301 Business Law Survey.....	(3)
DM 230 General Dairy Manufacturing..... (4)			
		Senior	
		FI 421, 422 Advanced Food Processing.....	(6)
Sophomore			
ABM 203 Ag Business Credit and Finance..... (3)			
Mktg 204 Marketing Principles..... (4)			
Mgt 201 Principles of Management..... (3)			

MEATS OPTION (ADD COURSES BELOW TO BASIC CURRICULUM)

Freshman		Junior	
AH 121 Market Beef Production..... (4)		FI 338 Sausage, Smoked and Canned Meats.....	(3)
AH 122 Elements of Swine Production..... (4)		Mgt 311 Industrial Management.....	(3)
FI 210 Meats..... (3)		VS 123 Anatomy & Physiology.....	(3)
Sophomore		Senior	
Zoo 131-2 General Zoology..... (8)		FI 431 Meat Technology.....	(4)
FI 212 Meat Classification and Grading..... (2)			

See COURSES OF INSTRUCTION section of this catalog for descriptions of courses in Food Processing and other subjects.

* To be selected in accordance with the General Education requirement.

** Bot 121 may be substituted for FP 230 or for VC 230.

Ornamental Horticulture

Sophomore	F	W	S
Ornamental Trees (OH 221)	4		
Principles of Landscape Design (OH 223)		4	
Plant Propagation (OH 233)			4
General Entomology (Ent 126)			4
Soils (SS 121)	4		
Agricultural Surveying (AE 131)		2	
Agricultural Tractors and Equipment Skills (AE 141)			2
Public Speaking (Sp 201)		2	
Economics (Ec 201 or 211)			3
Sports Education (PE 241)	½	½	½
General Psychology (Psy 202)	3		
Plant Pathology (Bot 323)	4		
General Bacteriology (Bact 221)		4	
* Electives	1	4	3
	<u>16½</u>	<u>16½</u>	<u>16½</u>
Junior			
Fertilizers (SS 221)		3	
Basic Accounting (Actg 131, 132)		3	3
American Government (Pol Sc 301)	3		
General Inorganic Chemistry (Chem 121, 122)	4	4	
Organic Chemistry (Chem 226)			4
Genetics (Bio 303)	3		
Business Law Survey (Bus 301)			3
* Electives	7	7	6
	<u>17</u>	<u>17</u>	<u>16</u>
Senior			
Diseases and Pests (OH 327)	4		
Native Plant Materials (Bot 238)			3
Arboriculture (OH 421)	4		
Senior Project (OH 461, 462)	2	2	
Undergraduate Seminar (OH 463)			2
§ Plant Breeding (CP 304)	4		
Biochemistry (Chem 328)		4	
** Management elective			3
§§ Literature, Philosophy	3	3	
§§ Humanities elective			3
Growth of American Democracy (Hist 304)		3	
U.S. in World Affairs (Hist 305)			3
Fruit Crops (FP 230 or 332)		4	
Electives			2
	<u>17</u>	<u>16</u>	<u>16</u>

See COURSES OF INSTRUCTION section of this catalog for descriptions of courses in Ornamental Horticulture and other subjects.

- * At least 12 units to be selected with the approval of the adviser.
- ** To be selected from any 300-400 series courses in ABM or FM.
- § Plant physiology (Bot 322) may substitute for this requirement.
- §§ To be selected in accordance with the General Education requirement.

POULTRY INDUSTRY DEPARTMENT

Department Head, Richard I. Leach

Roland K. Pautz

Leo Sankoff

The poultry industry is an important part of agriculture and food production in California. This industry offers an increasing demand for young men trained in modern techniques of the industry. The function of this department is to prepare students for various major fields of commercial poultry production and the many allied services of the industry. Opportunities in the allied industry services are many as shown by the fact that graduates have worked in more than fifty kinds of jobs within the industry.

The college plant has facilities for more than 15,000 birds in the 12-acre poultry plant which maintains a commercially productive unit with six breeds of chickens, in addition to the turkey flock. The plant includes a modern 15,000 egg hatchery, poultry-dressing plant, and egg-handling facilities as well as most of the types of poultry-raising equipment commonly used in California.

Each poultry major has an opportunity to conduct commercially productive projects in market eggs, hatching eggs or meat birds which gives him additional experiences in the field of his major interest and practice in many business transactions. Advanced students may have opportunities to conduct technical management or developmental problems.

Students interested in the two-year technical certificate should refer to the introductory statement for the School of Agriculture which describes this program. Detailed curriculum information is available from the department head.

CURRICULUM IN POULTRY INDUSTRY

	F	W	S
Freshman			
Poultry Industry Development (PI 121).....	4		
Replacement Programs & Broiler Production (PI 122).....		4	
Poultry Feeding & Nutrition (PI 123).....			4
Agricultural Mechanics (AE 121, 122).....		2	2
Freshman Composition (Eng 104, 105, 106).....	3	3	3
Agricultural Mathematics (Math 102, 103 or 113, 114).....	3	3	
Health Education (PE 107).....			2
Physical Education (PE 141).....	½	½	½
General Zoology (Zoo 131, 132).....	4	4	
General Botany (Bot 121).....			4
Electives.....	2		2
	16½	16½	17½
Sophomore			
Poultry Selection and Egg Production (PI 221).....	2		
Poultry Production Processing & Marketing (PI 222).....		3	
Poultry Incubation (PI 223).....			2
Poultry Plant Design & Equipment (PI 233).....			2
Agricultural Engineering or Welding.....	2		
Poultry Anatomy and Physiology (PI 231).....	3		
Soils (SS 121).....			4
Public Speaking (Sp 201).....		2	
Economics (Ec 201 or 211).....	3		
** Humanities elective.....		3	
Sports Education (PE 241).....	½	½	½
General Bacteriology (Bact 221).....	4		
Genetics (Bio 303).....		3	
General Psychology (Psy 202).....		3	
** Business Management.....			3
Electives.....	2	3	4
	16½	17½	15½

** To be selected in accordance with General Education requirement.

** To be selected from Bus 301, FPM 310, IR 118, Mgt 311.

Poultry

	F	W	S
Junior			
Applied Poultry Breeding (PI 321).....	3		
Hatchery Business Organization (PI 322).....		4	
Poultry Hygiene and Flock Health (PI 303).....			3
Agricultural Engineering.....			2
Farm Records (FM 321).....	3		
Principles of Farm Management (FM 322).....			4
** Literature, Philosophy.....	3	3	
American Government (Pol Sc 301).....		3	
Growth of American Democracy (Hist 304).....			3
General Inorganic Chemistry (Chem 121, 122).....	4	4	
Organic Chemistry (Chem 226).....			4
Electives.....	3	3	
	<hr/>	<hr/>	<hr/>
	16	17	16
Senior			
Advanced Poultry Enterprise Supervision (PI 402).....		3	
Turkey Industry (PI 421).....	3		
Senior Project (PI 461, 462).....	2	2	
Undergraduate Seminar (PI 463).....			2
Animal Nutrition (AH 402).....			4
†† Management Elective.....		3	
U. S. in World Affairs (Hist 305).....			3
Biochemistry (Chem 328).....		4	
Electives.....	11	5	7
	<hr/>	<hr/>	<hr/>
	16	17	16

See COURSES OF INSTRUCTION section of this catalog for descriptions of courses in Poultry Industry and other subjects.

** To be selected in accordance with General Education requirement.

†† To be selected from any 300-400 series course in ABM or FM.

SOIL SCIENCE DEPARTMENT

Department Head, Logan S. Carter

Arnold M. Dean Bruce A. Dickson Raymond V. Leighty
Curtis Dean Piper Marvin J. Whalls

A student in this department may choose one of two majors.

Soil Science. This major prepares students for employment in positions which require a wide knowledge of agriculture, such as agricultural teachers, soil conservationists, land appraisers, fertilizer distributors, farm advisers, farm managers, or farm operators, and highly specialized positions, such as those of soil surveyors, laboratory technicians, college instructors, and soil specialists.

Natural Resources Management. The Natural Resources Management major is designed as an interdisciplinary program to prepare the student for employment with governmental agencies or private concerns charged with the analysis, planning, development and management of outdoor recreational resource areas. Graduates may serve in the capacities of park rangers, recreation specialists, park naturalists, park historians, and recreation resource planners and managers.

Facilities of the department have been developed to provide laboratory and field house space and equipment to meet the needs of the program. Demonstration plots and the application of practices on the college farm are utilized to the fullest possible extent in the study of methods for putting knowledge to work. Practices of outstanding value on nearby ranches and recreational areas and those being carried on by public agencies are also widely utilized.

Students interested in the two-year technical certificate in soil science should refer to the introductory statement for the School of Agriculture which describes this program. Detailed curriculum information is available from the department head.

CURRICULUM IN SOIL SCIENCE

Freshman	F	W	S
Soils (SS 121)	4		
Soil Management (SS 122)		4	
Soil Materials (SS 123)			3
Crop Production (CP 121 or 122 or 230 or VC 230)	4		
Animal Production (AH 230 or DH 230 or PI 230)			4
Agricultural Mechanics (AE 121 or 122 or 141)		2	
Freshman Composition (Eng 104, 105)	3	3	
§ Mathematics		3	3
General Botany (Bot 121, 122)	4	4	
Health Education (PE 107)			2
Physical Education (PE 141)	½	½	½
Electives			3
	15½	16½	15½

§ A minimum of 9 units shall be chosen with the approval of the adviser from Math 102, 103, 113, 114, 115, 117, 141; Stat 211.

Soil Science

	F	W	S
Sophomore			
Soil Conservation (SS 202)		3	
Fertilizers (SS 221)	3		
Range Management (AH 229)			4
Fruit Production (FP 131 or 132 or 230 or 332)		4	
Nursery Practices (OH 230 or 121)			3
Agricultural Surveying (AE 131)	2		
§ Mathematics	3		
General Inorganic Chemistry (Chem 121, 122)	4	4	
Organic Chemistry (Chem 226)			4
Economics (Ec 201 or 211)	3		
American Government (Pol Sc 301)		3	
Growth of American Democracy (Hist 304)			3
Sports Education (PE 241)	½	½	½
Electives	2	3	3
	<hr/>	<hr/>	<hr/>
	17½	17½	17½
Junior			
Soil Classification (SS 321)	4		
Soil Fertility (SS 322)		3	
Land Use Planning (SS 433)			3
Farm Records (FM 321) or Basic Accounting (Actg 131)	3		
Farm Management (FM 322)			4
Biochemistry (Chem 328)	4		
General Bacteriology (Bact 221)		4	
General Entomology (Ent 126)			4
U. S. in World Affairs (Hist 305)		3	
Public Speaking (Sp 201)	2		
Introduction to Literature (Eng 207)		3	
* Electives	3	4	6
	<hr/>	<hr/>	<hr/>
	16	17	17
Senior			
Soil Microbiology (SS 422)		3	
Soil Chemistry (SS 423)			3
Soil Physics (SS 432)	4		
Senior Project (SS 461, 462)	2	2	
Undergraduate Seminar (SS 463)			2
General Psychology (Psy 202)		3	
Introduction to Philosophy (Phil 201)			3
*** Introductory Plant Physiology (Bot 322)		4	
** Humanities elective	3		
† Management Elective	3		
* Electives	4	5	7
	<hr/>	<hr/>	<hr/>
	16	17	15

* Of the total elective units a minimum of 15 shall be chosen with the approval of the adviser.

** To be selected in accordance with the General Education requirement.

*** Bot 323 may be substituted.

† To be selected from any 300-400 series course in ABM or FM.

§ A minimum of 9 units shall be chosen with the approval of the adviser from Math 102, 103, 113, 114, 115, 117, 141; Stat 211.

CURRICULUM IN NATURAL RESOURCES MANAGEMENT

	F	W	S
Freshman			
Recreation Systems and Management (NRM 101).....	3		
Forest Resources (NRM 102).....		3	
Soils (SS 121).....			4
General Botany (Bot 121, 123).....	4		4
College Physics (Phys 121).....		4	
Agricultural Mathematics (Math 103).....	3		
College Algebra for Agriculture (Math 114).....		3	
Agricultural Mechanics (AE 128).....		2	
Photogrammetry (AE 145).....			3
Landscape Drafting (OH 124).....	2		
Freshman Composition (Eng 104, 105).....	3	3	
Public Speaking (Sp 201).....			2
Safety and First Aid (PE 121).....			2
Physical Education (PE 141).....	½	½	½
	<u>15½</u>	<u>15½</u>	<u>15½</u>
Sophomore			
Resource Survey (NRM 223).....	3		
Resource Planning (NRM 224).....		3	
General Zoology (Zoo 131, 132).....	4	4	
College Physics (Phys 122, 123).....		4	4
General Ecology (Bio 325).....			3
Agricultural Surveying (AE 131).....	2		
Trigonometry for Agriculture (Math 115).....			3
Introduction to Literature (Eng 207).....		3	
Cultural Anthropology (Ant 201).....	3		
General Psychology (Psy 202).....			3
Sports Education (PE 241).....	½	½	½
# Electives and courses to complete major.....	4	3	4
	<u>16½</u>	<u>17½</u>	<u>17½</u>
Junior			
Site Ecology (NRM 323).....	3		
Environmental Interpretation (NRM 326).....		3	
Business Law Survey (Bus 301).....			3
Elementary Probability and Statistics (Stat 211).....		3	
General Inorganic Chemistry (Chem 122).....	4		
Economics (Ec 201 or 211).....	3		
Technical Writing (Eng 219).....			3
Introduction to Philosophy (Phil 201).....			3
History of California (Hist 112).....		3	
American Government (Pol Sc 301).....	3		
Growth of American Democracy (Hist 304).....		3	
The U. S. in World Affairs (Hist 305).....			3
Health Education (PE 107).....		2	
# Electives and courses to complete major.....	4	3	5
	<u>17</u>	<u>17</u>	<u>17</u>

Of the total elective units 23 must be chosen with the approval of the adviser in one of the concentration areas: Naturalist or Administration.

Soil Science/Veterinary Science

Senior	F	W	S
Site Development and Maintenance (NRM 429).....		4	
Recreation Resource Management (NRM 438).....			4
Senior Project (NRM 461, 462).....	2	2	
Undergraduate Seminar (NRM 463).....			2
Soil Conservation (SS 202).....	3		
Hydrology (AE 315).....		3	
Landscape Plants (OH 430).....			2
Plant Ecology (Bot 326).....			4
* Humanities elective.....	3		
Political and Economic Geography (Geog 315).....	3		
Business and Human Relations (IR 415).....	3		
Geology (PSc 209).....		3	
# Electives and courses to complete major.....	2	4	5
	16	16	17

See COURSES OF INSTRUCTION section of this catalog for descriptions of courses in Natural Resources Management, Soil Science, and other subjects.

VETERINARY SCIENCE DEPARTMENT

Department Head, John K. Allen
Wallace F. Glidden

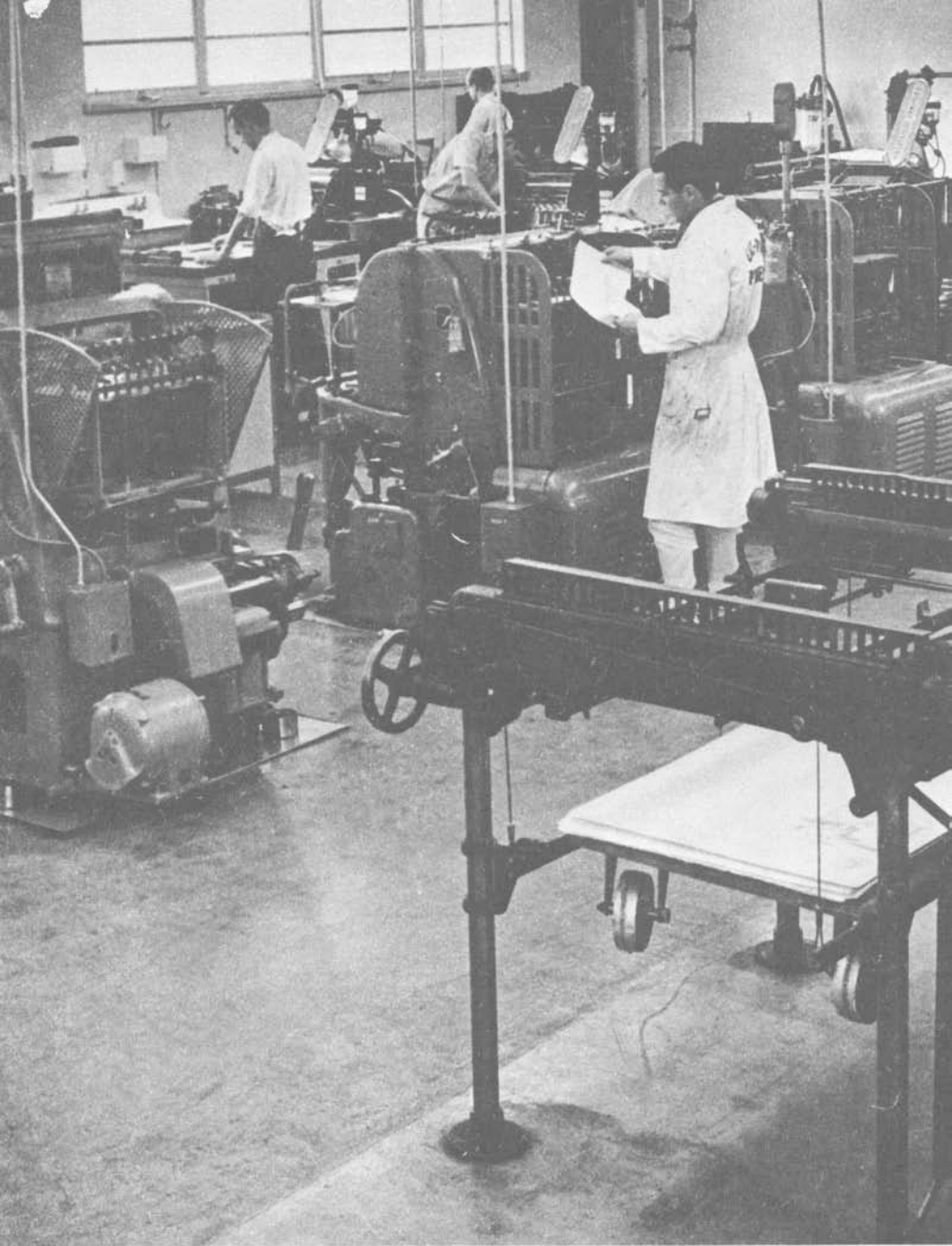
Veterinary science courses are offered to supplement the major work provided in the animal science departments of the School of Agriculture. Keeping the college herds and flocks healthy provides the student with valuable laboratory opportunities in basic veterinary hygiene. Veterinary science courses are open as elective courses to students who have the proper prerequisites.

The department also supplies meat inspection service for the meats laboratory.

* To be selected in accordance with the General Education requirement.

Of the total elective units 23 must be chosen with the approval of the adviser in one of the concentration areas: Naturalist or Administration.

THE SCHOOL OF APPLIED ARTS



Section of Letter Press Laboratory in Printing Technology and Management Department

THE SCHOOL OF APPLIED ARTS

Carl C. Cummins Dean
James E. Simmons, Associate Dean

The School of Applied Arts provides a number of services and functions within the total college framework.

Included in the wide range of course offerings in the school are programs leading to the Bachelor's degree in the following majors:

- | | |
|-------------------------|------------------------------------|
| Business Administration | Journalism |
| Child Development | Physical Education |
| English | Printing Technology and Management |
| Home Economics | Speech |

The Master of Arts degree is offered in English and in Education. The Master of Science degree is available in Home Economics and in Physical Education.

The School of Applied Arts, through the Education Department, assists in the coordination of a campus-wide teacher education program and prepares individuals who are seeking credentials. The college is accredited to recommend for the Standard Teaching Credential with a Specialization in Elementary Teaching, and the Standard Teaching Credential with a Specialization in Secondary Teaching.

In addition to the courses offered as a part of the major curricula, the School of Applied Arts also provides supplementary courses and courses required for General Education in all curricula. It is a service school providing for students in agriculture, applied arts, applied sciences, architecture, and engineering courses related to and directly supporting the area of the major.

The college has long supported a co-curricular program, and to this end the School of Applied Arts provides valuable experience in Music, Drama, Speech and Forensics, Journalism, and Intramural Sports activities. Specialized co-curricular activities include: Society for the Advancement of Management (Business Administration), California Association for Health, Physical Education and Recreation, Sigma Delta Chi (Journalism), Student California Teachers Association, Phi Upsilon Omicron (Home Economics), and others.

BUSINESS ADMINISTRATION DEPARTMENT

Department Head, Owen L. Servatius

- | | | |
|-------------------|---------------------|-------------------|
| Roy E. Anderson | Paul Kenyon | Rol W. Rider, Jr. |
| Lawrence E. Baur | Ernest C. Miller | Bruce H. Roberts |
| William M. Boyce | Harold R. Miller | J. Weldon Rohner |
| Erling A. Breckan | Eugene L. O'Connor | Roger L. Sherman |
| Wallace H. Burt | Howard R. O'Daniels | Howard F. Smith |
| Richard A. Carsel | Philip H. Overmeyer | Fuad Tellew |
| George M. Eastham | Dominic Perello | John R. Umbeck |
| John R. Jones | Walter E. Rice | Victor F. Wolcott |

The business administration program prepares students for employment in the administrative and technical functions of business, labor unions, and government agencies. Specialized course work is designed to shorten the essential period of apprenticeship all administrators must serve. Correlated theory and practice are provided early in the program so the student will know the why and how of business operations.

The program provides courses in general education together with a core of basic business courses upon which to build a concentration in a specialized field of business. The opportunities afforded the student in the business administration program are unique in that the offerings of the Schools of Agriculture, Architecture, Engineering, Applied Sciences and Applied Arts are strongly recommended to the student. The course work in these fields, together with the foundations provided by the courses in business and the broad general education background, will give training which will assist the student to go directly into the field of business in which he is best qualified.

Business Administration

CURRICULAR CONCENTRATIONS

Accounting

The accounting concentration provides training and practice for both public and private accounting areas.

Economics

This concentration stresses economic analysis as it applies to business and governmental decision making. It is designed to afford the student an opportunity to explore economic theory and its application to the American economy and to prepare students for entry positions in business or government, or for graduate studies.

Finance and Property Management

This concentration is designed as a flexible program for the student wishing to pursue opportunities in the fields of finance, insurance and real estate.

Industrial Relations

The two areas of interest within this concentration relate to labor-management relations and personnel management.

Management

This concentration stresses the managerial process and decision making fundamental to all levels and functional areas of the business and industrial enterprise. The management program offers both quantitative and general management emphases to satisfy the individual needs of the student relative to business or academic ambitions.

Marketing

Marketing includes all the business activities involved in directing the flow of goods and services from the original producer through intermediate processors to the consumer. This concentration emphasizes the management of marketing activities within the firm in coordination with all other activities to accomplish the firm's objective.

CURRICULUM IN BUSINESS ADMINISTRATION

Freshman *	F	W	S
The Business Enterprise (Bus 101)	4		
Human Relations (IR 118)		3	
Freshman Composition (Eng 104, 105)	3	3	
Principles of Speech (Sp 200)			3
** Literature			3
Physical Education (PE 141)	½	½	½
Health Education (PE 107)	2		
** Natural Sciences	4	7	4
Mathematics for General Education (Math 200)		3	
Finite Mathematics for Business (Math 210)			3
Electives	3		4
	<hr/> 16½	<hr/> 16½	<hr/> 17½

* Unless already acceptable typists, majors will be required to take Bus 141 and/or Bus 142 during their freshman year.

** To be selected in accordance with the General Education requirement.

Business Administration

Sophomore	F	W	S
Principles of Economics (Ec 211, 212, 213).....	3	3	3
Principles of Accounting (Actg 221, 222).....	4	4	
Cost Accounting and Analysis (Actg 223).....			4
Industrial Relations (IR 214).....		3	
Marketing Principles (Mktg 204).....			4
Principles of Management (Mgt 201).....		3	
Sports Education (PE 241).....	½	½	½
Introduction to Philosophy (Phil 201).....			3
Data Processing (CSc 100).....	2		
Mathematics of Business (Math 215).....	4		
Elementary Probability and Statistics (Stat 211).....		3	
Statistical Methods (Stat 212).....			3
Electives.....	4		
	17½	16½	17½
Junior			
Business Law (Bus 307, 308).....	4	4	
Money, Credit and Banking (Ec 337).....	3		
Financial Management (FPM 342, 343).....		3	3
General Psychology (Psy 202).....	3		
Political and Economic Geography (Geog 315).....			3
American Government (Pol Sc 301).....	3		
Growth of American Democracy (Hist 304).....		3	
U.S. in World Affairs (Hist 305).....			3
***Electives and courses to complete major.....	4	6	6
	17	16	15
Senior			
Business Policies (Mgt 413).....	3		
Business Organization (Mgt 414).....		3	
Business and Human Relations (IR 415).....			3
Senior Project (Bus 461, 462).....	2	2	
Undergraduate Seminar (Bus 463).....			2
** Literature, Philosophy, Art or Music.....		3	
Social Sciences elective.....	3		
***Electives and courses to complete major.....	7	9	11
	15	17	16

See COURSES OF INSTRUCTION section of this catalog for descriptions of courses in Accounting, Business Administration, Economics, Finance and Property Management, Industrial Relations, Management, Marketing and other subjects.

** To be selected in accordance with the General Education requirement.

*** 27 of the elective units in the junior and senior years must be chosen with the approval of the adviser in a field of concentration.

CHILD DEVELOPMENT

(Interdisciplinary Program)

Coordinator: Marie S. Pfeiffer, Head, Home Economics Department
 M. Eugene Smith, Head, Social Sciences Department
 Bernice B. Loughran, Art
 M. Dale Federer, Psychology

The interdisciplinary program in Child Development is designed to prepare persons interested in becoming specialists, teachers, and administrators for nursery schools and children's centers. In addition to providing actual experience in the guidance of children, this program provides the graduate with the knowledge and experience leading to a professional career in a variety of family service and child development programs.

The curriculum provides course work in anthropology, psychology, sociology, art, music, child development, and in the principles of program planning and administration. A nursery school laboratory on the campus and day care centers and nursery schools in the community provide students the opportunity to work with children.

All students in the Child Development program will have advisers appointed by the Coordinator of the program. Interested students should consult the Coordinator for further information.

The following table illustrates the distribution of units in the curriculum. The entire program totals 198 quarter units including elective units which vary depending upon the student's objective.

Child Development	44
Literature, Art and Music	17
Psychology, Sociology and Anthropology	30
Basic Subjects	67
Electives and courses to complete major	39

CURRICULUM IN CHILD DEVELOPMENT

	F	W	S
Freshman			
Orientation to Home Economics (HE 101)	1		
The Beginning Family (HE 103)			3
The Child, Family, and Community (HE 108)			2
Orientation to Art Materials (Art 232)		3	
Orientation to Crafts (Art 233)			3
Music Theory (Mu 101)	3		
Freshman Composition (Eng 104, 105, 106)	3	3	3
Introduction to Sociology (Soc 105)		3	
General Inorganic Chemistry (Chem 121, 122)		4	4
Health Education (PE 107)	2		
Physical Education (PE 141)	½	½	½
Mathematics for General Education (Math 100)	3		
Electives	3	3	
	15½	16½	15½

Child Development

	F	W	S
Sophomore			
Nutrition (HE 210).....		3	
Family and Community Health (HE 222).....	2		
Child Development—Infancy (HE 232).....		3	
Child Development—Preschool Years (HE 233).....			3
Children's Literature (Eng 205).....			3
Basic Music (Mu 201).....	2		
Cultural Anthropology (Ant 201).....	3		
Organic Chemistry (Chem 226).....	4		
General Psychology (Psy 202).....		3	
Survey of Economics (Ec 201).....			3
Public Speaking (Sp 201).....			2
Elementary Human Physiology (Zoo 122).....		4	
Natural History (Bio 127, 128, 129).....	3	3	3
Physical Education (PE 241).....	½	½	½
Electives.....	2		3
	<hr/>	<hr/>	<hr/>
	16½	16½	17½
Junior			
American Government (Pol Sc 301).....	3		
Growth of American Democracy (Hist 304).....		3	
U.S. in World Affairs (Hist 305).....			3
Social Problems (Soc 303).....		3	
Social Stratification (Soc 323).....			3
Personality and Mental Health (Psy 301).....	3		
Genetics (Bio 303).....			3
Human Growth and Development (Ed 304).....		3	
Nursery School Programming (HE 319).....	2		
Nursery School Participation (HE 320).....	3		
Parent Education (HE 313).....			2
Advanced Nutrition (HE 328).....		3	
Basic Structure and Concepts of Mathematics (Math 327, 328).....		3	3
Electives.....	6	2	2
	<hr/>	<hr/>	<hr/>
	17	17	16
Senior			
* Literature.....		3	
* Philosophy.....	3		
Urban Sociology (Soc 313).....		3	
Psychological Testing (Psy 432).....			3
Administration of Child Development Programs (HE 404).....	2		
Supervised Nursery School and Community Experiences (HE 403).....		6	
Family Development (HE 405).....			3
Social Psychology (Psy 401).....	3		
Senior Project (HE 461, 462).....	2	2	
Undergraduate Seminar (HE 463).....			2
Electives.....	7	3	8
	<hr/>	<hr/>	<hr/>
	17	17	16

See COURSES OF INSTRUCTION section of this catalog for descriptions of courses in Home Economics and other subjects.

* To be selected in accordance with the General Education requirement.

EDUCATION DEPARTMENT

Department Head, Walter P. Schroeder

William W. Armentrout	William Curtis	James A. Langford
Roger S. Bailey	Erland G. Dettloff	Bernice B. Loughran
Carl Burk	Bernard Dusek	Alice E. Roberts
Arthur G. Butzbach	Edward J. Ernatt	Harry H. Scales
Donovan F. Cartwright	M. Dale Federer	L. Robert Sorensen
Marjorie Cass	Charles W. Jennings	J. Barron Wiley
Ralph C. Collins	Ola K. Johnson	Irwin A. Willson
	Erna Knapp	Malcolm W. Wilson

The Education Department staff, in addition to teaching professional courses, advises fifth-year and graduate students who are working toward initial and advanced credentials. All undergraduate students preparing to teach in the elementary or secondary schools may earn a baccalaureate major in: Agriculture, Biological Science, Chemistry, English, Home Economics, Mathematics, Physical Education, Physics, Social Sciences, or Technical Arts (Industrial Arts). Credential candidates must also earn a minor which should be selected as early as possible. The details of the requirements are available from the major department, the minor department, or the Education Department.

The Education Department offers the Master's Degree in Education; professional courses in Elementary School Teaching, Secondary School Teaching, School Supervision (including elementary and secondary principalships), Pupil Personnel Services; and service courses in Art, Audio-Visual, and Psychology, plus a Teaching Minor in Art.

Special emphasis is placed on the preparation of persons to teach vocational subjects in the schools including advisement for the Bachelor of Vocational Education Degree. Instruction is also given in some administrative and supervisory phases of vocational education.

Instructors in many departments at California State Polytechnic College help students develop competence in the subject to be taught and the methods of teaching. Each candidate for teaching is prepared to be a professional staff member in a public school. An institutional approach to teacher education is strengthened through the Coordinating Committee for Teacher Education composed of staff members in the major, minor and the education departments which provides over-all planning and direction for the teacher education program. Good relationships with community and school personnel enable teaching candidates to engage in a variety of experiences needed to become successful instructors.

The Education Department provides coordination for the following teacher credential programs which are accredited by the State Board of Education.

Standard Teaching Credential—Elementary Specialization
Standard Teaching Credential—Secondary Specialization

CURRICULUM FOR THE MASTER OF ARTS DEGREE IN EDUCATION

All programs with concentrations in the student's teaching major (Agriculture, Physical Sciences, or Social Sciences) require 45 units of acceptable work, including a minimum of 18 units of acceptable course work in the subject field of concentration (12 units of which must be in 500 series courses), and a minimum of 12 units of 500 series course work in Education.

All programs with a concentration in Education require 45 quarter units of acceptable graduate work, including a minimum of 18 units of 500 series course work in Education and a minimum of 12 units of course work acceptable for graduate work outside the field of Education. See *Graduate Study Bulletin* for further details.

See COURSES OF INSTRUCTION section of this catalog for descriptions of courses in Education, Art, Audiovisual Education, Psychology and other subjects.

ENGLISH DEPARTMENT

Department Head, Willard M. Pederson

Elizabeth B. Anderson	Wilfred M. Green	Ena Marston
Gordon A. Bailey	Robert J. Huot	John H. Mott, Sr.
Stanley L. Barr	Gloria Jameson	James J. Peterson
Robert O. Boothe	Starr Jenkins	Eugene G. Prater
Marvin D. Brown	Mead R. Johnson	David R. Rollings
Max E. Darnielle	Miles B. Johnson	Habib Shekholeslami
Harold D. Evans	John F. Kerr	William B. Wahl
Arthur H. Friezschke	Charles H. Lindamood	Isaac N. Walker
Eugene J. Gawain	Robert G. Lint	Philip J. Zarabozo
David M. Grant		

The English Department serves all schools of the college by providing courses which will increase a student's understanding, appreciation, and use of his language, in reading and composition. The department offers a variety of courses which, through close study of the works of acknowledged masters of language usage and through providing opportunities for the student himself to use language with greater accuracy and skill, contribute to the general education of majors in Agriculture, Engineering, Architecture, the Applied Arts and Applied Sciences.

The primary occupational objective of the department is the preparation of qualified teachers of English for elementary and secondary schools and for junior college. For this purpose the department offers a program leading to the B.A. degree for English teachers in the elementary and secondary schools, and a program leading to the M.A. degree for English instructors in the junior colleges. To produce teachers well versed in the areas of English commonly taught, the major curricula provide a balanced emphasis in study of the language and in the use of the language in composition and literature. A student majoring in English progresses through four significant steps in his education: first, a study of principles governing language, composition, and literature; second, a study of content illustrating these principles; third, application by the student of principles to content produced by himself and others; fourth, application of both principles and content to problems commonly met in the teaching situation.

For the purpose of assigning students to the appropriate level of training in language communication, a placement test is given. The test measures acceptable proficiency in language communication as revealed in sentence structure, appropriate usage, spelling, and paragraph units.

CURRICULUM IN ENGLISH

Freshman	F	W	S
Freshman Composition (Eng 104, 105, 106).....	3	3	3
Introduction to Fiction, Drama, Poetry (Eng 201, 202, 203)....	2	2	3
Principles of Speech (Sp 200)			3
Physical Education (PE 141)	½	½	½
Health Education (PE 107)	2		
Basic Mathematics for General Education (Math 100).....		3	
History of Civilization (Hist 101, 102, 103).....	3	3	3
* Natural Science.....	3	3	3
** Electives	2		1
	15½	14½	16½

* A minimum of 15 units of natural science is required for graduation. (See General Education Requirement). Include one sequence course which meets for three quarters with a minimum of 9 units.

** Satisfactory skill in typing is required for graduation. A student who does not type may satisfy the requirement by electing Bus 141, 142.

English

	F	W	S
Sophomore			
European Literature (Eng 211)	3		
Advanced Composition (Eng 304, 305, 306)	3	3	3
American Literature (Eng 311, 312, 313)	3	3	3
American Government (Pol Sc 301)	3		
Growth of American Democracy (Hist 304)		3	
U.S. in World Affairs (Hist 305)			3
Sports Education (PE 241)	½	½	½
* Natural Science	3	3	
Cultural Anthropology (Ant 201)		3	
General Psychology (Psy 202)			3
** Social Sciences (except history)			3
Electives	1	1	1
	<hr/> 16½	<hr/> 16½	<hr/> 16½
Junior			
British Literature (Eng 307, 308, 309)	3	3	3
Modern English Grammar (Eng 301)	3		
Introduction to Shakespeare (Eng 210)			3
Children's Literature (Eng 205) or Readings for Young Adults (Eng 316)		3	
Oral Interpretation (Sp 305)		3	
Introduction to Philosophy (Phil 201)	3		
** Art, Music, or Drama			3
Electives	6	6	6
	<hr/> 15	<hr/> 15	<hr/> 15
Senior			
Senior Project (Eng 461)	2		
History of the English Language (Eng 303)			3
Modern Novel (Eng 415) or Modern Poetry (Eng 416) or Elizabethan Drama (Eng 419)	3		
Significant Writers (Eng 414, 417, or 418)	3	3	3
Electives	7	12	9
	<hr/> 15	<hr/> 15	<hr/> 15

CURRICULUM FOR THE MASTER OF ARTS DEGREE

(For complete requirements see *Graduate Study Bulletin*)

	<i>Units</i>
Eng 502 Introduction to Critical Analysis	3
Eng 503 Contemporary Language Study	3
Eng 504 Problems in Language	3
Eng 505 Problems in Composition	3
Eng 511 Problems in American Literature	3
Eng 512 Problems in British Literature	3
Eng 590 Graduate Seminar in English	3
Additional units in the Eng 300, 400 and 500 series, selected with advisory committee approval	15
Elective units in other departments, selected with advisory committee approval	9
Total Units	<hr/> 45

See COURSES OF INSTRUCTION section of this catalog for descriptions of courses in English, Foreign Language and other subjects.

* A minimum of 15 units of natural science is required for graduation. (See General Education requirement.) Include one sequence course which meets for three quarters with a minimum of 9 units.

** To be selected in accordance with the General Education requirement.

ETHNIC STUDIES

(Interdisciplinary Course Offerings)

Acting Coordinator: Bruce E. Tjaden

Bernice B. Loughran, Art
Gloria Jameson, English
Donald W. Hensel, Social Sciences

Marie S. Pfeiffer, Home Economics
Fuad H. Tellaw, Economics
Alexander Capurso, Music
Sharron L. Kerr, Dance

The College presently offers in several departments a number of courses which are classified as ethnic studies designed to facilitate the study of various cultures and subcultures, their origins, development, contributions, and changing characteristics. The underlying premise is that in studying the society and culture of a people, a combination of several disciplines can be utilized to produce comparative insights and a more comprehensive knowledge. Although a major is not offered in ethnic studies, a proper selection of courses from this area may provide a student with an interdisciplinary minor, acceptable in some programs. The courses can be used to supplement the requirements for many degree programs, and some will satisfy the general education-breadth requirement.

The following courses are typical of those available in ethnic studies and students are referred to the current class schedule for cultures or areas to be emphasized within the courses in a given quarter.

Anthropology

Ant 201 Cultural Anthropology (3)

Art

- *Art 214 American Art (2)
- *Art 216 Non-Western Art (2)

Economics

- Ec 300 Economic Problems (3)
- Ec 325 Underdevelopment and Economic Growth (3)

Education

Ed 521 Teaching the Culturally Deprived Child (3)

English

- *Eng 214 Afro-American Literature (3)
- *Eng 215 Latin American Literature (3)
- Eng 414 Significant World Writers (3)
- Eng 418 Significant American Writers (3)
- Eng 504 Problems in Language (3)

Foreign Language

Lang 101, 102, 103 Foreign Language—Independent Study (3) (3) (3)
(See course listing for specific languages)

Geography

Geog 201, 202, 203 Regional World Geography (3) (3) (3)
Geog 401 Area Geography (3)

* These courses were not approved in time for inclusion in the 1969-70 description of courses, but may be offered on an experimental or trial basis during one or more quarters in the 1969-70 academic year. They will appear in the class schedule for the specific quarter offered but will be continued on a regular basis only if approved for the 1970-71 Catalog.

Ethnic Studies

History

- Hist 112 History of California (3)
- Hist 307*, 308*, 309 Latin American History (3)
- Hist 331 Afro-American History (3)
- *Hist 341 Mexican History (3)
- Hist 381, 382 African History (3)
- Hist 411, 412, 413 History of East Asia (3)(3)(3)

Home Economics

- *HE 301 Culture of Afro-American Pre-School Child (3)
- *HE 302 Culture of Brown American Pre-School Child (3)

Philosophy

- Phil 302 World Religions (3)

Physical Education

- PE 141 Physical Education (Social folk dance) (½)

Political Science

- Pol Sc 311 Inter-American Relations (3)
- Pol Sc 402 Politics and Governments of Developing Areas (3)
- Pol Sc 465 Contemporary Problems and Institutions of the Middle East and Africa (3)
- Pol Sc 468 Contemporary Problems and Institutions of Africa South of the Sahara (3)

Sociology

- Soc 303 Social Problems (3)
- Soc 313 Urban Sociology (3)
- Soc 315 Race Relations (3)
- *Soc 316 American Minorities (3)
- Soc 323 Social Stratification (3)
- Soc 344 Sociology of Poverty (3)

Music

- Mu 208 Ethnic Music of the World (3)

* These courses were not approved in time for inclusion in the 1969-70 description of courses, but may be offered on an experimental or trial basis during one or more quarters in the 1969-70 academic year. They will appear in the class schedule for the specific quarter offered but will be continued on a regular basis only if approved for the 1970-71 Catalog.

HOME ECONOMICS DEPARTMENT

Department Head, Marie Pfeiffer

Connie Breazeale
Sarah E. Burroughs
Karen P. Goebel
Sarah A. Hardeman

Barbara D. Haskell
Lezlie A. Labhard
Mildred E. Roske
Patricia Saam

Pauline Shaffer
Ellen T. Stookey
Gretchen C. Streichert
Barbara P. Weber

The principal objectives of the Home Economics Department are to provide educational preparation for: (1) teachers of home economics in the secondary schools, (2) managers and dieticians in food service programs. In addition, persons with a more general interest in home economics will find the curriculum prepares for other occupational pursuits as well as provides a sound basis for successful family and personal life. Students are invited to consult with the department concerning their special interests in the field of home economics.

In addition to providing general education courses, the curriculum places considerable emphasis upon applied courses during the first two years and provides other courses basic to the advanced work in the later years.

CURRICULAR OPTIONS

Home Economics Education

The student preparing to teach home economics will follow the course listing for this option and will, in addition, need to complete the requirements for a teaching minor, certain courses in professional education, and a fifth year including graduate work in the major field. The Standard Teaching Credential with Specialization in Secondary Teaching is granted upon successful completion of this program.

Students interested in a general home economics program should follow this option, omitting the additional requirements for the teaching credential. Proper choice of elective courses will provide preparation for numerous positions such as home service adviser for utility firms, home economic journalist, and specialist in extension service, clothing and textiles, consumer education, home furnishings, or child care programs.

Food Administration—Dietetics

The Food Administration—Dietetics option provides the educational background for management of institutional and commercial food service programs. Membership in the American Dietetic Association is available to graduates following a one-year internship. In their junior year students concentrate in therapeutic or administrative dietetics or in business administration.

CURRICULUM IN HOME ECONOMICS

Freshman	F	W	S
Orientation to Home Economics (HE 101)	1		
The Beginning Family (HE 103)			3
Introduction to Foods (HE 121)	5		
Freshman Composition (Eng 104, 105, 106)	3	3	3
Physical Education (PE 141)	½	½	½
Math for General Education (Math 100)	3		
* Art	3		
Health Education (PE 107)			2
Introduction to Sociology (Soc 105)			3
General Inorganic Chemistry (Chem 121, 122)		4	4
Electives and courses to complete major	2	10	2
	<hr/>	<hr/>	<hr/>
	17½	17½	17½

* To be selected in accordance with the General Education requirement.

Home Economics

	F	W	S
Sophomore			
Personal and Home Management (HE 203)			3
Nutrition (HE 210)		3	
Child Development—Infancy (HE 232)		3	
Child Development—Preschool Years (HE 233)			3
Cultural Anthropology (Ant 201)	3		
General Psychology (Psy 202)		3	
Organic Chemistry (Chem 226)	4		
General Bacteriology (Bact 221)		4	
Public Speaking (Sp 201)	2		
Sports Education (PE 241)	½	½	½
Survey of Economics (Ec 201)	3		
Elementary Zoology (Zoo 122)			4
Electives and courses to complete major	4	3	6
	<u>16½</u>	<u>16½</u>	<u>16½</u>
Junior			
Meal Management (HE 321)		3	
Dynamics of Clothing (HE 341)	3		
Advanced Nutrition (HE 328)		3	
* Literature			3
Personality and Mental Health (Psy 301)	3		
Electives and courses to complete major	11	11	14
	<u>17</u>	<u>17</u>	<u>17</u>
Senior			
Home Management (HE 424)			3
Senior Project (HE 461, 462)	2	2	
Undergraduate Seminar (HE 463)			2
American Government (Pol Sc 301)	3		
Growth of American Democracy (Hist 304)		3	
U.S. in World Affairs (Hist 305)			3
* Philosophy	3		
Electives and courses to complete major	7	10	7
	<u>15</u>	<u>15</u>	<u>15</u>

HOME ECONOMICS EDUCATION OPTION

(Add Courses Below to Basic Curriculum)

Freshman		Junior	
HE 131 Clothing Construction (5)		HE 319 Nursery School Activities (2)	
		HE 320 Nursery School Participation	(3)
Sophomore		HE 322 Textiles	(3)
HE 222 Family and Community Health	(2)	HE 323 Housing for Contemporaries	(3)
HE 231 Household Equipment (3)		HE 333 Clothing Design and Construction	(3)
HE 242 Interior Design	(3)	Senior	
		HE 405 Family Development	(3)
		HE 423 Home Management Residence	(3)

* To be selected in accordance with the General Education requirement.

FOOD ADMINISTRATION—DIETETICS OPTION

(Add Courses Below to Basic Curriculum)

Freshman	Senior
Actg 221-2 Principles of Accounting (8)	HE 425 Quantity Cookery (3)
Bus 206 Purchasing (3)	HE 426 Food Production and Management (3)
	HE 427 Equipment and Layout (3)
Sophomore	HE 429 Diet Therapy (3)
Chem 328 Biochemistry (4)	Bact 421 Food Microbiology (4)

CURRICULUM FOR THE MASTER OF SCIENCE DEGREE

(For complete requirements see the *Graduate Study Bulletin*)

A. Required:	<i>Units</i>
HE 523 Time Studies in Home Management	3
HE 525 Experimental Studies in Textiles	4
HE 528 Experimental Studies in Foods	4
HE 533 The Child in Contemporary Culture	4
HE 580 Graduate Seminar	3
B. Select at least three of the following courses:	18
HE 328 Advanced Nutrition	3
HE 404 Administration of Child Development Programs	2
HE 405 Family Development	3
HE 426 Food Production Management	3
HE 427 Equipment and Layout	3
HE 429 Diet Therapy	3
HE 433 Historic Costume	3
HE 501 Management of Family Resources	3
HE 532 Problems and Trends in Interior Design	3
C. Courses outside the Home Economics Department:	
Select from 400 and 500 series level and have Advisory Committee approval.	9
D. Thesis (HE 599)	9
Total Units	45

See COURSES OF INSTRUCTION section of this catalog for descriptions of courses in Home Economics and other subjects.

JOURNALISM DEPARTMENT

Department Head, John R. Healey

Vincent J. Gates

Helen P. Kelley

Loren L. Nicholson

Brent H. Keetch

Modern journalism places a premium on specialists who have acquired familiarity with a specific field in addition to basic professional training. This college has trained "specialized journalists" exclusively. The Journalism Department offers a program leading to the bachelor of science degree in journalism with concentrations in different occupational areas of journalism—agricultural, community, industrial, and home economics.

All journalism majors must complete the basic curriculum which deals with fundamental journalistic aspects and supplementary courses in arts and sciences. Each major also must complete a certain number of required and elective courses in his particular field of concentration.

Regardless of concentration all journalism majors will be expected to serve as staff members on the school publications and news media and on journalism field teams. In addition to the 198 units required for a degree, the journalism major must complete an eight weeks' noncredit internship in a publishing, radio, advertising, public relations, business or industrial organization under an approved and supervised program. Such internships will take place normally during summers. Credit toward the internship requirement may be granted for journalism field team participation.

Enrollment in journalism courses is open to qualified students of all other departments who wish to gain skills in the techniques and methods of advertising, public relations, publicity, publications, and photography.

CURRICULAR CONCENTRATIONS

Agricultural Journalism

This concentration prepares for farm or farm-city careers in reporting, editing, radio and television news; publication production; advertising copywriting, layout, selling; public relations and publicity; photography; information. Twenty-one of the elective units must be chosen with the approval of the adviser.

Community Journalism

This concentration prepares for community newspaper operation and production; suburban news, advertising and business operation with emphasis on management and ownership; printing and publishing of small daily, weekly and semi-weekly publications; community broadcasting station operation and management. Twenty-three of the elective units must be chosen with the approval of the adviser.

Business and Industrial Journalism

This concentration provides training for editorial, advertising and promotion employment on trade and business publications and house organs; sales promotion, industrial relations and industrial publicity; production and management of specialized industrial publications and printing; internal and external public relations programming; trade association secretary-manager positions; advertising agency and broadcasting advertising with industrial emphasis; photography and graphic arts for industrial operations. Twenty-three of the elective units must be chosen with the approval of the adviser.

Home Economics Journalism

This concentration relates to women's publications; editorial, advertising and promotion; consumer organization public relations and sales promotion; community publications staff writing and editing with emphasis on women's home and family features; public utilities promotion and advertising of interest to homemaking and family interest groups; photography and broadcast news designed especially for women's special activities. Twenty-three of the elective units must be chosen with the approval of the adviser.

CURRICULUM IN JOURNALISM

	F	W	S
Freshman †			
Introduction to Journalism (Jour 118)	2		
Freshman Composition (Eng 104, 105, 106).....	3	3	3
Introduction to Literature (Eng 207)			3
Physical Education (PE 141).....	½	½	½
Mathematics (Math 102, 103 or Math 100, 200).....		3	3
General Biology (Bio 101, 102, 103 or equiv.).....	3	3	3
Basic Photography (Jour 221)	3		
Advanced Photography (Jour 222)		3	
Photojournalism (Jour 223)			3
§ Electives and courses to complete major.....	6	5	1
	<hr/>	<hr/>	<hr/>
	17½	17½	16½
Sophomore			
Principles of Economics (Ec 211, 212)	3	3	
Sports Education (PE 241).....	½	½	½
American Literature (Eng 311, 312, 313).....	3	3	3
General Physical Science (PSc 101, 102, 103 or equiv.).....	4	4	4
Journalism History (Jour 201).....	3		
News Writing (Jour 202).....		3	
Reporting I (Jour 203).....			3
Introduction to Sociology (Soc 105).....			3
§ Electives and courses to complete major.....	3	4	3
	<hr/>	<hr/>	<hr/>
	16½	17½	16½
Junior			
American Government (Pol Sc 301).....	3		
Growth of American Democracy (Hist 304).....		3	
U. S. in World Affairs (Hist 305).....			3
General Psychology (Psy 202).....	3		
Health Education (PE 107)	2		
Graphic Arts Processes (PT 127)		3	
Editing and Copy Desk (Jour 233).....		3	
Public Speaking (Sp 201).....			2
Feature Writing (Jour 302).....		3	
Broadcast Media News (Jour 333)			3
Global Geography (Geog 308).....			3
Senior Project (Jour 461)			2
§ Electives and courses to complete major	7	4	5
	<hr/>	<hr/>	<hr/>
	15	16	18
Senior			
State and Local Government (Pol Sc 401).....	3		
Senior Project (Jour 462).....	2		
Undergraduate Seminar (Jour 463).....			2
Newspaper and Magazine Advertising (Jour 421).....	3		
Advertising Layout and Copywriting (Jour 425).....		2	
Applied Journalism Techniques (Jour 451, 452, 453).....	2	2	2
Journalism Press Laws (Jour 402).....		3	
Public Relations (Jour 412).....			3
§ Electives and courses to complete major	6	8	9
	<hr/>	<hr/>	<hr/>
	16	15	16

See COURSES OF INSTRUCTION section of this catalog for descriptions of courses in Journalism and other subjects.

† Unless already acceptable typists, majors will be required to attain typing proficiency during their freshman year.

§ From 18 to 23 of the elective units must be chosen with the approval of the adviser according to the field of concentration.

MUSIC DEPARTMENT

Department Head, Harold P. Davidson

Emanuel R. Heifetz

William V. Johnson

Ronald V. Ratcliffe

Clifton E. Swanson

John G. Russell

The purposes of the courses in the Music Department are to give all musically inclined students the opportunity to participate in college musical organizations and to further their proficiency both in singing and in playing instruments; to give all students interested in music a broader insight into the general field of music through courses in appreciation, theory, harmony, and music history; and to provide the prospective teacher with basic skills and instructional techniques in music required for the general elementary credential.

It is necessary that the student have some previous experience with a musical instrument in order to try out for band, brass, chamber, and orchestral ensembles, and for dance orchestra. While previous experience in choral singing is helpful, it is not mandatory for the student trying out for the men's glee club and the women's glee club.

Students enrolled in one of the teacher education majors may elect a teaching minor in music. This program requires that a minimum of 30 units be taken, at least 18 of which must be 300 or 400 numbered courses. Those interested in this program should consult an instructor in the Music Department. Demonstration of music skill in piano may be by audition or by satisfactory performance in Mu 111, 112, 113. Participation in a music activity for at least three quarters is recommended.

See COURSES OF INSTRUCTION section of this catalog for descriptions of courses in Music and other subjects.

PHYSICAL EDUCATION DEPARTMENT

Department Head, Robert A. Mott

Richard Anderson	Richard R. Harper	Sharron L. Kerr
Andrew Brennan	Dwayne G. Head	Thomas J. Lee
Victor Buccola	William Hicks	Evelyn I. Pellaton
Francis S. Chestnut	Vaughan Hitchcock	Richard J. Purcell
Frank C. Egenhoff, Jr.	Leroy B. Hughes	Clarence H. Ward
David W. Grosz	Melva Irvin	Mary L. Stallard
Sheldon Harden	James J. Jensen	James D. Sanderson
	Edward J. Jorgensen	Mary Lou White

The major function of the Physical Education Department is to provide both required and elective courses in physical education and health to meet the general education needs of all students. To supplement this general education, the department administers an extensive intramural sports program for all students of the college. A second function of the department is to prepare both men and women as secondary teachers in the fields of physical education and health. It is possible to have a curricular concentration in the field of recreation. A total of 28 units with adviser's approval may be taken in this area.

Because of an ideal geographical location and outstanding physical education facilities, the college has become a center for workshops held by the health and physical education organizations of the State.

Extensive outdoor facilities include a number of turfed areas for physical education classes and intramural sports activities adjacent to the Men's Physical Education Building. A football stadium, regulation baseball diamond with permanent stands and quarter-mile track with a 220-yard straightaway provide outstanding facilities for intercollegiate athletic teams. Basketball, volleyball, handball, shuffleboard, all-weather tennis courts and two competitive swimming pools are used for instruction and student recreation. The Men's Physical Education Building provides excellent facilities for all phases of the total physical education and intercollegiate athletic program. The main gymnasium has a championship basketball court and three intramural basketball courts. It also has a wrestling room, weight training area and a gymnastic room. All these facilities are adjacent to the men's locker and shower room.

The women's program is centered in Crandall Gym which has adequate facilities for basketball, volleyball, badminton, gymnastics. A dance studio, pool, and an adaptive physical education laboratory are located in this area.

CURRICULUM IN PHYSICAL EDUCATION

Freshman	F	W	S
Freshman Composition (Eng 104, 105, 106).....	3	3	3
Mathematics for General Education (Math 100, 200).....	3	3	
Health Education (PE 107).....			2
Physical Education (PE 141).....	½	½	½
Safety and First Aid (PE 121).....	2		
Community Recreation (PE 126).....			3
Swimming and Water Sports (PE 123).....			2
General Physical Science (PSc 101, 102 or equiv.).....		4	4
General Zoology (Zoo 131, 132).....	4	4	
Electives	4	2	2
	16½	16½	16½

Physical Education

Sophomore	F	W	S
Survey of Economics (Ec 201)	3		
* Social Sciences elective (except History)		3	3
General Psychology (Psy 202)		3	
Intramural Sports (PE 232)		3	
General Physical Science (PSc 103 or equiv.)	4		
Public Speaking (Sp 201)		2	
Sports Education (PE 241)	½	½	½
Human Anatomy (Zoo 337)	3		
Human Physiology (Zoo 338, 339)		3	3
Principles of Physical Education (PE 201)	3		
Apparatus and Gymnastics (PE 255 or 256)		2	
School and Community Health Education (PE 203)	2		
Advanced Public Speaking (Sp 202)			2
Sociology of Family Life (Soc 206)			3
Electives	1	1	5
	16½	17½	16½
Junior (Women)			
American Government (Pol Sc 301)	3		
Growth of American Democracy (Hist 304)			3
* Literature or Philosophy	3	3	
* Literature, Philosophy, or Arts			3
Educational Psychology (Ed 312)		3	
Team Sports for Girls (PE 324, 325, 326)	2	2	2
Teaching Elementary School Physical Education (PE 332)		3	
Physiology of Exercise (PE 303)			2
Camping and Outdoor Education (PE 337)	3		
Physical Education Activity (PE 341, 342, 343)	1	1	1
Kinesiology (PE 302)		2	
Introduction to Dance (PE 334)		3	
Electives	4		6
	16	17	17
Senior (Women)			
Senior Project (PE 461, 462)	2	2	
Undergraduate Seminar (PE 463)			2
U.S. in World Affairs (Hist 305)	3		
Dance (PE 446, 447, 448)	2	2	2
Individual and Dual Sports (PE 328)		3	
Organization and Administration of Health and Physical Education (PE 401)	3		
Tests and Measurements in Physical Education (PE 425)		3	
Administration of School Health Education (PE 405)		2	
Adaptive Physical Education (PE 406)			2
Electives	6	4	10
	16	16	16

* To be selected in accordance with the General Education requirement.

Physical Education

	F	W	S
Junior (Men)			
American Government (Pol Sc 301).....	3		
Growth of American Democracy (Hist 304).....			3
* Literature or Philosophy	3	3	
* Literature, Philosophy, or Arts			3
Educational Psychology (Ed 312).....		3	
Football Coaching Theory and Practice (PE 321)			2
Track and Field Theory and Practice (PE 333).....			2
Baseball Coaching Theory and Practice (PE 323).....	2		
Teaching Physical Education in Elementary Schools (PE 332).....		3	
Physiology of Exercise (PE 303).....			2
Techniques of Officiating (PE 331).....	2		
Physical Education Activity (PE 341, 342, 343).....	1	1	1
Kinesiology (PE 302).....		2	
Wrestling Coaching Theory and Practice (PE 327)		2	
Electives	6	2	4
	17	16	17
Senior (Men)			
Senior Project (PE 461, 462).....	2	2	
Undergraduate Seminar (PE 463).....			2
U.S. in World Affairs (Hist 305).....	3		
Basketball Theory and Practice (PE 422).....		2	
Minor Sports Theory and Practice (PE 441, 442, 443).....	1	1	1
Organization and Administration of Physical Education (PE 401).....	3		
Tests and Measurements in Physical Education (PE 425).....		3	
Administration of School Health Education (PE 405).....		2	
Athletic Training and Massage (PE 432)		1	
Adaptive Physical Education (PE 406)			2
Electives	7	5	11
	16	16	16

CURRICULUM FOR THE MASTER OF SCIENCE DEGREE

(For complete requirements see the *Graduate Study Bulletin*)

	<i>Units</i>
Required graduate level courses in physical education	15
(PE 501, 502, 511, 513 and 521)	
Elective graduate level units in physical education.....	9
(Of these, six may be taken in PE 599, Thesis)	
A maximum of 21 units may be taken outside of the Physical Education Department in 300, 400, and 500 level courses. Of these, at least nine must be taken in 500 level courses	21
	45

See COURSES OF INSTRUCTION section of this catalog for descriptions of courses in Physical Education and other subjects.

* To be selected in accordance with the General Education requirement.

PRINTING TECHNOLOGY AND MANAGEMENT DEPARTMENT

Department Head, Roderick W. Carruthers

James H. Babb
Wesley T. Dunn

C. Herold Gregory
H. E. Howe

James E. Rice
Joseph W. Truex

The Printing Technology and Management Department offers a four-year curriculum leading to the Bachelor of Science degree. The curriculum is designed to prepare graduates for positions of responsibility in the printing and publishing industry or teaching graphic arts vocations in the high schools and junior colleges.

The program provides courses in general education together with a core of printing technology courses. The student is introduced to all stages of the printing processes during the first two years. A concentration in either printing management or printing education is selected for the junior and senior years. In addition, students are required to complete a number of courses in business administration or professional education, depending upon the concentration selected. A student who terminates his formal education prior to graduation will have sufficient training to qualify him for employment in the printing and publishing industry. However, the program is not designed to provide vocational education for the printing trade.

The Printing Technology and Management Department occupies 33,000 square feet of floor space in the modern Graphic Arts Building. Theory is taught in up-to-date classrooms incorporating the latest in teaching aids. Ten modern, well-equipped laboratories of printing equipment provide the student with diverse experience in the practical aspects of the industry.

Students seeking careers in business administration, architecture, journalism or other professions which commonly engage the services of printers or publishers will benefit significantly from an understanding of the printing processes, their requirements and limitations. The following courses are offered for non-majors only: Graphic Arts Processes (PT 127), Advanced Graphic Arts (PT 238), Screen Processes (PT 357), Survey of Lithography I (PT 338), Survey of Lithography II (PT 339). Non-majors will also find the following courses to be beneficial to acquiring a broad knowledge of printing processes: Introduction to Printing Technology (PT 101), Proofreading (PT 102), Graphics (PT 104), Theory of Color (PT 201), Tape Perforation (PT 341).

CURRICULAR CONCENTRATIONS

Printing Management

This concentration is designed as a flexible program for the student interested in pursuing employment as a printing plant manager, planner, quality control specialist, production control specialist, estimator, or printing salesman. The program also prepares the student for employment as a technical representative for manufacturers of graphic arts machinery and products.

Printing Education

This concentration is designed for the student interested in teaching printing in junior and senior high schools. The program requires the student to graduate with a major in printing, an academic minor and selected courses in professional education. Completion of the program requires a fifth year of graduate work. The Standard Teaching Credential with Specialization in Secondary Teaching is granted upon successful completion of this program.

CURRICULUM IN PRINTING TECHNOLOGY AND MANAGEMENT

Freshman	F	W	S
Introduction to Printing Technology (PT 101).....	2		
Proofreading (PT 102)			2
Graphics (PT 104)	3		
Printing Papers (PT 111)	2		
Typography (PT 122)		3	
Binding and Finishing (PT 123)			3
Relief Plates (PT 126)		2	
Letterpress (PT 132, 133)		3	3
Journalism History (Jour 201).....	3		
Elementary Probability and Statistics (Stat 211)	3		
Freshman Composition (Eng 104, 105)	3	3	
Statistical Methods (Stat 212)		3	
Applied Biology (Bio 110)			3
* Art			3
Health Education (PE 107).....			2
Manufacturing Processes (MP 151)		1	
Physical Education (PE 141)	½	½	½
	<hr/>	<hr/>	<hr/>
	16½	15½	16½
Sophomore			
Theory of Color (PT 201)	2		
Introduction to Printing Management (PT 204).....	2		
Copy Preparation for Reproduction (PT 223)			3
Composing Machines (PT 224, 225)	3	3	
Process Camera (PT 227)	3		
Stripping and Platemaking (PT 228)		3	
Lithography (PT 229)			3
** Automated Typesetting (PT 236)			3
General Chemistry (Chem 124, 125, 126)	4	4	4
* Literature	3	3	
General Psychology (Psy 202)			3
Sports Education (PE 241)	½	½	½
Electives		4	
	<hr/>	<hr/>	<hr/>
	17½	17½	16½
Junior			
Estimating (PT 303)			3
Theory of Lithography (PT 312)		3	
Publication Systems (PT 332)		3	
Principles of Economics (Ec 211, 212)	3	3	
Public Speaking (Sp 201)	2		
* Social sciences (except History)	3		
Report Writing (Eng 218)			3
Logic (Phil 202)		3	
## Electives and courses to complete major	9	4	10
	<hr/>	<hr/>	<hr/>
	17	16	16

* To be selected with adviser approval in accordance with the General Education requirement.

** Satisfactory skill in typing required for this course. A student who does not type may satisfy the requirement by electing Bus 141.

29 of the elective units in the junior and senior years must be chosen with the approval of the adviser in a field of concentration.

Printing

Senior	F	W	S
Senior Project (PT 461, 462)	2	2	
Undergraduate Seminar (PT 463)			2
Psychology of Business and Industry (Psy 302).....		3	
American Government (Pol Sc 301)	3		
Growth of American Democracy (Hist 304)		3	
U.S. in World Affairs (Hist 305)			3
##Electives and courses to complete major	12	8	11
	<u>17</u>	<u>16</u>	<u>16</u>

See COURSES OF INSTRUCTION section of this catalog for descriptions of courses in Printing Technology and Management and other subjects.

29 of the elective units in the junior and senior years must be chosen with the approval of the adviser in a field of concentration.

SPEECH DEPARTMENT

Department Head, James R. Emmel

Robert L. Andreini
Robert L. Cleath

Evelyn K. deVoros
J. Murray Smith

Donald R. Martin
Keith E. Nielsen

The Speech Department through its courses in speech, drama, and radio-television serves all schools of the College. Its offerings enable students to fulfill requirements in general education, to advance programs of preparation and vocational objectives in their chosen fields, and to enhance avocational pursuits and cultural development.

The primary objective of the department is to prepare prospective teachers of speech for positions in elementary and secondary schools. It also provides courses for students planning to enter many other fields related to the communicative arts and sciences.

The Speech Department offers an academic teaching major and a speech minor available to all teacher candidates. All speech majors must complete the basic speech curriculum and consult their advisers in the choice of electives to round out their programs and fulfill their minors. Both major and minor programs are geared not only to provide broad theoretical knowledge of the speech field, but also to give students extensive experience in diversified speech activities.

A variety of co-curricular activities is available for students interested in the speech arts. Intercollegiate forensic tournaments provide opportunities for Cal Poly speakers to compete with students from other universities and colleges in debate and other speech events. The college drama program annually presents six productions, three produced by the Speech Department, and three sponsored by the College Union Drama Committee. A broad spectrum of dramatic productions brings classical, musical, and modern plays to the college community. The college FM radio station KCPR provides experience for students in radio station operation, program production, and radio engineering. Additional speech activities include speechmaking to community audiences, programs of oral interpretation, and laboratory drama presentations.

CURRICULUM IN SPEECH

Freshman	F	W	S
Principles of Speech (Sp 200).....	3		
Introduction to Broadcasting, Debate, and Theater (Sp 214, 215, Dr 220).....	3	3	3
Freshman Composition (Eng 104, 105, 106).....	3	3	3
History of Civilization (Hist 101, 102, 103).....	3	3	3
† Natural science	3	3	3
Physical Education (PE 141).....	½	½	½
Electives		3	3
	15½	15½	15½

† To be selected in accordance with the General Education requirement.

Speech

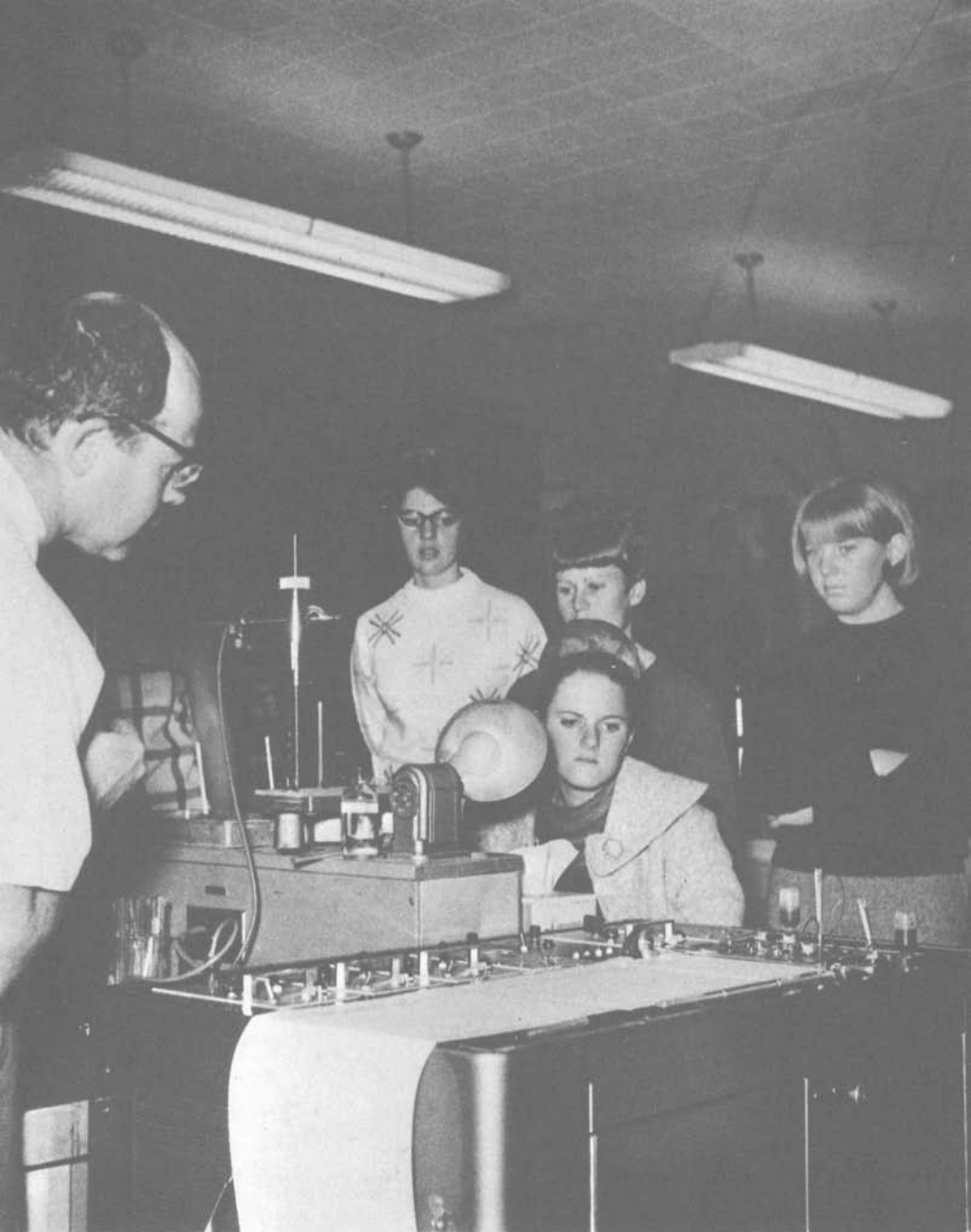
	F	W	S
Sophomore			
Essentials of Discussion (Sp 217).....	3		
Forensic Activity (Sp 300).....	1		
Argumentation and Debate (Sp 301).....	3		
Voice and Phonetics (Sp 306).....		3	
Introduction to Fiction, Drama, Poetry (Eng 201, 202, 203)	2	2	3
Mathematics for General Education (Math 100).....	3		
† Natural science		3	3
General Psychology (Psy 202).....		3	
Survey of Economics (Ec 201)			3
Health Education (PE 107).....			2
Sports Education (PE 241)	½	½	½
† Literature or Philosophy.....		3	
Electives	3	2	5
	<u>15½</u>	<u>16½</u>	<u>16½</u>
Junior			
Advanced Composition—Non-Fiction (Eng 304).....			3
Introduction to Speech Correction (Sp 302).....	3		
Industrial and Professional Speech (Sp 303).....	3		
Persuasion (Sp 304).....		3	
Techniques of Oral Reading (Sp 305).....			3
Acting (Dr 320).....	3		
Directing (Dr 321)		3	
American Government (Pol Sc 301).....	3		
Growth of American Democracy (Hist 304).....		3	
United States in World Affairs (Hist 305).....			3
* Electives	4	6	6
	<u>16</u>	<u>15</u>	<u>15</u>
Senior			
Introduction to Shakespeare (Eng 210).....			3
Stagecraft (Dr 322).....		2	
Discussion and Conference Leadership (Sp 403).....		2	
Advanced Oral Interpretation (Sp 405).....	2		
History and Criticism of Public Address (Sp 407, 408, 409)	3	3	3
Biblical Reference in Speechmaking (Sp 410).....			3
Applied Broadcasting Practices (Sp 451).....	2		
Undergraduate Seminar (Sp 463)	2		
Senior Project (Sp 461)		2	
* Electives	6	6	6
	<u>15</u>	<u>15</u>	<u>15</u>

See COURSES OF INSTRUCTION section of this catalog for descriptions of courses in Speech, Drama and other subjects.

* At least 10 units must be at the 300–400 level.

† To be selected in accordance with the General Education requirement.

THE SCHOOL OF APPLIED SCIENCES



**Physiograph Recording Heart Beat of a Frog Under Influence
of Drugs in Biological Sciences Laboratory**

THE SCHOOL OF APPLIED SCIENCES

Clyde P. Fisher, Dean

Vance D. Lewis, Associate Dean

The School of Applied Sciences offers curricula leading to the Bachelor of Science degree in Biochemistry, Biological Sciences, Chemistry, Computer Science, Mathematics, Physics, and Social Sciences. The Bachelor of Arts degree is offered in History. Graduate programs leading to the Master of Arts degree in Mathematics, Master of Science in Biological Sciences, and Master of Science in Applied Mathematics are also offered. The Reserve Officer Training Corps (ROTC) program is made available to all male students of the college through the Military Science Department. The College Library, serving the entire College, is also administered by the School.

Courses offered by the School of Applied Sciences meet the needs of several groups of students:

1. Students working toward Bachelor of Arts, Bachelor of Science, Master of Arts, or Master of Science degrees with majors in the Applied Sciences.
2. Students from all majors who need to meet the requirements in General Education. These courses are required so that every graduate will be better prepared to be a participating citizen and a productive member of the State, nation, and world.
3. Students in Agriculture, Applied Arts, Applied Sciences, Architecture, and Engineering who require competency in subjects which support, complement, or are closely related to their areas of specialization.
4. Students planning to become elementary, secondary, or junior college teachers, who need background in mathematical, natural and social sciences.

The School of Applied Sciences and the School of Applied Arts cooperate to recommend candidates for the California Standard Teaching Credential with majors in Biological Sciences, Chemistry, History, Mathematics, Physics, and Social Sciences. Teaching minors are offered in Botany, Chemistry, History, Mathematics, Physics, Political Science, and Zoology. Students may concentrate in Physical Sciences or Social Sciences as a part of the requirements for the Master of Arts in Education degree.

BIOLOGICAL SCIENCES DEPARTMENT

Department Head, Glenn A. Noble

John H. Applegarth
James P. Bacon, Jr.
Tracey G. Call
Fred L. Clogston
Douglas Donaldson
Harry L. Fierstine
Harry C. Finch
R. C. Hatfield
Dennis N. Homan

C. Dennis Hynes
Richard Krejsa
Alfred S. Lazarus
David H. Montgomery
Richard F. Nelson
Pratapsinha C. Pendse
Richard A. Pimentel
John D. Pinto
Ronald L. Ritschard

Robert J. Rodin
Aryan I. Roest
Shirley R. Sparling
William D. Stansfield
John W. Thomas
David H. Thomson
William Thurmond
Derrell B. White
Wayne T. Williams

The department offers a complete undergraduate program leading to the Bachelor of Science degree. Students majoring in the department may concentrate interests in bacteriology, botany, entomology, zoology and other areas. Courses are offered to fulfill the biology requirements of other departments. For superior students a graduate program is offered leading to the Master of Science degree.

After earning a degree, students generally enter fields such as teaching, medical and biological laboratory technology, public health, wildlife management, agriculture, private, state and national park and forest services. A significant number of students also enter graduate or professional schools for advanced study of botany, entomology, microbiology, plant pathology, zoology, marine sciences, veterinary science, medicine, and dentistry.

Students are trained using modern facilities and instruments in a geographical area offering unusual opportunities for the study of a wide variety of plants and animals representative of both Northern and Southern California.

Courses designed for graduate students are numbered in the 500 series. Requirements for admission as a graduate student are given in the section on **ADMISSIONS** of this catalog. In addition, a candidate must provide test results of the Graduate Record Examination aptitude test and the advanced test in biology. Details of the curriculum for each student will be developed with his graduate committee and adviser.

In addition to the curricular concentrations listed below, the department offers the courses required for preprofessional training in medicine and the paramedical fields. In the teaching area, all the state requirements may be met for an academic major in biological sciences leading to credentials in secondary and in elementary teaching.

CURRICULAR CONCENTRATIONS

Applied Field Biology

This concentration is designed for students interested in wildlife conservation, fisheries, and natural history.

Biology

The general biology program is designed for the student who wants the broadest possible training.

Botany

Plant structure, physiology, ecology, diseases and classification are the basis for courses leading to competency required for persons desiring positions as botanists.

Clinical Laboratory Technology (Medical Technology)

Concentration in this field prepares the student for his in-service training in a hospital.

Entomology

The courses in general entomology, insect morphology, and economic entomology prepare the student for many occupations with insect pests, as technicians in research or extension programs, or for graduate studies.

Marine Biology

Students in this concentration may look forward to occupational and professional work in the rapidly expanding field of oceanographic studies and enterprises.

Microbiology

This concentration is designed for students interested in bacterial and other microbiological aspects of food, sanitation, industry, the ocean or public health.

Plant Pathology

Students are trained to recognize, evaluate and solve plant disease problems. They may be employed as technicians in research or extension service or may continue their studies at the graduate level.

Zoology

Invertebrate or vertebrate animals, terrestrial or aquatic species, macro or micro studies, form the basis of programs involved in the training of zoologists.

CURRICULUM IN BIOLOGICAL SCIENCES

	F	W	S
Freshman			
General Botany (Bot 121, 122, 123) or General Zoology	4	4	4
¹ General Inorganic Chemistry (Chem 121, 122)	4	4	
Organic Chemistry (Chem 226)			4
Freshman Composition (Eng 104, 105, 106)	3	3	3
* Mathematics for Engineers (Math 117)	5		
² Analytic Geometry & Calculus (Math 141)		4	
Health Education (PE 107)			2
Physical Education (PE 141)	½	½	½
** Electives and courses to complete major		1	3
	16½	16½	16½
Sophomore			
General Zoology (Zoo 131, 132, 133) or General Botany	4	4	4
General Bacteriology (Bact 221)	4		
General Psychology (Psy 202)		3	
General Entomology (Ent 126)			4
College Physics (Phys 121, 122, 123)	4	4	4
Principles of Economics (Ec 201 or 211)	3		
* Social Sciences (except History)		3	
Sports Education (PE 241)	½	½	½
** Electives and courses to complete major	1	2	4
	16½	16½	16½
Junior			
Ecology (Bio 325)	3		
Genetics (Bio 303)	3		
Advanced Composition (Eng 200 or 301)		3	
American Government (Pol Sc 301)	3		
* Literature or Philosophy	3	3	
* Humanities			3
Senior Project (Bio 461)			2
Biochemistry (Chem 328)		4	
Public Speaking (Sp 201)			2
** Electives and courses to complete major	5	7	10
	17	17	17

* To be selected in accordance with the General Education requirement.

** Of the total elective units a minimum of 22 shall be chosen in a field of concentration in the Biological Sciences with the approval of the adviser. At least 14 of these must be in 300 or 400 courses.

¹ Chem 124, 125 will substitute for Chem 121 and 122.

* Math 102 and 103 or Math 100 and 200 will substitute.

Biological Sciences

Senior	F	W	S
General Physiology (Bio 431)	4		
Senior Project (Bio 462)		2	
Undergraduate Seminar (Bio 463)			2
Growth of American Democracy (Hist 304)		3	
U.S. in World Affairs (Hist 305)			3
** Electives and courses to complete major	12	11	11
	<hr/>	<hr/>	<hr/>
	16	16	16

CURRICULUM FOR THE MASTER OF SCIENCE DEGREE

(For college requirements see the *Graduate Study Bulletin*)

	Units
Courses in the general field of biological sciences	12
Selected from 300, 400 and 500 level courses. Three units each must be selected from courses having any four of the following prefixes: Bact, Bio, Bot, Cons, Ent, Zoo.	
Courses in the major field of interest	15
Selected from 300, 400 and 500 level courses in the Biological Sciences Department.	
Electives from 300, 400 and 500 level courses.....	6
Thesis (Bio 599)	9
Seminar in Biology (Bio 590)	3
	<hr/>
	45***

See COURSES OF INSTRUCTION section of this catalog for descriptions of courses in Bacteriology, Biology, Botany, Conservation, Entomology, Zoology and other subjects.

*** Of the total elective units a minimum of 22 shall be chosen in a field of concentration in the Biological Sciences with the approval of the adviser. At least 14 of these must be in 300 or 400 courses.

**** At least 18 of these units must be in 500 level courses, and all 45 units must be acceptable for graduate credit.

CHEMISTRY DEPARTMENT

Department Head, Bruce Kennelly

Alan W. Cobb
Charles E. Dills
Norman L. Eatough
A. L. Houk
Jerome F. Houllis
Martin Kellerman

Richard L. Kissling
James M. Peters
Russell L. Tice
Howard Walker
Harold J. Watson

Omer K. Whipple
Leslie A. Whitaker
Hewitt G. Wight
David G. Williamson
Max T. Wills
Marshall Wright

The Chemistry Department serves all schools of the College by offering courses which help provide scientific explanations for work taken by students in Agriculture, Engineering, Applied Arts and Applied Sciences. The department also contributes to the general education of all students by giving them a thorough foundation in the method and factual content of chemical science and the role it plays in society. The chemistry and biochemistry curricula lead to the bachelor of science degree.

Chemistry is the branch of science which deals with the composition and changes in composition of all substances. A science with a scope this broad offers many fields of specialization. Chemists analyze and synthesize such products as plastics, fibers, drugs, dyes and rocket fuels. The petroleum, textile, fertilizer, pharmaceutical, paint, paper and metal industries employ large numbers of chemists for quality control and development of new products. The occupational objectives of the curricula in chemistry are to qualify students for entry at the bachelor's level into positions in government service and industry and to help prepare teachers of the physical sciences. The curriculum in chemistry prepares the student to work at the bachelor's level as an organic, analytical, physical, or inorganic chemist. In addition, graduates have entered medical, dental and graduate schools. Courses are taught in modern laboratories making use of the latest scientific instruments.

The Chemistry Department is fully approved and accredited by the American Chemical Society. Students who wish to be recommended for certification by the American Chemical Society must complete the equivalent of 6 quarter units in German or Russian (Lang 101 and 102, Foreign Language—Independent Study) and pass an examination demonstrating the ability to read scientific German or Russian. Use and application of German or Russian scientific literature is to be made in chemistry courses taken during the third and fourth year of the program and in the literature search for the Senior Project.

Graduate courses are offered which help to complete the requirements for the teaching credentials and for the master of arts degree in education with a concentration in the physical sciences.

Proper selection of electives in the curriculum in biochemistry permits specialization in nutritional, food, feed, pesticide, fertilizer or clinical chemistry. Students find employment in the laboratories of those companies devoted to the processing of food products and the production of agricultural and pharmaceutical chemicals. Positions for which the student may qualify include vitamin assay biochemist, food and drug chemist, meat technologist, fertilizer chemist, insecticide residue analyst and public health chemist.

It is recommended that the high school student planning to major in chemistry or biochemistry include at least two semesters of chemistry in his high school program. Students enrolling in General Chemistry or General Inorganic Chemistry are required to pass Chem 106, or the equivalent, or have the recommendation of their faculty adviser.

Chemistry

CURRICULUM IN CHEMISTRY

	F	W	S
Freshman			
General Chemistry (Chem 121, 122, 126, or Chem 124, 125, 126).....	4	4	4
General Chemistry Laboratory (Chem 143).....			1
Freshman Composition (Eng 104, 105, 106).....	3	3	3
Mathematics for Engineers (Math 117).....	5		
Analytic Geometry and Calculus (Math 141, 142).....		4	4
Physical Education (PE 141).....	½	½	½
Health Education (PE 107).....			2
Biological Sciences (Bio 101, 110, Bot 121 or Zoo 131).....	3		
Electives.....		5	3
	<hr/> 15½	<hr/> 16½	<hr/> 17½
Sophomore			
Quantitative Analysis (Chem 331, 332).....	4	4	
Organic Chemistry (Chem 226).....			4
Laboratory Glassblowing (Chem 342).....		1	
General Physics (Phys 131, 132, 133).....	4	4	4
Analytic Geometry and Calculus (Math 143, 241).....	4	4	
* Literature.....	3		
Sports Education (PE 241).....	½	½	½
Economics (Ec 201 or 211).....			3
Report Writing (Eng 218).....		3	
* Literature, or Philosophy.....			3
* Humanities.....			3
Electives.....	2		
	<hr/> 17½	<hr/> 16½	<hr/> 17½
Junior			
Organic Chemistry (Chem 327, 338).....	5	5	
Biochemistry (Chem 328).....		4	
Physical Chemistry (Chem 412, 413).....		3	3
Physical Chemistry Laboratory (Chem 442, 443).....		1	1
Qualitative Organic Analysis (Chem 343).....			4
Introduction to Optics and Atomic Physics (Phys 211).....			4
General Psychology (Psy 202).....	3		
American Government (Pol Sc 301).....	3		
* Social Sciences (except History).....	3		
Electives.....	2	4	4
	<hr/> 16	<hr/> 17	<hr/> 16
Senior			
Inorganic Chemistry (Chem 402).....		3	
Advanced Organic Chemistry (Chem 403).....			3
Advanced Physical Chemistry (Chem 437).....	4		
Instrumental Analysis (Chem 439).....	4		
Senior Project (Chem 461, 462).....	2	2	
Undergraduate Seminar (Chem 463).....			2
Growth of American Democracy (Hist 304).....		3	
U.S. in World Affairs (Hist 305).....			3
Electives.....	6	8	8
	<hr/> 16	<hr/> 16	<hr/> 16

* To be selected in accordance with the General Education requirement.

CURRICULUM IN BIOCHEMISTRY

	F	W	S
Freshman			
General Chemistry (Chem 121, 122, 126, or 124, 125, 126).....	4	4	4
Freshman Composition (Eng 104, 105, 106).....	3	3	3
Mathematics for Engineers (Math 117).....		5	
Analytic Geometry and Calculus (Math 141).....			4
Physical Education (PE 141).....	½	½	½
Health Education (PE 107).....			2
General Zoology (Zoo 131) or General Botany (Bot 121).....	4		
Electives.....	4	3	3
	<hr/>	<hr/>	<hr/>
	15½	15½	16½
Sophomore			
Quantitative Analysis (Chem 331).....	4		
Organic Chemistry (Chem 226).....	4		
Biochemistry (Chem 328, 329).....		4	4
Physics (Phys 121, 122, 123 or 131, 132, 133).....	4	4	4
Laboratory Glassblowing (Chem 342).....		1	
Mathematics (Math 142 or Stat 211).....	4		
Economics (Ec 201 or 211).....			3
* Humanities.....		3	
Sports Education (PE 241).....	½	½	½
Electives.....	1	4	5
	<hr/>	<hr/>	<hr/>
	17½	16½	16½
Junior			
Organic Chemistry (Chem 327).....	5		
Biophysical Chemistry (Chem 337).....	4		
** Physical Chemistry (Chem 412, 413).....		3	3
** Physical Chemistry Laboratory (Chem 442, 443).....		1	1
Qualitative Organic Analysis (Chem 343).....			4
Report Writing (Eng 218).....		3	
American Government (Pol Sc 301).....	3		
* Social Sciences (except History).....		3	
* Literature.....			3
General Psychology (Psy 202).....		3	
Electives.....	5	4	6
	<hr/>	<hr/>	<hr/>
	17	17	17
Senior			
Advanced Biochemistry (Chem 434).....	4		
Food Analysis (Chem 435).....		4	
Agricultural Chemicals (Chem 436).....			4
Senior Project (Chem 461, 462).....	2	2	
Undergraduate Seminar (Chem 463).....			2
Special Problems for Advanced Undergraduates (Chem 400).....		2	
* Literature, or Philosophy.....	3		
Growth of American Democracy (Hist 304).....	3		
U.S. in World Affairs (Hist 305).....		3	
Electives.....	5	5	10
	<hr/>	<hr/>	<hr/>
	17	16	16

See COURSES OF INSTRUCTION section of this catalog for descriptions of courses in Chemistry and other subjects.

* To be selected in accordance with the General Education requirement.

** Chem 335 and Chem 338 may be substituted.

MATHEMATICAL SCIENCES DEPARTMENT

Department Head, Milo E. Whitson

Sabah Al-hadad	D. Edward Glassco	George R. Mach
Oliver M. Andersen	John E. Groves	Y. Leon Maksoudian
Robert A. Bentley	Thomas E. Hale	John H. Manning
Arthur C. W. Bethel	Charles J. Hanks	George H. McMeen
William O. Buschman	Reino Hannula	Allen D. Miller
Robert O. Butler	Charles T. Haskell	Peter L. Quinn
Joseph Carlson	Wilbur Hogan	Chester H. Scott
James T. Culbertson	Gilbert L. Homfeld	Oliver T. Snodgrass
Charles D. Curtis	Kempton L. Huehn	Joseph B. Stefanac
Robert H. Dourson	Rex L. Hutton	Daniel F. Stubbs
Charles A. Elston	W. Boyd Judd	Neal R. Townsend
Oswald J. Falkenstern	Elmo A. Keller	Ralph M. Warten
Volmar A. Folsom	Paul S. Lansman	Frederick G. Wild
Kenneth G. Fuller	George C. Laumann	Arthur D. Wirshup
Curtis F. Gerald	George M. Lewis	John A. Woodworth
	John J. Lowry	

The Mathematical Sciences Department offers a complete program of college work leading to a bachelor of science degree in mathematics with options in applied mathematics, computer science, statistics, and mathematics teaching. A bachelor of science degree is also offered in Computer Science. Besides the courses for these degrees, the department offers mathematical sciences courses needed in all other curricula for developing vocational and professional proficiency and for general education. The occupational flavor generated by these close interdepartmental relations increases both the usefulness of and the demand for the graduates who complete any one of the degrees in mathematical sciences.

High school students planning a mathematics or computer science major should have at least three, preferably four, years of high school mathematics, and two years of science.

Scores from the College Entrance Examination Board Scholastic Aptitude Test are used to determine the students' relative facility and competence in mathematics. For the particular mathematical sciences requirements in any curriculum refer to the display of that curriculum in this catalog.

A program of study which leads to a Master of Science degree in Applied Mathematics is offered. A graduate of this program will be qualified for advanced positions in industry, business, civil service, college teaching, or other scientific endeavors. A Master of Arts degree in Mathematics is offered to further the preparation of students who may be working for a junior college or a secondary teaching credential.

CURRICULUM IN COMPUTER SCIENCE

Freshman	F	W	S
Fortran Programming (CSc 101).....	1		
Programming of Data Processing Equipment (CSc 102).....		2	
Boolean Algebra (CSc 218).....			3
Analytic Geometry and Calculus (Math 141, 142, 143).....	4	4	4
General Physics (Phys 131, 132).....		4	4
Freshman Composition (Eng 104, 105, 106 or 219).....	3	3	3
* Biological Sciences	3		
Health Education (PE 107).....	2		
Physical Education (PE 141).....	½	½	½
Electives	3	3	2
	16½	16½	16½

* To be selected in accordance with the General Education requirement.

Mathematics

	F	W	S
Sophomore			
Linear Programming (CSc 219).....			3
Digital Computer Programming (CSc 221).....	3		
Digital Computer Programming (CSc 304).....			3
Analytic Geometry and Calculus (Math 241).....	4		
Differential Equations (Math 242).....		4	
Mathematics of Matrices (Math 204).....		3	
General Physics (Phys 133).....	4		
Principles of Economics (Ec 211, 212).....		3	3
* Literature	3		
Sports Education (PE 241).....	½	½	½
Basic Accounting (Actg 131, 132).....		3	3
Electives	2	3	4
	16½	16½	16½
Junior			
Systems Analysis (CSc 350).....			3
Programming Languages (CSc 451).....			3
Introduction to Numerical Methods (CSc 332).....	3		
Numerical Analysis (CSc 333).....		3	
Mathematics of Statistics (Stat 321, 322).....	3	3	
* Literature or Philosophy	3	3	
General Chemistry (Chem 124).....			4
American Government (Pol Sc 301).....		3	
Growth of American Democracy (Hist 304).....			3
General Psychology (Psy 202).....	3		
Control Analysis (IE 304).....	2		
Operations Research (IE 305).....		2	
Electives	3	3	3
	17	17	16
Senior			
Algorithmic Compilers (CSc 351).....	3		
Computer Programming Systems (CSc 452).....		3	
Multi-Programming Systems (CSc 453).....			3
Senior Project (CSc 461, 462).....	2	2	
Undergraduate Seminar (CSc 463).....			2
Analog Computer Techniques (El 313).....	3		
U.S. in World Affairs (Hist 305).....		3	
Math of Stat (Stat 323) or Stat Qual Cont (IE 336).....	3		
Managerial Accounting (Actg 301).....			4
Genetics (Bio 303).....		3	
Principles of Digital Computers (EL 404).....			3
Electives	6	5	4
	17	16	16

CURRICULUM IN MATHEMATICS

Curricular Options

Applied Mathematics

The Applied Mathematics Option emphasizes preparation for industrial and civil service employment.

Computer Sciences

The Computer Sciences Option provides a significant core of theoretical and practical courses for occupational and professional competence in this new field.

Mathematics Teaching

The Mathematics Teaching Option provides the undergraduate basis in the preparation of the student for teaching at the secondary level.

* To be selected in accordance with the General Education requirement.

Mathematics

Statistics

The Statistics Option provides a specialization in the applications of statistics for wide industrial or business use as well as for many governmental agencies.

	F	W	S
Freshman			
Analytic Geometry and Calculus (Math 141, 142, 143)	4	4	4
Fortran Programming (CSc 101)	1		
Physics (Phys 131, 132 or Phys 121, 122)		4	4
Freshman Composition (Eng 104, 105, 106)	3	3	3
Health Education (PE 107)	2		
Physical Education (PE 141)	½	½	½
Electives and courses to complete major	6	5	5
	<hr/>	<hr/>	<hr/>
	16½	16½	16½
Sophomore			
Analytic Geometry and Calculus (Math 241)	4		
Digital Computer Programming (CSc 221)			3
Differential Equations (Math 242)		4	
Mathematics of Statistics (Stat 321)			3
Mathematics of Matrices (Math 204)	3		
Physics (Phys 133 or Phys 123)	4		
Economics (Ec 201 or 211)		3	
* Social Sciences (except History)			3
* Oral and written expression			2
General Psychology (Psy 202)		3	
Sports Education (PE 241)	½	½	½
Electives and courses to complete major	5	6	5
	<hr/>	<hr/>	<hr/>
	16½	16½	16½
Junior			
* Literature or Philosophy	3	3	
* Biological Sciences			3
* Natural Sciences (except Physics)	4	3	
American Government (Pol Sc 301)		3	
Growth of American Democracy (Hist 304)			3
Electives and courses to complete major	10	8	11
	<hr/>	<hr/>	<hr/>
	17	17	17
Senior			
Senior Project (Math 461, 462)	2	2	
Undergraduate Seminar (Math 463)			2
* Literature	3		
U.S. in World Affairs (Hist 305)	3		
Electives and courses to complete major	8	14	14
	<hr/>	<hr/>	<hr/>
	16	16	16

APPLIED MATHEMATICS OPTION (ADD COURSES BELOW TO MATHEMATICS CURRICULUM)

Junior and Senior Years

Math 312 Linear Algebra	(3)	Math 404 Vector Analysis	(3)
Math 318, 319 Advanced		Math 408 Complex Variables	(3)
Engineering Mathematics	(7)	Math 412 Advanced Calculus	(3)
CSc 332, 333 Numerical Analysis	(6)	CSc 304 Computer Programming	(3)
Math 381 Modern Algebra	(3)		

* To be selected in accordance with the General Education requirement.

Mathematics

COMPUTER SCIENCE OPTION (ADD COURSES BELOW TO MATHEMATICS CURRICULUM)

Sophomore Year

CSc 102 Programming..... (2)	Math 318 Advanced Engineering
CSc 218 Boolean Algebra (3)	Mathematics (4)

Junior and Senior Years

CSc 304 Computer Programming .. (3)	CSc 452 Computer Programming .. (3)
CSc 351 Algorithmic Compilers --- (3)	CSc 332, 333 Numerical Analysis.. (6)
CSc 451 Programming (3)	Stat 322 Math of Statistics (3)

MATHEMATICS TEACHING OPTION (ADD COURSES BELOW TO MATHEMATICS CURRICULUM)

Sophomore Year

CSc 102 Programming (2)	Math 104 Slide Rule..... (1)
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Junior and Senior Years

Math 307 Theory of Equations (3)	Math 411 Foundation of Geometry (3)
Math 312 Linear Algebra (3)	Math 441 Theory of Numbers (3)
Math 381, 382 Modern Algebra ... (6)	Math 442 College Geometry (3)
Math 402-3 Secondary School Math (6)	

STATISTICS OPTION (ADD COURSES BELOW TO MATHEMATICS CURRICULUM)

Junior and Senior Years

Stat 322-3 Math of Statistics (6)	CSc 332 Numerical Methods..... (3)
Stat 425-6 Probability Theory (6)	Math 412 Advanced Calculus (3)
Math 312 Linear Algebra (3)	*Bio 303 Genetics (3)
Math 318 Advanced Engineering	CSc 304 Computer Programming .. (3)
Mathematics (4)	IE 336 Quality Control (3)

CURRICULUM FOR THE MASTER OF ARTS DEGREE

(For complete requirements see the Graduate Study Bulletin)

	<i>Units</i>
I. Required:	
Math 508, 509, 510, 580	12
II. Select two courses from the following:	
Math 505, 506, 507, 512, 516, 521	6
III. Select six courses from those in II above and the following:	
CSc 304, 332, 333, 351; Math 312, 313, 381, 382, 404, 405, 408, 409, 411, 412, 413, 441, 442	18
IV. Elect 9 additional units with approval of adviser	9
V. Satisfactorily complete a terminal written and oral examination	—
Total units	45

CURRICULUM FOR THE MASTER OF SCIENCE DEGREE

(For complete requirements see the Graduate Study Bulletin)

	<i>Units</i>
I. Required: Math 512, 516, 580, 593	12
II. Select one of the following courses: Math 513, CSc 531; Stat 527.....	3
III. Select with approval of adviser 9 units in one area outside Mathematical Sciences (physics, engineering, economics, chemistry, etc.)	9
IV. Electives with approval of advisory committee to include at least 15 units of Mathematical Sciences courses, 3 units of which shall be 500-numbered courses	21
Total units	45

See COURSES OF INSTRUCTION section of this catalog for descriptions of courses in Computer Science, Mathematics, Philosophy, Statistics and Probability, and other subjects.

* Satisfies Biological Sciences General Education course requirement.

MILITARY SCIENCE DEPARTMENT

Department Head, Colonel Robert W. Green

Capt. Keith M. Nightingale Maj. Arnold T. Rossi Maj. Douglas W. Smith
Maj. Donald Phillips Lt. Col. George L. Silva Maj. Malcolm K. Wallace

PURPOSE

The production of qualified, educated junior officers for the United States Army is a vital part of the National Defense effort. The Military Science Department conducts ROTC (Reserve Officer Training Corps) classroom and leadership laboratory instruction for students who desire to fulfill their military obligation as commissioned officers. Additionally, certain outstanding students are offered direct commissions in the U. S. Regular Army. As in any other academic courses, credits accrued for completing Military Science courses are awarded toward college graduation. It is permissible for students not enrolled in the ROTC program to enroll in particular Military Science classes for elective credit based on the determination that the student load is within the capability of the assigned instructor group. To be eligible for participation in ROTC, a student must be a regularly enrolled male student of this institution, have sufficient time remaining as a college student to permit completion of the advanced ROTC course prior to reaching his 28th birthday, and be physically, mentally and morally qualified. A physical examination is required for acceptance into the program. Students who anticipate enrollment in ROTC should arrange to have a report of physical examination completed prior to registration. ROTC scholarships are available; see under SCHOLARSHIPS.

ROTC removes most uncertainties connected with the student's military obligation. Senior students are given the opportunity to request the time they desire to be called to active duty, the branch of the army in which they desire to be commissioned, and the general geographical area in which they desire to be stationed while performing their active duty.

EQUIPMENT AND UNIFORMS

All necessary ROTC equipment, uniforms and text books are furnished to the student by the United States government free of charge. Title to this property, other than expendable items, remains with the government. Upon entry into active duty after graduation, each commissioned student is granted a special \$300 uniform allowance to use for purchasing his own uniforms.

DRAFT DEFERMENT

Each regularly enrolled ROTC student may execute a deferment agreement with the United States government at the end of the first quarter of his freshman year. The agreement provides absolute draft deferment as long as the student remains enrolled in the ROTC program.

Graduating students who have completed the ROTC program and who apply to and are accepted by accredited institutions for graduate instruction, upon approval of the Department of the Army, are deferred from active duty to obtain a graduate degree.

FOUR YEAR PROGRAM

The four year elective ROTC program is a progressive course of instruction divided into a two year basic course and a two year advanced course. The basic course may be substituted for PE 141 and 241 courses.

Students with previous military service, or with Junior or Senior ROTC credit from another institution, may be granted advanced standing in the course. Students who will complete degree requirements in three academic years may enroll in freshman and sophomore ROTC courses concurrently and complete the four-year program in three years.

Army regulations permit a student to substitute related academic courses for one quarter of each of the last two years of the ROTC program. These academic courses are in place of the regular MSc winter quarter requirements during each of the junior and senior year sequences.

Four year program students are required to attend only one summer training camp for a six week period following completion of their junior year. The government furnishes all uniforms, equipment, room, board, and medical care for students at camp. Additionally, each student is paid \$240 and is provided a six-cents-per-mile transportation allowance from and to his home. Academic grades are awarded and five quarter units of credit granted for the successful completion of this summer camp.

Students who elect to enter the advanced course of ROTC instruction are paid \$50 per month while they are enrolled in the advanced course. There is no obligation connected with the receipt of this subsistence allowance other than the willingness by the student to accept a reserve commission of Second Lieutenant if it is offered to him upon graduation and to serve a period of two years on active duty as a commissioned officer.

TWO YEAR PROGRAM

The opportunity offered by ROTC training is available in a special program to transfer students and to currently enrolled college students who were unable, for cogent reasons, to participate in the four year ROTC program.

To qualify for the two year program, the student must complete a special basic ROTC summer camp of six weeks duration. Those students currently enrolled at this college will complete the basic camp between their sophomore and junior years. Transfer students must complete the camp during the summer immediately prior to their matriculation at this college. It is important that potential transfer students who plan to participate in the two year ROTC program make their intentions known directly to the Head, Military Science Department, no later than 1 March of the year they plan to register at the college even though this date may precede the date of their final acceptance by the college.

The government will provide six-cents-per-mile transportation allowance to and from basic summer camp, and the rate of pay as an Army Private. All equipment, uniforms, room and board are furnished free while at camp. The basic summer camp is in addition to the advanced summer camp which must be taken at the end of the junior year as part of the advanced course. No college credit is given for the basic summer camp and it cannot be substituted for PE 141 or 241.

Upon successful completion of the basic summer camp, the student is admitted directly into the advanced ROTC course in September during his registration at the college. He is entitled then to the advanced course subsistence allowance and all other privileges of advanced course standing as enumerated above under the four year program.

See COURSES OF INSTRUCTION section of this catalog for descriptions of courses in Military Science and other subjects.

PHYSICS DEPARTMENT

Department Head, Woodford E. Bowls

Joseph C. Boone	Lewis E. Hammitt	David M. Roach
Athol J. D. Brunk	Robert E. Holmquist	Arthur Z. Rosen
George L. Cassiday	Ray J. Holt	Gordon A. Silver
William E. Clements	Aernat S. James	William L. Van Wyngaarden
Walter E. Elliott	Herbert R. Kabat	Ralph S. Vrana
Robert H. Frost	Leon W. Magur	Lloyd J. Work
Teymoor Gedayloo	Kenneth S. Ozawa	

The Physics Department serves all schools of the College by offering courses which help provide scientific explanations for work taken by students in Agriculture, Engineering, Applied Arts and Applied Sciences. The department also contributes to the general education of all students by giving them a thorough foundation in the method and factual content of the physical sciences and the roles which they play in society. The physics curriculum leads to the bachelor of science degree.

The occupational objectives of the curriculum in physics are to qualify students for entry at the bachelor's level into positions in government service and industry and to help prepare teachers of the physical sciences. Graduates are engaged in the development and design of products associated with electronics, aircraft, guided missiles, satellites, atomic power, petroleum, paper, metals, textiles and plastics.

Graduate courses are offered which help to complete the requirements for the teaching credentials and for the master of arts degree in education with a concentration in the physical sciences.

It is suggested that the high school student planning to major in physics include in his high school program as much as possible of the following: six semesters of college preparatory mathematics, two of physics and two of chemistry.

CURRICULUM IN PHYSICS

	F	W	S
Freshman			
Biological Sciences (Bio 101, 110, Bot 121, or Zoo 131).....	3		
Freshman Composition (Eng 104, 105, 106).....	3	3	3
Manufacturing Processes (MP 141, 142)	1	1	
Health Education (PE 107).....			2
Physical Education (PE 141).....	½	½	½
Analytic Geometry and Calculus (Math 141, 142, 143).....	4	4	4
General Chemistry (Chem 121, 122, 126).....	4	4	4
General Physics (Phys 131, 132).....		4	4
Electives	1		
	<hr style="width: 100%; border: 0.5px solid black;"/>	<hr style="width: 100%; border: 0.5px solid black;"/>	<hr style="width: 100%; border: 0.5px solid black;"/>
	16½	16½	17½
Sophomore			
Economics (Ec 201 or 211).....			3
Sports Education (PE 241)	½	½	½
Analytic Geometry and Calculus (Math 241).....	4		
Differential Equations (Math 242).....		4	
Fortran Programming (CSc 101).....		1	
Organic Chemistry (Chem 226).....	4		
General Physics (Phys 133).....	4		
Introduction to Optics and Atomic Physics (Phys 211).....		4	
Introduction to Nuclear Physics (Phys 213).....			3
Introductory Nuclear Physics Laboratory (Phys 243).....			1
Electrical Circuits (Phys 206).....		3	
Electrical Measurements Laboratory (Phys 256, 257).....		1	1
Physical Optics (Phys 223).....			4
Electives	5	3	5
	<hr style="width: 100%; border: 0.5px solid black;"/>	<hr style="width: 100%; border: 0.5px solid black;"/>	<hr style="width: 100%; border: 0.5px solid black;"/>
	17½	16½	17½

Physics

	F	W	S
Junior			
* Literature			3
Vector Analysis (Math 404, 405).....	3	3	
Heat (Phys 301).....			3
Analytic Mechanics (Phys 302, 303).....	3	3	
Electricity and Magnetism (Phys 306).....			4
Sound (Phys 212).....		3	
Quantum Mechanics (Phys 405).....		3	
Atomic Physics (Phys 401).....	3		
Atomic Physics Laboratory (Phys 441).....	1		
* Humanities			3
Electives	3	4	6
	16	16	16
Senior			
American Government (Pol Sc 301).....	3		
Growth of American Democracy (Hist 304).....		3	
U. S. In World Affairs (Hist 305).....			3
* Social Sciences (other than History).....	3		
* Literature or Philosophy		3	
Electricity and Magnetism (Phys 307).....	3		
Nuclear Physics (Phys 403).....		3	
Nuclear Physics Laboratory (Phys 443).....		1	
Quantum Mechanics (Phys 407).....			3
Solid State Physics (Phys 406).....			3
Solid State Physics Laboratory (Phys 456).....			1
Senior Project (Phys 461, 462).....	2	2	
Undergraduate Seminar (Phys 463).....			2
Electives	5	4	4
	16	16	16

See COURSES OF INSTRUCTION section of this catalog for descriptions of courses in Physics and Physical Science and other subjects.

* To be selected in accordance with the General Education requirement.

SOCIAL SCIENCES DEPARTMENT

Department Head, M. Eugene Smith

William M. Alexander	Shirley E. Keilbach	Barton C. Olsen
Robert E. Burton	Mary Jane Kobayashi	B. L. Scruggs
A. Norman Cruikshanks	Scott J. Maughan	Robert E. Treacy
Ralph W. Dilts	Edward L. Mayo	Herman C. Voeltz
James L. Fitts	Peter H. Molnar	Jay C. von Werlhof
Anne C. Fowler	Thomas F. Nolan	Joseph N. Weatherby
Michel N. Franck	Michael J. O'Leary	William M. Wharton, Jr.
Donald W. Hensel	Charles S. Oldham	

The Social Sciences Department serves all of the schools of the College in providing general education for citizenship. In general, the department seeks to provide the student with a better understanding of the society in which he lives, to develop in the student those skills and attitudes which are prerequisites for effective citizenship, and to prepare and encourage the individual toward intelligent and responsible social action.

The occupational objectives of the department are to train students for those numerous entry jobs in civil service, business, industry, and social welfare which require a bachelor's degree with a major in the social sciences, and to train those who expect to teach the social studies in elementary or secondary schools.

Students with majors in fields other than the social sciences may select courses which will aid in qualifying them for a variety of civil service positions.

The department offers two degrees: a Bachelor of Arts in History and a Bachelor of Science in Social Sciences. The latter provides opportunity for concentration in any one of several areas.

The department also offers graduate courses which permit the student to qualify for a Master of Arts Degree in Education with a concentration in the field of social sciences.

CURRICULUM IN HISTORY

	F	W	S
Freshman †			
History of Civilization (Hist 101, 102, 103).....	3	3	3
Freshman Composition (Eng 104, 105, 106).....	3	3	3
Physical Education (PE 141).....	½	½	½
* Natural Science	3	3	3
Principles of Political Science (Pol Sc 101, 102, 103).....	3	3	3
Mathematics for General Education (Math 100).....			3
Health Education (PE 107).....		2	
Electives	3	2	
	15½	16½	15½
Sophomore			
History of the United States (Hist 201, 202, 203).....	3	3	3
Sports Education (PE 241).....	½	½	½
* Natural Science	3	3	
Economics (Ec 211 or 201).....	3		
Principles of Sociology (Soc 201, 202).....	3	3	
Public Speaking (Sp 201, 202).....		2	2
Cultural Anthropology (Ant 201).....			3
General Psychology (Psy 202).....			3
Electives	3	5	5
	15½	16½	16½

* Select according to General Education requirement; must include one sequence course for three quarters with a minimum of 9 units.

† Typing proficiency is required for graduation. A student who does not type may use one unit of elective credit to take Bus 141 to satisfy the requirement.

Social Sciences

	F	W	S
Junior			
European Historiography (Hist 301).....	3		
American Historiography (Hist 302).....		3	
U.S. in World Affairs (Hist 305).....			3
U.S. History at 300-400 level		3	3
History (other than U.S.) at 300-400 level	3	3	3
** Literature	3	3	
** Literature or Philosophy			3
*** Electives	6	3	3
	15	15	15
Senior			
Senior Project (Hist 460)	2		
History at 300-400 level	3	3	6
Social Sciences (other than History) at 300-400 level	3	3	
** Philosophy or Art			3
*** Electives	7	9	6
	15	15	15

CURRICULUM IN SOCIAL SCIENCES Curricular Concentrations

Social Sciences

With proper selection of electives, this concentration leads to preparation for elementary or secondary teaching on completion of the fifth year. It also provides the student with a broad background for entry positions in business.

Social Services

By providing instruction in the social services area, this concentration prepares students to enter such fields as social work, corrections, probation, or parole.

Government Service

With proper selection of electives, this concentration provides students with preparation for entry positions in government at the local, state, and national level such as management analyst, personnel specialist, budget specialist, and administrative specialist.

	F	W	S
Freshman †			
Freshman Composition (Eng 104, 105, 106).....	3	3	3
Physical Education (PE 141).....	½	½	½
Basic Mathematics for General Education (Math 100)			3
* Natural Science	3	3	3
History of Civilization (Hist 101, 102, 103).....	3	3	3
Principles of Political Science (Pol Sc 101, 102, 103).....	3	3	3
Electives	4	4	2
	16½	16½	17½

* To be selected in accordance with the General Education requirement. Include one sequence course which meets for three quarters with a minimum of 9 units.

** To be selected in accordance with the General Education requirement.

*** At least 19 units must be at the 300-400 level. Two years of foreign language are highly recommended.

† Typing proficiency is required for graduation. A student who does not type may use one unit of elective credit to take Bus 141 to satisfy the requirement.

Social Sciences

Sophomore	F	W	S
Introduction to Philosophy (Phil 201).....			3
Principles of Sociology (Soc 201, 202, 203).....	3	3	3
Public Speaking (Sp 201).....	2		
Health Education (PE 107).....		2	
Sports Education (PE 241).....	½	½	½
General Psychology (Psy 202).....			3
* Natural Science.....	3	3	
History of the United States (Hist 201, 202, 203).....	3	3	3
Electives.....	5	5	5
	<u>16½</u>	<u>16½</u>	<u>17½</u>
Junior			
Literature (Eng 211, 212, 213; or 311, 312, 313).....	3	3	3
Advanced Public Speaking (Sp 202).....	2		
Cultural Anthropology (Ant 201).....			3
Senior Project (Soc Sc 461).....			2
U.S. in World Affairs (Hist 305).....	3		
Philosophy (Phil 202 or 204).....		3	
Principles of Economics (Ec 211, 212, 213).....	3	3	3
** Electives and courses to complete the major.....	6	6	6
	<u>17</u>	<u>15</u>	<u>17</u>
Senior			
Sociology (300 or 400 level).....	3		
Senior Project (Soc Sc 462).....	2		
Undergraduate Seminar (Soc Sc 463).....		2	
Political Science or History (Any 6 units from 300 or 400 level).....		3	3
Geography (Geog 315).....	3		
Comparative Economic Systems (Ec 304).....			3
Social Psychology (Psy 401).....		3	
** Electives and courses to complete the major.....	8	8	10
	<u>16</u>	<u>16</u>	<u>16</u>

See COURSES OF INSTRUCTION sections of this catalog for descriptions of courses in Anthropology, Geography, History, Political Science, Social Science, Sociology and other subjects.

* To be selected in accordance with the General Education requirement.

** From 18 to 28 of the elective units must be chosen with the approval of the adviser in a field of concentration.

THE SCHOOL OF ARCHITECTURE



A Section of Architectural Exhibit at Poly Royal

THE SCHOOL OF ARCHITECTURE

George J. Hasslein, FAIA, Dean

Directors

Paul R. Neel
William R. Phillips
Kenneth E. Schwartz

Robert F. Asbury, Jr.
William H. Brown
Eric J. Dluhosch
John W. Edmisten
J. Handel Evans
Donald P. Grant
R. L. Graves, Jr.
Joseph I. Greenberg
Kenneth L. Haggard
Kenneth M. Hall
Anatol Helman

George K. Ikenoyama
Thomas V. Johnston
Donald J. Koberg
Charles C. Kridler
David W. Kwan
Billy J. Leftwich
Jack R. Lewis
Hans Mager
Willard L. McGonagill
Dell O. Nickell
Raymond E. Nordquist

C. James Olsten
Benjamin K. Polk
Charles W. Quinlan
John P. Reuer
Kurt E. Rogness
John S. Stuart
Stephen J. Wanat
Wesley S. Ward
Maurice L. Wilks
Robert E. Williams

The School of Architecture offers three interacting degree programs: Architecture, Architectural Engineering, and City and Regional Planning. The student is kept aware that these programs have a common objective and that they are all aimed at the betterment of man's physical environment. These programs endeavor to give the student a set of social values, a technical background, and a training which releases his creative faculties in a way which will make him effective in his profession and as a person.

The first two years of all three programs contain much common material and develop basic skills and background. A decision as to which program the student will pursue need not be made until the beginning of the junior year providing the basic curriculum for the first two years is followed without the substitutions indicated. The College is residential in nature with an interest in and concern for the student's total time and being. The location of the College between the great population centers of San Francisco and Los Angeles is ideal for an architectural school in that it permits concentration and provides for environmental studies ranging from rural to large metropolitan complexes. There is a continual stream of visiting instructors. Field trips are arranged to various parts of the State as required work.

The excellent School facilities include design laboratories, dark rooms, soils laboratory, stress laboratory, shops, construction yard, project yard and grading galleries. An outlying area of 12 acres known as the "Canyon" is available for extensive experimental construction.

The School is a Member of the Association of Collegiate Schools of Architecture and maintains a Student Chapter of the American Institute of Architects and Scarab, the professional architectural fraternity.

All student work submitted for course credit becomes School property and will be returned only at the discretion of the instructor.

Recommended Preparation

The prospective transfer student should endeavor to include in his preparation as much as possible of the following 24 semester units of introductory architectural courses: Perspective 2, Freehand Drawing 1, Architectural Delineation 3, Architectural Design 10, Materials of Construction 2, Architectural Drafting 6.

Basic Curriculum

The first two years of the Architecture, Architectural Engineering, and City and Regional Planning curriculums have been designed to introduce the student to material which is pertinent to all these disciplines.

Architecture

The student who is undecided as to his degree objective should follow the common two-year program shown without the substitutions indicated and may thereby delay his degree decision until the end of the sophomore year. The student who is certain of his degree objective or who makes his decision during his freshman or sophomore year may take advantage of the substitutions noted.

BASIC CURRICULUM

Freshman	F	W	S
Descriptive Drawing (Arch 140)	1		
Introduction to Drawing and Perspective (Arch 144)	3		
⁴ Materials of Construction (Arch 106)			3
Delineation (Arch 145, 146)		2	2
Introduction to Design (Arch 111, 132, 143)	2	2	2
¹ Analytic Geometry and Calculus (Math 141, 142, 143)	4	4	4
² General Physics (Phys 131, 132)		4	4
Engineering Surveying (AE 237)		2	
Freshman Composition (Eng 104, 105)	3	3	
Public Speaking (Sp 201)			2
General Psychology (Psy 202)	3		
Health Education (PE 107)	2		
Physical Education (PE 141)	$\frac{1}{2}$	$\frac{1}{2}$	$\frac{1}{2}$
	<hr/>	<hr/>	<hr/>
	18 $\frac{1}{2}$	17 $\frac{1}{2}$	17 $\frac{1}{2}$
Sophomore			
Basic Design (Arch 251, 252, 253)	3	3	3
³ Introduction to Urban Environment (CRP 211, 212, 243)	3	3	3
⁴ Architectural Practice (Arch 231, 232, 233)	3	3	3
⁴ Strength of Materials (Arch 205, 206)		3	3
Engineering Problems—Digital Computers (Arch 250)	1		
² General Physics (Phys 133)	4		
American Government (Pol Sc 301)	3		
Growth of American Democracy (Hist 304)		3	
U.S. in World Affairs (Hist 305)			3
⁵ Philosophy		3	
Survey of Economics (Ec 201)			3
Sports Education (PE 241)	$\frac{1}{2}$	$\frac{1}{2}$	$\frac{1}{2}$
	<hr/>	<hr/>	<hr/>
	17 $\frac{1}{2}$	18 $\frac{1}{2}$	18 $\frac{1}{2}$

CURRICULUM IN ARCHITECTURE

The educational preparation for the professional practice of architecture is of five year duration culminating in the Bachelor of Architecture degree. This program is accredited by the National Architectural Accrediting Board. Preparation for architecture spans several disciplines and requires a range of aptitudes. Not only must the architect be technically able and have a good aesthetic sense, but he must understand people and be sensitive to their needs. The program in architecture is broad in nature; however with a selection of elective work, areas of specialization can be included in the planning or engineering fields.

¹ City and Regional Planning majors may substitute Math 200, 210, Stat 211.

² City and Regional Planning majors may substitute Phys 121, 122, 123.

³ Architectural Engineering majors will substitute a life science elective from the General Education List for CRP 243.

⁴ City and Regional Planning majors may substitute 18 units of courses with School approval.

⁵ To be selected in accordance with the General Education requirement.

Architecture

	F	W	S
Junior			
Architectural Design (Arch 351, 352, 353)	4	4	4
Architectural Practice (Arch 341, 342, 343)	2	2	2
Stress Analysis (Arch 304)	3		
Steel and Timber Structures (Arch 305, 306)		3	3
Stress Analysis Laboratory (Arch 344)	1		
History of Architecture (Arch 317, 318, 319)	3	3	3
Electrical Systems Design (EE 324)	3		
Plumbing and Building Sanitation (ME 333)		3	
Heating and Air Conditioning (EnvE 306)			3
Business Law Survey (Bus 301)		3	
*Life Sciences elective			3
	16	18	18
Senior			
Architectural Design (Arch 451)	5	5	5
Professional Practice (Arch 441, 442, 443)	2	2	2
Concrete and Masonry Structures (Arch 404, 405, 406)	2	2	2
Undergraduate Seminar (Arch 463)			2
**Electives	6	6	6
	15	15	17
Fifth Year			
Architectural Design (Arch 551)	5	5	5
Design Project (Arch 571, 572, 573)	2	2	2
Engineering Economy (IE 414)	3		
*Literature		3	
*Humanities			3
**Electives	6	6	6
	16	16	16

CURRICULUM IN ARCHITECTURAL ENGINEERING

The four year program in Architectural Engineering leads to the Bachelor of Science degree and has its major emphasis in the structural engineering of buildings. However, the program permits entry into many phases of the construction industry. The curriculum is creative in purpose with aptitudes in science and mathematics recommended. Students of architectural engineering are educated with architects in a way to give their work the same dedication. Graduates of this program will in general seek professional registration as civil and structural engineers.

	F	W	S
Junior			
Design Theory (Arch 314, 315, 316)	2	2	2
Architectural Practice (Arch 341, 342, 343)	2	2	2
Stress Analysis (Arch 304)	3		
Steel and Timber Structures (Arch 305, 306)		3	3
Stress Analysis Laboratory (Arch 344)			1
Analytic Geometry and Calculus (Math 241)	4		
Mathematics of Matrices (Math 204)		3	
Introduction to Numerical Methods (CSc 332)			3
General Chemistry (Chem 124)		4	
Electrical Systems Design (EE 324)	3		
Plumbing and Building Sanitation (ME 333)		3	
Heating and Air Conditioning (EnvE 306)			3
*Humanities	3		
*Literature			3
	17	17	17

* To be selected in accordance with the General Education requirement.

** 10 units of electives must be approved by the School.

Architecture

Senior	F	W	S
Structural Design (Arch 444, 445, 446)	5	5	5
Design Theory (Arch 401, 402, 403)	2	2	2
General Engineering (Arch 414, 415, 416)	2	2	2
Soil Mechanics and Foundations (Arch 421, 422)	3	3	
Senior Project (Arch 461, 462)	2	2	
Undergraduate Seminar (Arch 463)			2
Electives	3	3	6
	<hr/>	<hr/>	<hr/>
	17	17	17

CURRICULUM IN CITY AND REGIONAL PLANNING

The four year curriculum leading to a Bachelor of Science degree in City and Regional Planning is directed toward a very important emerging professional field which guides and designs the communities wherein we live. Inasmuch as the education of the student of planning is associated with that of the architect and the engineer, the program has an additional emphasis on design of the physical environment as well as on the process of planning. Aptitude demands on the student are less in the area of mathematics and more concerned with the activities of people and their values.

Junior	F	W	S
Planning Theory (CRP 301, 302, 303)	2	2	2
Planning Laboratory (CRP 351, 352, 353)	4	4	4
Design for Planners (Arch 347, 348, 349)	2	2	2
Business Law Survey (Bus 301)	3		
Political & Economic Geography (Geog 315)	3		
State and Local Government (Pol Sc 401)		3	
Introduction to Sociology (Soc 105)	3		
Social Problems (Soc 303)		3	
Report Writing (Eng 218)			3
*Literature		3	
*Life Sciences elective			3
	<hr/>	<hr/>	<hr/>
	17	17	14
Senior			
Planning Theory (CRP 401, 402)	2	2	
Planning Laboratory (CRP 451, 452, 453)	4	4	4
Senior Project (CRP 461, 462)	2	2	
Undergraduate Seminar (CRP 463)			2
Design for Planners (Arch 447, 448, 449)	2	2	2
Urban Sociology (Soc 313)	3		
*Humanities elective			3
Electives	2	3	3
	<hr/>	<hr/>	<hr/>
	15	13	14

See COURSES OF INSTRUCTION section of this catalog for descriptions of courses in Architecture and Architectural Engineering, City and Regional Planning and other subjects.

* To be selected in accordance with the General Education requirement.

THE SCHOOL OF ENGINEERING

CHART OF RECOMMENDED JUNIOR COLLEGE PREPARATION FOR ENGINEERING MAJOR CURRICULA

CAL POLY ENGINEERING MAJORS REQUIRING VARIOUS COURSES¹

Recommended J. C. Preparation in Terms of Cal Poly Courses	Chr. Units	Aero	EE	EL	ET	EnvE	IE	IT	ME	WM
Chemistry										
Chem 121, Gen Inorg Chem.....	4				X			X X	X X	X X X
Chem 122, Gen Inorg Chem.....	4									
Chem 124, Gen Chem.....	4		X X	X X						
Chem 125, Gen Chem.....	4									
Chem 126, Gen Chem.....	4									
Mathematics										
Math 117, Math for Engrs.....	5				X X X X X X			X X		X X X X X X
Math 131, Math for Engrs.....	4									
Math 132, Math for Engrs.....	4									
Math 133, Math for Engrs.....	4									
Stat 211, Elem Prob & Stat.....	3									
Math 141, Anal Geom & Calc.....	4		X X X X X X	X X X X X X						
Math 142, Anal Geom & Calc.....	4									
Math 143, Anal Geom & Calc.....	4									
Math 241, Anal Geom & Calc.....	4									
Math 242, Diff Equations.....	4									
Physics										
Phy 121, College Physics.....	4				X X X X			X X X X		X X X X
Phy 122, College Physics.....	4									
Phy 123, College Physics.....	4									
Phy 131, Gen Phys for Engrs.....	4		X X X X	X X X X						
Phy 132, Gen Phys for Engrs.....	4									
Phy 133, Gen Phys for Engrs.....	4									
Phy 211, Optics & Atom Phys.....	4									
Engineering & Supporting Courses										
Engineering Drafting.....	---		1	3	4	6	3	3	6	1
Engr 240, Digital Comp Appl.....	---	1	1	1	1	1	1	0	1	1
Mfg Processes.....	---	4	4	4	8	6	6	6	6	4
Strength of Mat., Aero 207 or Aero 202.....	---	5	5	0	5	5	5	0	5	5
Engr Statistics and Dynamics.....	---	7	7	7	7	7	7	0	7	7
Power Tech (IT 122-3), Electr., (IT 131-2-3), Tech Comp (IT 101), Hum Rel (IR 118).....	---							18		
General Education										
Soc Sc (Psy 202, Pol Sc 301, Hist 304-5, Econ).....	---	18	21	18	15	15	18	15	18	18
Humanities (Lit., Phil., etc.).....	---	9	9	9	9	9	9	9	9	9
Miscellaneous: PE (3), Health (2), Eng Comp (6), Sp (2), Biology (3), etc.....	---	18	17	23	20	11	16	26	9	16
Maximum Transfer Units.....	---	105	105	105	105	105	105	105	105	105

¹ The prospective transfer student should consult the curriculum in this catalog for his particular major, including possible options or concentrations.

THE SCHOOL OF ENGINEERING

Archie Higdon, Dean

Charles R. Russell, Associate Dean

The Engineers' Council for Professional Development defines engineering "as the profession in which a knowledge of the mathematical and natural sciences gained by study, experience, and practice is applied with judgment to develop ways to utilize economically the materials and forces of nature for the benefit of mankind."

Engineering at Cal Poly is strongly oriented toward preparing young people for immediate entry into the practice of engineering in the industrial world upon graduation from one of the four-year bachelor's degree programs. Each student selects his major as a freshman and takes at least one course per quarter in that major from the first quarter at Cal Poly. This process increases motivation to master the mathematics, basic science, and engineering science which constitute a very important half of each engineering curriculum.

Engineering graduates of Cal Poly are in great demand. They command high salaries and find an endless variety of engineering challenges awaiting them. They enter design, manufacturing, research, development, sales, maintenance, operation, etc. in industry, government, consulting firms, and many related activities. Increasing numbers find employment outside of the engineering profession in positions where an engineering education is either required or preferred.

Engineering curricula offered in the School of Engineering leading to the Bachelor of Science degree are: Aeronautical Engineering, Electrical Engineering, Electronic Engineering, Environmental Engineering, Industrial Engineering, Mechanical Engineering, and Metallurgical Engineering.

The School of Engineering also offers curricula leading to the Bachelor of Science degree in Engineering Technology and Industrial Technology.

Engineering Technology is defined by the Engineers' Council for Professional Development as that part of the technological field which requires the application of scientific and engineering knowledge and methods combined with technical skills in support of engineering activities, relating the craftsman to the field of engineering.

Industrial Technology provides professional preparation for students desiring careers in industrial sales, production supervision, industrial education, and closely related fields. The Industrial Sales and Technology option relates the applied aspects of engineering to business management. The Industrial Education option prepares graduates for industrial arts and trade-technical teaching positions in high schools and junior colleges.

AERONAUTICAL ENGINEERING DEPARTMENT

Department Head, Charles P. Davis

Alfred E. Andreoli	Frank J. Hendel	Clifford J. Price
Thomas W. Carpenter	Jon A. Hoffmann	Daniel Sobala
Lester W. Gustafson	Louis C. Miller	

The Aeronautical Engineering curriculum prepares students for engineering work dealing with the structure, propulsion, control, and ground support equipment for aircraft, missiles, and spacecraft. The problems faced by the aerospace industry offer an unusual engineering challenge. Much of the analysis must be accomplished at the very frontiers of knowledge yet products must nevertheless be designed and manufactured. Thus, an exceptionally wide gamut of engineering abilities is required within the industry.

The program of the Aeronautical Engineering Department places emphasis on both analysis and design. Supplementary to both is the basic work in drafting, shops, and laboratory. Throughout the entire four-year curriculum there is constant interplay between theory and application. Opportunities are available for advanced elective work in the student's field of special interest.

Graduates of the Aeronautical Engineering Department obtain employment in all phases of the aerospace industry such as general design, aerodynamics, stress analysis, flight testing, and field engineering.

The department has laboratories for fabrication, propulsion, structural test, and aerodynamics, and also has two design rooms and a hangar with adjoining airstrip.

The department sponsors a student chapter of the national society—the American Institute of Aeronautics and Astronautics.

CURRICULUM IN AERONAUTICAL ENGINEERING

Freshman	F	W	S
Aerospace Fundamentals (Aero 121, 122, 123)	3	3	3
* Manufacturing Processes	1	1	2
Elements of Electronics (EL 101)			2
Electronics Laboratory (EL 141)			1
Fundamentals of Technical Drawing (ET 151)		2	
Analytic Geometry and Calculus (Math 141, 142, 143)	4	4	4
General Physics (Phys 131, 132)		4	4
Freshman Composition (Eng 104, 105)	3	3	
Applied Biology (Bio 110)	3		
Health Education (PE 107)	2		
Physical Education (PE 141)	½	½	½
	16½	17½	16½

* One of the following sequences: a) WM 141, 142, 251, 252; b) MP 141, 142, 153, 154; c) MP 141, 142, EnvE 141, IE 141.

Aeronautical Engineering

Sophomore	F	W	S
Digital Computer Applications (Engr 250)		1	
Engineering Problems—Analog Computers (Aero 252)		1	
Strength of Materials (Aero 207)			5
Strength of Materials Laboratory (Aero 229)			1
Introductory Circuit Analysis (EL 213)			3
Circuits Laboratory (EL 253)			1
General Physics (Phys 133)	4		
Engineering Mechanics (ME 211, 212)	3	4	
Analytic Geometry and Calculus (Math 241)	4		
Differential Equations (Math 242)		4	
Advanced Engineering Mathematics (Math 318)			4
General Chemistry (Chem 124, 125)	4	4	
Public Speaking (Sp 201)	2		
Introduction to Literature (Eng 207)			3
Survey of Economics (Ec 201)		3	
Sports Education (PE 241)	½	½	½
	17½	17½	17½
Junior			
Aerothermodynamics (Aero 301, 302, 303)	5	5	5
Aerodynamics (Aero 306)			5
Stress Analysis (Aero 324, 325)	4	4	
Analog Computer Techniques (Aero 322)	3		
Electromechanics (EL 311)			3
Electromechanics Laboratory (EL 351)			1
Theory of Materials (WM 301)		3	
General Psychology (Psy 202)		3	
American Government (Pol Sc 301)	3		
Growth of American Democracy (Hist 304)		3	
U. S. in World Affairs (Hist 305)			3
Electives	3		
	18	18	17
Senior			
Flight Mechanics (Aero 421)	3		
Aero Design (Aero 444, 445, 446)	4	4	4
Mechanical Vibrations (Aero 410)		4	
Senior Project (Aero 461, 462)	2	2	
† Aero Elective	3	3	3
† Social Sciences (except History)			3
† Literature or philosophy	3	3	
Elective			7
	15	16	17

See COURSES OF INSTRUCTION section of this catalog for descriptions of courses in Aeronautical Engineering and other subjects.

† 9 units to be selected from the following groups: Aero 411, 412, 413; 401, 402, 403; 408, 409, 414, 415, 416, 417, 419, 457, 458.

† To be selected in accordance with the General Education requirement.

ELECTRICAL ENGINEERING DEPARTMENT

Department Head, Fred W. Bowden

Warren R. Anderson	Richard K. Dickey	Alexander Landyshev
Michael M. Cirovic	William F. Horton	Herbert L. Miles
S. K. Datta	Russell Korsmeyer	

The Electrical Engineering Department prepares the graduate for a career as a professional engineer dealing with electrical energy. It provides a broadly based curriculum, fully supported by auxiliary subjects which increase the graduate's competence to develop his professional career. Students in the department may prepare themselves for employment in the electrical industry which offers a wide range of activity, or they may plan to continue their formal education in graduate school. Graduates are encouraged to seek registration as professional engineers.

Design by the scientific method is the central theme of the curriculum of the Electrical Engineering Department. This theme is incorporated into every possible course situation throughout the entire curriculum and it is emphasized through extensive laboratory course work. As the student's education progresses he is confronted with realistic problems and is expected to utilize his capabilities to (1) recognize the essential technical problems to be solved, (2) use the scientific method in arriving at solutions, (3) evaluate the problem solutions taking into consideration tolerances, economics, reliability, and social impact in addition to strictly technical matters.

Attention is called to courses EE 104, 154, 204, and 244 which are especially structured to assist junior college transfer students in their transition to the department curriculum.

Students are encouraged to participate in the two clubs sponsored by the department: Student Branch of the Institute of Electrical and Electronic Engineers, a technical organization; and the Poly Phase Club, a social club.

CURRICULUM IN ELECTRICAL ENGINEERING

Freshman	F	W	S
Electric Circuits (EE 132, 133)		5	5
Orientation (EE 151)	1		
Engineering Communication (ET 153)	1		
Analytical Geometry and Calculus (Math 141, 142, 143)	4	4	4
General Chemistry (Chem 124, 125)	4	4	
General Physics (Phys 131)			4
Freshman Composition (Eng 104, 105)	3	3	
Public Speaking (Sp 201)			2
†Life Science	3		
§Manufacturing Processes		1	
Health Education (PE 107)			2
Physical Education (PE 141)	$\frac{1}{2}$	$\frac{1}{2}$	$\frac{1}{2}$
	<u>16½</u>	<u>17½</u>	<u>17½</u>

† To be selected in accordance with General Education requirement.
 § To be selected from EnvE 141, IE 141, WM 141, 142, MP 141, 142.

Electrical Engineering

Sophomore	F	W	S
Engineering Electromagnetics (EE 221)	6		
Wave Propagation and Power Transmission (EE 222)		4	
Electron Devices (EL 209)			3
Electron Devices Laboratory (EL 249)			1
Digital Computer Applications (Engr 250)		1	
Analytic Geometry and Calculus (Math 241)	4		
Differential Equations (Math 242)		4	
Advanced Engineering Mathematics (Math 318)			4
General Physics (Phys 132)	4		
Introduction to Optics and Atomic Physics (Phys 211)		4	
Engineering Mechanics (ME 211)			3
Survey of Economics (Ec 201)			3
††Social Sciences, humanities elective		3	
††Literature or philosophy elective	3		3
§Manufacturing Processes		1	
Sports Education (PE 241)	½	½	½
	17½	17½	17½
Junior			
Electromechanics (EE 304)	3		
Electromechanics Laboratory (EE 344)	1		
Network Synthesis (EE 322)		4	
Linear Analysis with Analog Computer (EE 323)			4
Electromagnetic Machines (EE 331, 332)		4	4
Engineering Mechanics (ME 212)	4		
Fluid Mechanics (ME 341)		3	
Electronic Circuits (EL 314, 316)		3	3
Electronic Circuits Laboratory (EL 344, 346)		1	1
Strength of Materials (Aero 207)			5
Mathematics elective	4		
††Social Sciences elective	3		
American Government (Pol Sc 301)	3		
Growth of American Democracy (Hist 304)		3	
	18	18	17
Senior			
Linear Control Systems Design (EE 431)	4		
Digital Computers (EE 432)		3	
*Electrical Engineering electives	3	3	3
**Senior Project (EE 461)	2		
Ethics in Engineering (EE 423)			2
Analog and Hybrid Computers (EE 427)		4	
Thermodynamics (ME 302)	3		
Heat Transfer (EnvE 313)			3
U.S. in World Affairs (Hist 305)	3		
General Psychology (Psy 202)		3	
§Manufacturing Processes	2		
††Literature elective			3
Electives		3	3
	17	16	14

See COURSES OF INSTRUCTION section of this catalog for descriptions of courses in Electrical Engineering and other subjects.

* 6 units from EE 414, 415, EE 421, 422, or EE 425, 426; 3 units from EE 327, EE 402, EE 407, EE 428, or special project approved by adviser and department head.

** Normally, Senior Project will be completed in one quarter, but a student may, in conference with his adviser, elect EE 462 and use two quarters.

†† To be selected with adviser approval in accordance with the General Education requirement.

§ To be selected from Env E 141, IE 141, WM 141, 142, MP 141, 142.

ELECTRONIC ENGINEERING DEPARTMENT

Department Head, E. R. Owen

Richard A. Bucich
Thomas T. L. Chou
Michael M. Cirovic
Edward J. Clerkin
Clifford B. Cloonan
Freeman Freitag

Michael Hawes
Harry Hazebrook
Harold J. Hendriks
Charles A. Herald
William B. Lindsay
John W. McCombs

Wayne E. McMorran
Larry D. Moore
John B. Rapp
Jacob Sabto
Fred H. Steuck
Donley J. Winger

Electronic Engineering is a recognized branch of engineering which provides society with devices and systems of broad utility. By electronics our senses and abilities are amplified and extended. Hearing (radio), seeing (television and radar), feeling (instrumentation), calculating (digital and analog computers), and many other operations can be performed electronically to extend man's power of control and scope of communication.

The instructional program of the department is concerned primarily with the development, design, and application of devices and systems which can perform such functions. Hence, the laboratory, shop, drawing-room, and computer center activities are of equal importance with the classroom lecture activity, providing constant interplay between the theoretical and the experimental aspects of engineering. The student works in an environment which encourages him to derive creative satisfaction from the solution of technological problems under practical conditions.

Preparation for a career in engineering actually begins in high school with the study of mathematics and science. Continued emphasis is placed on these subjects in the college curriculum. However, the freshman will recognize that in addition to these subjects there is planned career-preparation which deals directly with electronics. Not only do these studies in electronics contribute to a practical know-how and understanding of phenomena, but they also support mathematics and physics by showing early application of these studies. By the end of the freshman year the student will have had the opportunity to solve some appropriate problems on digital and analog computers.

The core of the program emphasizes two areas of study in the sophomore and junior years: basic circuit theory using modern methods of analysis in the complex frequency plane and linear transform theory, and the physics and circuitry of linear and nonlinear electronic devices. Continued studies in mathematics, science and other technologies provide the analytical and scientific background for an understanding of solid-state, vacuum, and gas devices.

With the skills and understandings provided by the sophomore-junior year courses, the student is ready in the senior year for specialization-in-depth in some areas and exploration of several advanced subjects in the field of electronics, such as microwave electronics, advanced communication theory, control systems, and network synthesis. Quantum electronics is explored in physics for application to optical communication with coherent light and in micro-integrated circuitry. Through proper selection of electives, students may direct their studies along lines of special interest or more intensive theoretical preparation for graduate study. Students interested in business management may elect advanced related courses in this field.

In contrast with the course of study at most colleges, the extensive sequence of courses in general education is spread uniformly throughout the four years, proceeding from written and oral communication through psychology, literature, and history, to economics and political science.

The department occupies a large and modern facility which has been designed for polytechnic education. Included are facilities for station W6BHZ operated by the Amateur Radio Club. The department also has a student branch of the Institute of Electrical and Electronic Engineers.

Electronic Engineering

CURRICULUM IN ELECTRONIC ENGINEERING

	F	W	S
Freshman			
Introductory Electronics (EL 111, 112)	2	2	
Experimental Electronics (EL 151, 152)	1	1	
Electronic Instruments (EL 113)			2
Electronic Instruments Laboratory (EL 153)			1
Fundamentals of Technical Drawing (ET 151)		2	
* Manufacturing Processes	2	1	1
Analytic Geometry and Calculus (Math 141, 142, 143)	4	4	4
General Physics (Phys 131, 132)		4	4
Freshman Composition (Eng 104, 105)	3	3	
Public Speaking (Sp 201)			2
† Literature			3
† Life science	3		
Health Education (PE 107)	2		
Physical Education (PE 141)	½	½	½
	17½	17½	17½
Sophomore			
Introductory Circuit Analysis (EL 201, 202)	5	3	
Introductory Circuits Laboratory (EL 241, 242)	1	1	
Physical Electronics (EL 207)		4	
Electron Devices (EL 209)			3
Electron Devices Laboratory (EL 249)			1
Graphics in Electronics (EL 146)		1	
Digital Computer Applications (Engr 250)			1
Analytic Geometry and Calculus (Math 241)	4		
Differential Equations (Math 242)		4	
Advanced Engineering Mathematics (Math 318)			4
Introduction to Optics and Atomic Physics (Phys 211)	4		
Engineering Mechanics (ME 211, 212)		3	4
General Psychology (Psy 202)	3		
† Literature or Philosophy			3
Sports Education (PE 241)	½	½	½
	17½	16½	16½
Junior			
Linear Systems Analysis (EL 301, 302)	3	3	
Networks Laboratory (EL 341, 342)	1	1	
Analog Computer Laboratory (EL 343)			1
Electronic Circuits (EL 314, 315, 316)	3	3	3
Electronic Circuits Laboratory (EL 344, 345, 346)	1	1	1
Electronic Equipment Reliability (EL 309)			3
Electromechanics (EE 304)			3
Thermodynamics (ME 302)		3	
Heat Transfer (EnvE 313)			3
Materials Engineering (WM 314)		3	
General Chemistry (Chem 124, 125)	4	4	
Survey of Economics (Ec 201)	3		
† Social Science (except History)			3
Electives	2		
	17	18	17

* Chosen from IE 141, EnvE 141, MP 141, 142, WM 141, 142, 151.

† To be selected with adviser approval in accordance with the General Education requirement.

Electronic Engineering

Senior	F	W	S
Electromagnetic Fields (EL 401)	3		
Principles of Digital Computers (EL 404)	3		
Advanced Amplifier Theory (EL 405)		3	
Linear Control Systems (EE 413)		4	
Electronic Systems Engineering (EL 441, 442, 443)	1	1	1
Senior Project (EL 461, 462)	2	2	
Undergraduate Seminar (EL 463)			2
Solid State Physics (Phys 412)	3		
Solid State Physics Laboratory (Phys 452)		1	
American Government (Pol Sc 301)	3		
Growth of American Democracy (Hist 304)		3	
U. S. in World Affairs (Hist 305)			3
† Humanities electives		3	
* Electives			11
	15	17	17

See COURSES OF INSTRUCTION section of this catalog for descriptions of courses in Electronic Engineering and other subjects.

* Department head approval necessary for 6 of these units to be selected from EL 402, 406, 411, 421, 422, 423, and other advanced courses in the student's professional specialization.

† To be selected with adviser approval in accordance with the General Education requirement.

ENGINEERING TECHNOLOGY DEPARTMENT

Department Head, James M. McGrath

Ray Allen	Earl R. Hesch	R. Wallace Reynolds
Ellard W. Betz	Robert M. Johnston	Carlos C. Richards
George S. Furimsky	Irvin J. Kogan	Leo E. Rogers
Theodore G. Graves	Richard T. Kombrink	Francis F. Whiting
Richard E. Hall	William J. Phaklides	

The Engineers Council for Professional Development defines engineering technology: "Engineering technology is that part of the technological field which requires the application of scientific and engineering knowledge and methods combined with technical skills in support of engineering activities."

The engineering technician is somewhat more specialized than the engineer, focusing on a narrower range of subject matter and skills. In general, he seeks less depth in basic and engineering sciences but develops more specific capability and education in technical skills and in the essential aspects of design and production.

Industry has an urgent need for increasing numbers of qualified engineering technicians. The college output of technicians is far below the demand, thus excellent opportunities exist for interested individuals.

The student who elects to transfer from one of the engineering curricula after completing a significant portion of that engineering program may, with the help of an academic adviser, use most if not all of his completed engineering courses in the technology program.

In addition to the courses in engineering technology the department provides courses in manufacturing processes presenting the engineering characteristics and capabilities of manually and automatically-controlled machine tools used in industry. American Standard Association standards, as applied to tools and machine elements, are an important feature of the courses which include the standard classifications and numbering systems for both ferrous and nonferrous materials.

The modern laboratories for manufacturing processes are well equipped with instrumentation and machine tools to support the principal concept that engineering is a constant interplay between theory and application.

For his area of specialization each student will select an option from the following list.

CURRICULAR OPTIONS

Air Conditioning-Refrigeration Technology

Emphasizes heating, ventilating, air distribution, air conditioning and refrigeration systems. It leads to specialization in the environmental control field.

Electronic Technology

Emphasizes experimental and laboratory phases of the field with coverage of the principles and theory necessary for full comprehension of electronic instruments and essential design problems for units and systems.

Manufacturing Processes Technology

Emphasizes machine tools and their modern control systems as well as the design, construction, and use of all types of production tooling. This is excellent preparation for entry into manufacturing for either design or production responsibility.

Mechanical Technology

Emphasizes applied machine design, mechanical equipment and systems, mechanisms, and production.

Engineering Technology

Welding Technology

Emphasizes all aspects of the welding field including techniques, nondestructive testing, power sources, and production problems.

CURRICULUM IN ENGINEERING TECHNOLOGY

Freshman	F	W	S
Electronic Instrument Practices (ET 132)		3	
Electronic Shop Practices (ET 156)			1
Manufacturing Processes (WM 141, 142)	1	1	
Manufacturing Processes (EnvE 141)			1
Manufacturing Processes (MP 141)	1		
Manufacturing Processes (MP 151)	1		
Elements of Electronics (EL 101)	2		
Electronics Laboratory (EL 141)	1		
Mathematics for Engineers (Math 117)	5		
Technical Calculus (Math 131, 132)		4	4
College Physics (Phys 121, 122)		4	4
Freshman Composition (Eng 104, 105)	3	3	
Health Education (PE 107)			2
Physical Education (PE 141)	$\frac{1}{2}$	$\frac{1}{2}$	$\frac{1}{2}$
Electives and courses to complete major	1		4
	<hr/>	<hr/>	<hr/>
	15½	15½	16½
Sophomore			
Applied Descriptive Geometry (ET 141)	2		
Engineering Drawing Systems (ET 142)		2	
Manufacturing Processes (IE 141)	1		
Fundamentals of Metallic Arc Welding (WM 155)		1	
Digital Computer Applications (Engr 250)		1	
Engineering Statics (ME 205)		3	
Engineering Dynamics (ME 206)			4
Technical Calculus (Math 133)	4		
College Physics (Phys 123)	4		
General Inorganic Chemistry (Chem 121)		4	
Programming of Digital Computers (CSc 221)			3
Basic Accounting (Actg 131)			3
Public Speaking (Sp 201)			2
Sports Education (PE 241)	$\frac{1}{2}$	$\frac{1}{2}$	$\frac{1}{2}$
Electives and courses to complete major	5	5	4
	<hr/>	<hr/>	<hr/>
	16½	16½	16½
Junior			
Mechanics of Materials (Aero 202)	5		
Metallurgy for Engineers (WM 306)		4	
Electrical Analysis (EE 122)		3	
Electrical Engineering Laboratory (EE 251, 252)		1	1
Electric Machines (EE 313)			3
Elementary Probability and Statistics (Stat 211)	3		
Introduction to Literature (Eng 207)		3	
Technical Writing (Eng 219)			3
General Psychology (Psy 202)	3		
Survey of Economics (Ec 201)			3
Electives and courses to complete major	5	5	5
	<hr/>	<hr/>	<hr/>
	16	16	15

Engineering Technology

Senior	F	W	S
Senior Project (ET 461, 462)		2	2
Fluid Flow (ME 311)	3		
Thermodynamics (ME 301)		4	
*Life Science			3
Industrial Management (Mgt 311)			3
American Government (Pol Sc 301)	3		
Growth of American Democracy (Hist 304)		3	
U.S. in World Affairs (Hist 305)			3
*Literature or philosophy	3	3	
Electives and courses to complete major	6	5	5
	15	17	16

AIR CONDITIONING-REFRIGERATION TECHNOLOGY OPTION

(Add Courses Below to Basic Curriculum)

Freshman	Junior
ET 101 Air Conditioning- Refrigeration Codes	EnvE 201-2-3 Heating and Ventilating
(2)	(9)
ET 121 Environmental Graphics.. (2)	ET 321 Air Distribution Systems.. (3)
Sophomore	Senior
ET 122-3 Environmental Graphics	ET 331-2 Refrigeration Systems... (6)
(4)	(5)
EnvE 231-2-3 Fluid Systems	Technical electives
(6)	(3)

ELECTRONIC TECHNOLOGY OPTION

(Add Courses Below to Basic Curriculum)

Freshman	Junior
EL 111 Introductory Electronics.. (2)	ET 233 Electronic Circuits II..... (4)
EL 151 Experimental Electronics.. (1)	ET 341 Electronic Circuits III..... (4)
	ET 342 Microwave Technique ... (4)
Sophomore	Senior
EL 112 Introductory Electronics.. (2)	EL 113 Electronic Instruments ... (2)
EL 152 Experimental Electronics.. (1)	ET 441 Digital Circuits
ET 231 Basic Circuit Analysis..... (4)	(4)
ET 232 Electronic Circuits I	ET 442 Automation Technology.. (4)
(4)	(4)
	ET 443 Electronics Systems
	(4)

MANUFACTURING PROCESSES TECHNOLOGY OPTION

(Add Courses Below to Basic Curriculum)

Freshman	Junior
ET 125 Advanced Turning	MP 421-2-3 Tool Design
(3)	(9)
	IE 232 Metrology
	(2)
Sophomore	Junior
MP 142 Manufacturing Processes.. (1)	IE 314 Production Control
MP 154 Manufacturing Processes.. (1)	(2)
ET 221 Abrasive Machining and Finishing	IE 233 Elements of Numerical Control Machining
(2)	(2)
Sophomore	Senior
ET 222 Advanced Machining Processes	MP 331 Tool Engineering
(3)	(3)
ET 344 Advanced Engineering Drawing	MP 435-6 Tool and Manufac- turing Engineering
(2)	(8)
	Technical electives
	(2)

* To be selected in accordance with the General Education requirement.



Engineering Drafting Laboratory

Engineering Technology

MECHANICAL TECHNOLOGY OPTION (Add Courses Below to Basic Curriculum)

Freshman

- ME 131 Mechanical Systems (3)
ME 144 Mechanical Engineering
Laboratory (1)

Sophomore

- ME 132 Mechanical Systems (3)
ME 145-6 Mechanical Engineer-
ing Laboratory (2)
MP 142 Manufacturing Processes.. (1)
MP 154 Manufacturing Processes.. (1)
WM 121 Principles of Metallurgy (2)
ET 320 Mechanisms (4)

Junior

- ET 344 Advanced Engineering
Drawing (2)
IE 232 Metrology (2)
ME 331 Mechanical Equipment
of Buildings (3)
IE 351 Production and Process
Planning (2)

Senior

- ET 421-2 Applied Machine
Design (8)
Technical electives (6)

WELDING TECHNOLOGY OPTION (Add Courses Below to Basic Curriculum)

Sophomore

- WM 359 Advanced Welding (1)
ET 235 Nondestructive Testing... (5)
ET 236 Welding Power Sources.. (3)

Junior

- ET 324-5-6 Advanced Welding
Technology (15)

Senior

- IE 314 Production Control (2)
WM 434-5-6 Welding Engineer-
ing (9)
MP 331 Tool Engineering (3)
IE 351 Production and Process
Planning (2)

See COURSES OF INSTRUCTION section of this catalog for descriptions of courses in Engineering Technology, Manufacturing Processes and other subjects.

ENVIRONMENTAL ENGINEERING DEPARTMENT

Department Head, Walter E. Holtz

Rodney G. Keiff
Harold M. Cota

Philip W. B. Niles
William J. Phaklides

Environmental Engineering is concerned with the interrelation of man, materials, and processes in a complex and changing environment. The broad field of Environmental Engineering includes Control of Air and Water Pollution, Industrial Hygiene, Reduction of Noise and Vibration, Air Conditioning, Heating, Ventilation, and Refrigeration.

The program offers a sound background in the fundamentals of thermodynamics, heat transfer, fluid mechanics, mass transfer, and physico-chemical characteristics of living and inanimate matter. The student will specialize in one of the curricular concentrations described below. The problem-oriented approach to instruction, in modern well-equipped laboratories, shops and design rooms, provides the student an excellent opportunity to gain understanding and experience as a joint exploration with the faculty.

A student branch of the American Society of Heating, Refrigeration, and Air Conditioning Engineers offers the student a vigorous program of technical and other activities, including field trips each year to the Los Angeles and San Francisco areas to study typical installations of systems.

Graduates obtain employment primarily with consulting engineers, manufacturers, contractors, and governmental agencies.

CURRICULAR CONCENTRATIONS

Air Conditioning and Refrigeration

This concentration prepares students to enter those phases of engineering dealing particularly with thermal systems and their control in a variety of applications ranging from cold storage plants and modern buildings to hypersonic aircraft and missiles.

Air Pollution Control

This concentration provides training in the field of air pollution control. An engineering approach to the subject prepares the student to enter careers in air quality management, and industrial, public and private agencies concerned with solving problems of air pollution.

CURRICULUM IN ENVIRONMENTAL ENGINEERING

Freshman	F	W	S
Environmental Graphics (ET 121, 122, 123)	2	2	2
Manufacturing Processes (EnvE 141, MP 141)	1		1
Analytic Geometry and Calculus (Math 141, 142, 143)	4	4	4
General Physics (Phys 131, 132)		4	4
Freshman Composition (Eng 104, 105)	3	3	
Public Speaking (Sp 201)			2
Introduction to Literature (Eng 207)	3		
* Literature or Philosophy			3
Health Education (PE 107)		2	
Physical Education (PE 141)	½	½	½
* Life Science	3		
	16½	15½	16½

* To be selected in accordance with the General Education requirement.

Environmental Engineering

	F	W	S
Sophomore			
Heating and Ventilating (EnvE 201, 202)	3	3	
Fluid Systems (EnvE 231, 232)	2	2	
Digital Computer Applications (Engr 250)		1	
Analytic Geometry and Calculus (Math 241)	4		
Differential Equations (Math 242)		4	
Advanced Engineering Mathematics (Math 318)			4
Engineering Mechanics (ME 211)		3	
General Physics (Phys 133)	4		
General Chemistry (Chem 124, 125, 126)	4	4	4
Strength of Materials (Aero 207)			5
Sports Education (PE 241)	½	½	½
§ Electives and courses to complete major			4
	17½	17½	17½
Junior			
Automatic Process Control (EnvE 316)			2
Thermodynamics (ME 302)	3		
Thermodynamics of Refrigeration (EnvE 302)		3	
System Design (EnvE 341, 342)	2	2	
Noise and Vibration Control (EnvE 307)	2		
Thermal and Fluids Laboratory (EnvE 331, 332)	2	2	
Heat Transfer (EnvE 313)			3
Introduction to Air Pollution (EnvE 324)	3		
Engineering Dynamics (ME 212)	4		
Electrical Engineering (EE 207, 208)		3	3
Electrical Engineering Laboratory (EE 251, 252)		1	1
Fluid Flow (ME 311)		3	
* Literature or philosophy			3
§ Electives and courses to complete major	1	4	6
	17	18	18
Senior			
Advanced System Design (EnvE 441)	3		
Advanced Mass and Energy Transfer (EnvE 401)	3		
Senior Project (EnvE 461, 462)	2	2	
Undergraduate Seminar (EnvE 463)			2
Electronic Engineering (EL 321)		3	
Electronic Engineering Laboratory (EL 354)		1	
General Psychology (Psy 202)			3
American Government (Pol Sc 301)	3		
Growth of American Democracy (Hist 304)		3	
The U.S. in World Affairs (Hist 305)			3
Survey of Economics (Ec 201)	3		
Electives and courses to complete major	3	8	8
	17	17	16

See COURSES OF INSTRUCTION section of this catalog for descriptions of courses in Environmental Engineering, Meteorology and other subjects.

* To be selected in accordance with the General Education requirement.

§ 26 of the elective units must be chosen with the approval of the adviser according to the field of concentration.

INDUSTRIAL ENGINEERING DEPARTMENT

Department Head, Donald E. Morgan

George W. Cockriel
Millard J. Fotter

James R. Golden
Roy W. Gustafson

George E. Hoffman
Paul E. Scheffer

Industrial Engineering is concerned with the design of engineering systems and management systems. With relation to engineering systems, industrial engineering is the science of utilizing and coordinating men, equipment and materials to attain a desired quantity and quality of output at a specified time and at the most favorable cost. With relation to management systems, it is the science of effective utilization of the human resources of an enterprise, accomplished through the design of integrated systems by the application of management principles and techniques.

The industrial engineer has responsibility in matters of design of systems which may be involved in areas of labor management, cost reduction and control, quality control, methods, planning, plant layout and data processing. He works closely with, and must understand the employee and the operating problems of management. This curriculum prepares graduates for positions in all phases of the system design in these areas of job activities.

The curriculum, leading to the Bachelor of Science degree, combines a thorough understanding of the fundamentals of engineering with a broad background in manufacturing processes, statistics, accounting, economics, social sciences and management principles.

Excellent industrial engineering laboratories are available in the areas of Work Measurement, Systems and Procedures, Manufacturing Management, Manufacturing Processes, Metrology, and Quality Control.

The Department sponsors Student Chapter No. 12 of the American Society of Tool and Manufacturing Engineers.

CURRICULUM IN INDUSTRIAL ENGINEERING

Freshman	F	W	S
Introduction to Industrial Engineering (IE 101)	2		
Engineering Analysis (IE 122)		2	
Systems Analysis (IE 123)			3
Elements of Electronics (EL 101)			2
Electronics Laboratory (EL 141)			1
* Manufacturing Processes	4	2	
Fundamentals of Technical Drawing (ET 151)	2		
Engineering Communication (ET 153)		1	
Analytic Geometry and Calculus (Math 141, 142, 143)	4	4	4
General Physics (Phys 131, 132)		4	4
Freshman Composition (Eng 104, 105)	3	3	
Public Speaking (Sp 201)			2
§ Life Science	3		
Health Education (PE 107)		2	
Physical Education (PE 141)	$\frac{1}{2}$	$\frac{1}{2}$	$\frac{1}{2}$
	$18\frac{1}{2}$	$18\frac{1}{2}$	$16\frac{1}{2}$

* EnvE 141, MP 141, 142, IE 141, WM 141, WM 142.

§ To be selected in accordance with the General Education requirement.

Industrial Engineering

Sophomore	F	W	S
Manufacturing Engineering Laboratory (IE 251, 252)	3	3	
Industrial Costs and Controls (IE 239)			3
Work Methods and Measurement (IE 236)			2
Digital Computer Applications (Engr 250)		1	
Analytic Geometry and Calculus (Math 241)	4		
Differential Equations (Math 242)			4
General Physics (Phys 133)	4		
Engineering Mechanics (ME 211, 212)		3	4
General Chemistry (Chem 124, 125)		4	4
Principles of Economics (Ec 212)		3	
Basic Accounting (Actg 131, 132)	3	3	
Sports Education (PE 241)	½	½	½
§ Literature or philosophy	3		
	17½	17½	17½
Junior			
Control Analysis (IE 304)	2		
Operations Research (IE 305)		2	
Computer Analysis (IE 333)			2
Manufacturing Design (IE 341, 342)	2	2	
Statistical Quality Control (IE 336)			3
Industrial Presentation Techniques (Arch 357)	2		
Strength of Materials (Aero 207)			5
Electrical Engineering (EE 207, 208)	3	3	
Electrical Engineering Laboratory (EE 251, 252)	1	1	
Electronic Engineering (EL 321)			3
Electronic Engineering Laboratory (EL 354)			1
American Government (Pol Sc 301)	3		
Growth of American Democracy (Hist 304)		3	
U.S. in World Affairs (Hist 305)			3
Fluid Mechanics (ME 341)		3	
Mathematics of Statistics (Stat 321, 322)	3	3	
	16	17	17
Senior			
Engineering Economy (IE 414)	3		
Manufacturing Management (IE 421, 422)		3	3
Fundamentals of Supervision (IE 441, 442)	2	1	
Predetermined Time Standards (IE 428)		2	
Senior Project (IE 461, 462)	2	2	
Undergraduate Seminar (IE 463)			2
Human Factors Engineering (IE 435)			2
Introduction to Design (ME 427)	4		
General Psychology (Psy 202)			3
§ Literature or philosophy	3	3	
§ Social Sciences (except History)			3
Electives	3	4	3
	17	15	16

See COURSES OF INSTRUCTION section of this catalog for descriptions of courses in Industrial Engineering and other subjects.

§ To be selected in accordance with the General Education requirement.

INDUSTRIAL TECHNOLOGY DEPARTMENT

Department Head, J. M. McRobbie

Ronald W. Hall
N. L. Smith, III
Kenneth R. Kimball

J. Edward Strasser
Frank B. Barrows

Roger L. Keep
Laurence F. Talbott

The curriculum of the Industrial Technology Department prepares graduates for employment in a broad range of professional positions in industrial management, industrial production, industrial marketing or industrial education. For those interested in employment in industry the course offerings qualify students for occupations in the mid-ground between engineering and business. For those planning, with a fifth year, to teach the technical subjects of industry there are both broad and specific offerings concerning course content and methods in all the major areas.

Emphasis is placed upon the study of tools, machines, materials, processes and products. Special consideration is given to the industrial application of mathematics, physics and chemistry. Also of major importance is the development of the ability to work with people concerning matters of a technical nature.

Each student gains a substantial general education through courses in the areas of language communication, social sciences, mathematics, physical education and the arts. His ability to communicate in technical areas is further developed through courses in technical writing and technical drawing.

The Industrial Technology Department's facilities provide for instruction and laboratory experiences in drafting, wood technology, electricity, electronics, metal technology, power technology, and graphic arts.

CURRICULAR OPTIONS

Industrial Sales and Technology

The Industrial Sales and Technology option emphasizes preparation for professional positions in the manufacturing and marketing of industrial products. Students selecting management and production aspects of this option obtain positions as plant supervisor, production-control analyst, systems coordinator, materials expediter, plant and product designer, technical writer, department head, executive trainee, personnel manager, product consultant, manufacturing specialist and training director. Management and production are concerned with effective manufacturing operations as they relate to people as well as materials and equipment. Students specializing in the marketing phase of the option are preparing for positions as manufacturers' sales representative, distributors' representative, liaison engineer, sales analyst, and sales manager.

Industrial Education

The Industrial Education Option is primarily concerned with an analysis of the materials, tools, processes, and occupations for today's industry. A broad base of industrial type experiences is provided. This foundation is supplemented with a specialized concentration in one or preferably two industries. In addition to practical laboratory experiences stressing understanding and skill, the student will develop ability to: (a) identify problems of an industrial education nature, (b) organize and present logical solutions to these problems, (c) effectively stimulate others in improving their understanding and performance in technical matters. Graduates of this option will be prepared for the many positions which require an extensive understanding of industrial manufacturing procedures plus the ability to work well with people and help them to become familiar with processes of industry. After experience in industry, they may qualify for positions of responsibility with in-plant technical training programs.

The student preparing to teach industrial arts in junior or senior high schools will follow the courses listed for this option and will, in addition, need to complete the requirements for a teaching minor, certain courses in professional education and a fifth year including graduate work in the major field. The Standard Teaching Credential with Specialization in Secondary Teaching is granted upon successful completion of this program.

CURRICULUM IN INDUSTRIAL TECHNOLOGY

	F	W	S
Freshman			
Technical Computation (IT 101)	2		
Introduction to Industrial Technology (IT 111)	2		
Power Technology (IT 122, 123)		2	2
Graphic Arts Processes (PT 127)	3		
Fundamentals of Technical Drawing (ET 151)		2	
* Manufacturing Processes	2	2	2
Mathematics for Engineering (Math 117)		5	
Technical Calculus (Math 131)			4
Human Relations (IR 118)	3		
Freshman Composition (Eng 104, 105)	3	3	
Introduction to Literature (Eng 207)			3
Public Speaking (Sp 201)			2
Applied Biology (Bio 110)		3	
Health Education (PE 107)			2
Physical Education (PE 141)	½	½	½
Electives and courses to complete major			1
	<hr/>	<hr/>	<hr/>
	15½	17½	16½
Sophomore			
Technical Sketching (IT 245)		2	
Electronics, D.C. and A.C. (IT 131, 132)	3	3	
Industrial Electronic Circuits (IT 133)			3
College Physics (Phys 121, 122, 123)	4	4	4
** Advanced writing course			3
Economics (Ec 201 or 211)	3		
Introduction to Philosophy (Phil 201)			3
General Psychology (Psy 202)			3
Sports Education (PE 241)	½	½	½
Electives and courses to complete major	6	6	
	<hr/>	<hr/>	<hr/>
	16½	15½	16½
Junior			
Mechanical Systems (IT 323)			3
Industrial Design (IT 346)		2	
Audio Visual Methods (AV 432)	3		
General Inorganic Chemistry (Chem 121, 122)	4	4	
Industrial Relations (IR 214)			3
Logic (Phil 202)		3	
Electives and courses to complete major	10	8	11
	<hr/>	<hr/>	<hr/>
	17	17	17
Senior			
Modern Industrial Materials (IT 429)			2
Senior Project (IT 461, 462)	2	2	
Undergraduate Seminar (IT 463)			2
American Government (Pol Sc 301)	3		
Growth of American Democracy (Hist 304)		3	
U.S. in World Affairs (Hist 305)			3
Electives and courses to complete major	11	12	9
	<hr/>	<hr/>	<hr/>
	16	17	16

* EnvE 141; MP 141, 142; IE 141; WM 141, 142.

** Eng 204 or 218 or 219.

Industrial Technology

INDUSTRIAL EDUCATION OPTION (ADD COURSES BELOW TO BASIC CURRICULUM)

Sophomore

IT 125 Industrial Wood Processes	(2)
IT 236 Wood Technology	(3)
PT 238 Advanced Graphic Arts	(3)

Junior

Ed 312 Educational Psychology....	(3)
Ed 401 Public Education in American Society	(3)
*300-400 series laboratory-type courses in Industrial Education specialties	(10)

Senior

IT 330 Principles and Practices of Industrial Arts	(5)
*300-400 series laboratory-type courses in Industrial Education specialties	(9)

INDUSTRIAL SALES AND TECHNOLOGY OPTION (ADD COURSES BELOW TO BASIC CURRICULUM)

Sophomore

Actg 131-2 Basic Accounting.....	(6)
Mktg 204 Marketing Principles ...	(4)
Ec 212 Principles of Economics ...	(3)

Senior

IT 404 Customer Relations	(2)
IT 405 Industrial Marketing	(2)
Mgt 418 Quantitative Methods and Controls in Business	(3)

Junior

IT 321-2 Mechanical Systems	(6)
IT 326 Product Evaluation	(2)
IT 331-2-3 Electronic Systems.....	(9)
Bus 301 Business Law Survey	(3)

See COURSES OF INSTRUCTION section of this catalog for descriptions of courses in Industrial Technology and other subjects.

* Courses must be chosen with the approval of adviser in one or more of the following area-specialties: electronics, metals, drafting, wood, power technology, or graphic arts.

MECHANICAL ENGINEERING DEPARTMENT

Department Head, Leon F. Osteyee

Robert W. Adamson
James G. Andresen
E. H. Baker
Chester O. Bishop
Laurence H. Carr

Franklin S. Crane
Otto Davidson
Edward R. Garner
Raymond G. Gordon
Roger A. Keech

Derek John Price
J. O. Richardson
Edward O. Stoffel
Howard F. Stoner
Herman West

Mechanical engineering concerns itself primarily with the design, construction, and use of a wide variety of equipment ranging from manufacturing machinery and power generation equipment to consumer goods. Of primary concern to the mechanical engineer is the proper application of rigid, fluid, and thermal mechanics in the design and use of this equipment.

Graduates obtain employment primarily with manufacturers, contractors, public utilities, and governmental agencies. Types of work performed by graduates include design, engineering sales, engineering test, supervision of manufacture and erection.

The curriculum gives the student a thorough founding in mechanical design and a choice of courses such as machine design, turbomachinery, and piping design, available in his senior year, that will augment and strengthen his background for such design.

Laboratories are an important part of the student's education. He is enrolled in mechanical engineering laboratories from the beginning of his freshman year until his graduation. These laboratories include work in power generation, fuel study, fluid flow, heat transfer, vibration, and strength of materials.

As the Mechanical Engineering student advances in professional course work, he may choose Welding Engineering, Design of Piping Systems, Stress Analysis, Thermal Power Design, Mechanical Control Systems, Petroleum, or a concentration in Nuclear Engineering.

There are two organized student clubs in the Mechanical Engineering Department: a student branch of the Society of Automotive Engineers and the Mechanical Engineering Society. These clubs offer students an active program of professional and social activity.

CURRICULUM IN MECHANICAL ENGINEERING

Freshman	F	W	S
Mechanical Systems (ME 131, 132).....	3		3
Mechanical Engineering Laboratory (ME 144, 145, 146).....	1	1	1
Applied Descriptive Geometry (ET 141)	2		
Engineering Drawing Systems (ET 142)		2	
Engineering Graphics (ET 143)			2
Analytic Geometry and Calculus (Math 141, 142, 143).....	4	4	4
* Manufacturing Processes	2	2	2
General Chemistry (Chem 124)	4		
General Physics (Phys 131, 132).....		4	4
Elements of Electronics (EL 101).....		2	
Electronics Laboratory (EL 141).....		1	
Physical Education (PE 141).....	$\frac{1}{2}$	$\frac{1}{2}$	$\frac{1}{2}$
	<hr/> 16 $\frac{1}{2}$	<hr/> 16 $\frac{1}{2}$	<hr/> 16 $\frac{1}{2}$

* EnvE 141, MP 141, 142, IE 141, WM 141, WM 142.

Mechanical Engineering

Sophomore	F	W	S
Engineering Mechanics (ME 211, 212)	3	4	
Dynamics Laboratory (ME 213)			1
Strength of Materials (Aero 207)		5	
Strength of Materials Laboratory (ME 249)			1
Digital Computer Applications (Engr 250)	1		
Metallurgy for Engineers (WM 306)			4
Analytic Geometry and Calculus (Math 241)	4		
Differential Equations (Math 242)		4	
Advanced Engineering Mathematics (Math 318)			4
General Chemistry (Chem 125)	4		
General Physics (Phys 133)		4	
Freshman Composition (Eng 104, 105)	3		3
Health Education (PE 107)	2		
Sports Education (PE 241)	½	½	½
** Electives and courses to complete major			3
	17½	17½	16½
Junior			
Introduction to Design (ME 427)		4	
Thermodynamics (ME 302, 303)	3	3	
Fluid Mechanics (ME 341, 342)	3		4
Mechanical Vibration (ME 316)			4
Heat Transfer (EnvE 313)			3
Electrical Engineering (EE 207, 208)	3	3	
Electrical Engineering Laboratory (EE 251, 252)	1	1	
Electronic Engineering (EL 321)			3
Electronic Engineering Laboratory (EL 354)			1
* Introduction to Optics and Atomic Physics (Phys 211)	4		
Growth of American Democracy (Hist 304)			3
American Government (Pol Sc 301)		3	
General Psychology (Psy 202)		3	
** Electives and courses to complete major	3		
	17	17	18
Senior			
Design (ME 428)	4		
Thermodynamics Laboratory (ME 343)		1	
Senior Project (ME 461, 462)	2	2	
Undergraduate Seminar (ME 463)			2
Principles of Economics (Ec 211)	3		
U.S. in World Affairs (Hist 305)			3
§ Social Sciences (except History)		3	
§ Life Science	3		
§ Literature or Philosophy			6
§ Humanities elective		3	
** Electives and courses to complete major	4	8	7
	16	17	18

See COURSES OF INSTRUCTION section of this catalog for descriptions of courses in Mechanical Engineering and other subjects.

* Phys 212 and 1 unit technical elective may be substituted.

** Of the total electives, 18 units must be chosen with the approval of the adviser.

§ To be selected with adviser approval in accordance with the General Education requirement.

WELDING AND METALLURGICAL ENGINEERING DEPARTMENT

Department Head, Richard C. Wiley

Enrico P. Bongio
Richard C. Carlston
Harry H. Honegger

Thomas D. Kay
William A. Oliver

Glenn E. Seeber
Orien W. Simmons

The Welding and Metallurgical Engineering Department prepares students for employment as metallurgical engineers, and also provides service courses in welding and metallurgy to students in other departments of the college.

Students who graduate as metallurgical engineers are employed by private industry and government agencies to deal with problems of design and manufacture of metals and alloys, corrosion protection, nondestructive testing, application of materials to specific needs and requirements including process development. Typical position titles are metallurgist, metallographer, materials engineer, welding engineer, nondestructive test engineer, and inspection and quality control specialist.

The curriculum offers opportunity to pursue specialized metallurgical areas on an elective basis in the senior year.

The Welding and Metallurgical Engineering Department is well equipped with various laboratories and shops. The welding shop facilities include general arc and oxyacetylene equipment, as well as production prototypes for the automatic and inert-gas shielded welding processes.

There are two metallurgical engineering laboratories for student use. The metallography laboratory is equipped with the latest instruments for study of internal structures of metals and alloys. The metallurgy laboratory includes equipment for vacuum melting and processing, heat treatment, nondestructive testing, air melting furnaces, a "wet" laboratory, and a physical testing laboratory.

The department sponsors a combined student chapter of two national societies, the American Welding Society and the American Society for Metals. The chapter offers an active program of professional and social activity.

CURRICULUM IN METALLURGICAL ENGINEERING

Freshman	F	W	S
Principles of Metallurgy (WM 121, 122)	2	2	
* Manufacturing Processes	2	1	1
Engineering Communication (ET 153)			1
General Physics (Phys 131, 132)		4	4
Analytic Geometry and Calculus (Math 141, 142, 143)	4	4	4
Freshman Composition (Eng 104, 105)	3	3	
General Psychology (Psy 202)			3
§ Life Science	3		
Health Education (PE 107)	2		
Physical Education (PE 141)	½	½	½
§ Literature or philosophy			3
Elective		2	
	16½	16½	16½

* EnvE 141, MP 141, 142, IE 141, WM 141, WM 142.

§ To be selected in accordance with the General Education requirement.

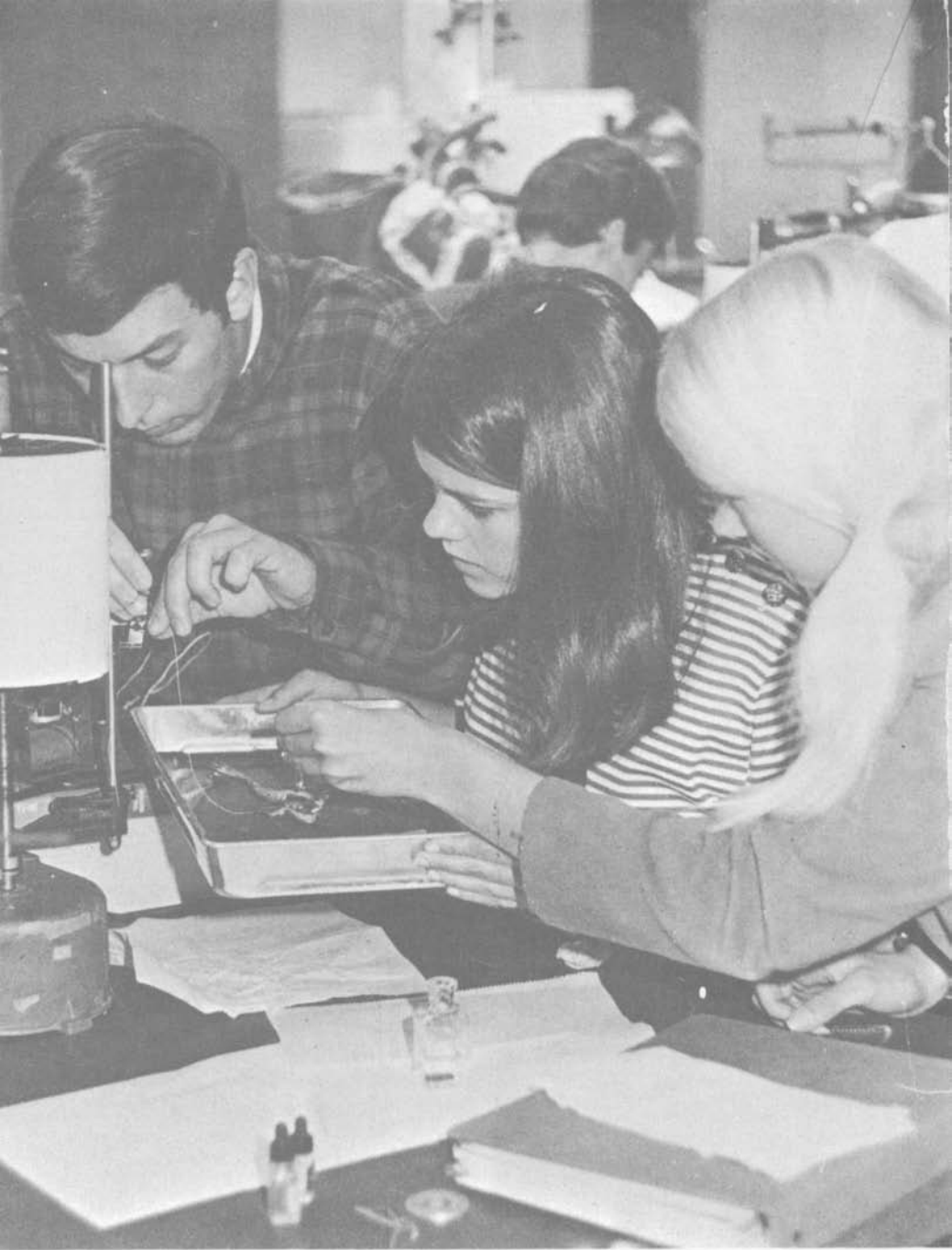
Welding/Metallurgy

	F	W	S
Sophomore			
Physical Metallurgy (WM 221, 222)	4	4	
Digital Computer Applications (Engr 250)	1		
Engineering Mechanics (ME 211, 212)		3	4
General Chemistry (Chem 124, 125, 126)	4	4	4
General Physics (Phys 133)	4		
Analytic Geometry and Calculus (Math 241)	4		
Differential Equations (Math 242)			4
§ Literature or philosophy		3	
American Government (Pol Sc 301)			3
Survey of Economics (Ec 201)		3	
Sports Education (PE 241)	½	½	½
Electives			2
	<hr/>	<hr/>	<hr/>
	17½	17½	17½
Junior			
Theory of Materials (WM 301, 302, 303)	3	3	3
Metallurgical Engineering (WM 324, 325, 326)	4	4	4
Electrical Engineering (EE 207, 208)	3	3	
Electronic Engineering (EL 321)			3
Electronic Engineering Laboratory (EL 354)			1
Strength of Materials (Aero 207)	5		
Physical Chemistry (Chem 432, 433)		3	3
Growth of American Democracy (Hist 304)		3	
U.S. in World Affairs (Hist 305)			3
Electives	2		
	<hr/>	<hr/>	<hr/>
	17	16	17
Senior			
Advanced Theory of Materials (WM 421, 422, 423)	4	4	4
Applied Metallurgical Engineering (WM 424, 425, 426)	5	5	5
Senior Project (WM 461, 462)	2	2	
Undergraduate Seminar (WM 463)			2
Engineering Science electives (300 or 400 series)			4
Mathematics of Statistics (Stat 321, 322)	3	3	
§ Literature or philosophy	3		
§ Social Science (except History)			3
Electives		3	
	<hr/>	<hr/>	<hr/>
	17	17	18

See COURSES OF INSTRUCTION section of this catalog for descriptions of courses in Welding and Metallurgical Engineering and other subjects.

§ To be selected in accordance with the General Education requirement.

COURSES OF INSTRUCTION



In Zoology 339, Human Physiology, the secrets of life are probed in a laboratory by students who gain understanding of the life systems of a frog.

ACCOUNTING

Actg 131, 132 Basic Accounting (3) (3)

A study of accounting to show how records are kept, their uses and limitations. For the student who needs a general knowledge of accounting. Not applicable for credit toward major in business administration. 2 lectures, 1 two-hour laboratory.

Actg 221, 222 Principles of Accounting (4) (4)

Principles and practices of fundamental accounting theory. 3 lectures, 1 two-hour laboratory.

Actg 223 Cost Accounting and Analysis (4)

Accounting for cost control applicable to production, distribution, and service enterprises. Analysis and interpretation of financial statements. 3 lectures, 1 two-hour laboratory. Prerequisite: Actg 132 or 222

Actg 301 Managerial Accounting (4)

Relationship of accounting to business. Analysis of accounting principles and procedures to needs of business. 4 lectures. Prerequisite: Actg 132 or 222

Actg 304, 305 Tax Accounting (3) (3)

Analysis of the federal and state tax laws and their application to taxpayers. Estate and other succession taxation, gift taxation, and income taxation of fiduciaries. 2 lectures, 1 two-hour laboratory. Prerequisite: Actg 222

Actg 321, 322, 323 Advanced Accounting (4) (4) (4)

Advanced accounting theory and practice including consolidated financial statements. Problems of valuation and income determination relating especially to cash, accounts receivable, inventories, and installment sales. 3 lectures, 1 two-hour laboratory. Prerequisite: Actg 222

Actg 331 Accounting Systems (3)

Installation and operation of accounting systems in business with special attention to internal control. Application of the latest techniques in the use of modern methods of handling numbers with special reference to accounting and statistical methods. 2 lectures, 1 two-hour laboratory. Prerequisite: Actg 223

Actg 332 Advanced Cost Accounting (4)

Process and standard costs; overhead costs, budgeting. Use of cost accounting data in economic analyses and managerial control. 3 lectures, 1 two-hour laboratory. Prerequisite: Actg 223

Actg 333 Accounting for Governmental and Non-Profit Organizations (2)

Accounting for governmental and non-profit organizations with emphasis on fund accounts. Budgetary and encumbrance procedures and special reporting requirements. 2 lectures. Prerequisite: Actg 132 or 222

Actg 346, 347 Auditing (3) (3)

Principles and procedures of the verification of accounts and the preparation of working papers and the completed audit report. 2 lectures, 1 two-hour laboratory. Prerequisite: Actg 323 or consent of instructor.

Actg 452, 453 C.P.A. Review (3) (3)

Intensive study of advanced accounting problems as found in C.P.A. examinations. Designed for those preparing for C.P.A. examination, and for those planning to enter field of private business accounting. 1 lecture, 2 two-hour laboratories. Prerequisite: Actg 323

Aeronautical Engineering

AERONAUTICAL ENGINEERING

Aero 101 Aircraft and Missile Fundamentals (3)

Fundamentals of aircraft and missile systems. Field trips conducted to existing departmental laboratories permit students to operate, and to see in operation, equipment used by aeronautical engineers. Not for aeronautical engineering majors. 3 lectures.

Aero 121, 122, 123 Aerospace Fundamentals (3) (3) (3)

Introduction to the engineering profession including the aeronautical and aerospace fields. Engineering approach to problem-solving and analysis of data obtained from experiments. Basic nomenclature and design criteria used in the aerospace industry. Applications to basic problems in the field. 1 lecture, 2 laboratories.

Aero 202 Mechanics of Materials (5)

Stresses, strains, deflections due to axial, torsional, and flexural loading. Statically indeterminate members and columns. Dynamic and repeated loading. Emphasis on problem-solving. May not be substituted for Aero 207. 5 lectures. Prerequisite: ME 205 or equivalent.

Aero 207 Strength of Materials (5)

Stresses, strains, and their relations applied to axial, torsional, and flexural loads. Statically indeterminate axial members, beams, and shafts. Columns, dynamic loads, repeated loads. 5 lectures. Prerequisite: ME 211

Aero 229 Strength of Materials Laboratory (1)

Physical properties of materials used in aircraft. Tension, compression, bending, shear, and torsion tests. Tests of riveted and bolted joints. Tests of long and short columns. Effect of heat treatment on material properties. Use of the SR-4 strain rosette for determining principal strains. Reporting of results in the form of written reports. 1 laboratory. Concurrent: Aero 207

Aero 240 Additional Engineering Laboratory (1-2)

Total credit limited to four units, with not more than two units in any one quarter. 1 or 2 laboratories.

Aero 252 Engineering Problems—Analog Computers (1)

Solution of selected engineering problems by means of analog computers. 1 laboratory. Prerequisite: Math 141

Aero 301, 302, 303 Aerothermodynamics (5)

Properties and characteristics of fluids, fluid statics and dynamics, the thermodynamic relations, the properties of subsonic and supersonic flow, both laminar and turbulent. 5 lectures, fall; 4 lectures, 1 laboratory, winter and spring. Prerequisite: ME 211, Math 318

Aero 306 Aerodynamics (5)

The standard atmosphere, compressible flow, airspeed measurements, types of fluid flow, airfoil theory, wing theory, lift, drag, expansion waves, normal and oblique shock waves, aircraft performance, stability and control. 5 lectures. Concurrent: Aero 303

Aero 322 Analog Computer Techniques (3)

The solution of typical problems and dynamics that an aeronautical engineer might encounter by use of analog computer techniques. 1 lecture, 2 laboratories. Prerequisite: Aero 252

Aero 324, 325 Stress Analysis (4) (4)

Analysis of airplane and missile structural components; combined stress and failure theories; column and sheet-stringer panel analysis. Shear-resistant and tension-field beams; single and multi-cell box beams; unsymmetrical and tapered beams. Bulkhead and cutout analysis; analysis of indeterminate structures. Laboratory tests of typical aircraft structural components. Experimental methods of stress analysis. 3 lectures, 1 laboratory. Prerequisite: Math 242, Aero 207

Aero 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.

Aero 401, 402 Aircraft and Missile Propulsion Systems (3) (3)

Flightcraft power plant types, components, characteristics, and requirements. Principles of thrust and energy utilization. Thermodynamic processes and performance of turboprop, turbo jet, ramjet, and rocket engines. 3 lectures. Prerequisite: Aero 303

Aero 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 of solid propellant rockets. Flight performance. Rocket testing. 3 lectures. Prerequisite: Aero 402

Aero 408 Advanced Flightcraft Structural Analysis (3)

Indeterminate structures, frame analysis, treatment of plates and shells, shear lag and deformation, effect of skin cutouts, application of structural theory to the design of flightcraft components. 3 lectures. Prerequisite: Aero 325

Aero 409 Flight Testing (3)

Flight test instrumentation, obtaining of data and methods of data reduction for determining aircraft and engine performance, aircraft stability and control and structural integrity. Evaluation of hydraulic, electrical, communication, control, and air conditioning systems. Compliance with specifications. Severe environmental operation. 3 lectures. Prerequisite: Aero 303

Aero 410 Mechanical Vibration in Flightcraft (4)

Kinematics of harmonic motion, harmonic analysis, the linear single degree of freedom system, dynamic balancing, critical speed of shafts, seismic instruments, two degrees of freedom systems, dynamic vibration absorbers, self-excited vibrations, including an introduction to flutter theory. 3 lectures, 1 laboratory. Prerequisite: Math 242

Aero 411, 412, 413 Space Technology (3) (3) (3)

Motion of a body in the central force field. Space vehicle trajectories, guidance systems, power generators for interplanetary travel, structural loading, and principles of space vehicle design. 3 lectures. Prerequisite: Aero 303

Aero 414 Advanced Fluid Mechanics (3)

Kinematics of flow, dynamics of flow, laminar and turbulent flow. Introduction to Cartesian vectors, vector notation. 3 lectures.

Aero 415 Aerodynamics of Stability and Control (3)

Longitudinal stability and control. Static and dynamic stability, wing moments and balance. Factors influencing the stability of the complete airplane. Lateral and directional stability. Design and operation of control surfaces. Compressibility effects. 3 lectures. Prerequisite: Aero 303

Aeronautical Engineering/ABM

Aero 416 Unconventional Aircraft (3)

Introduction to analysis of rotary wing aircraft, VTOL, STOL, and lifting body vehicles. Types of flight control mechanism. Performance and stability of vehicles. 3 lectures. Prerequisite: Aero 303

Aero 417 Structural Dynamics (3)

Effect of shock and vibration loads on aircraft and missile structures. Thermal loading and other transient loads imposed by the vehicle mission. 3 lectures. Prerequisite: Aero 410

Aero 419 Analysis of Aeronautical Systems (3)

Application of elementary systems analysis and operation analysis techniques to the project development phase of an aerospace vehicle or system. 3 lectures.

Aero 421 Flight Mechanics (3)

Analytical and graphical methods for the determination of flight characteristics of aircraft and aerospace vehicles. 1 lecture, 2 laboratories. Prerequisite: Aero 306

Aero 444, 445, 446 Missile and Aircraft Design Laboratory (4) (4) (4)

Preliminary layout of a typical transport aircraft and a space vehicle using design and calculation techniques developed in previous aeronautical engineering courses. Design of selected component structures and preparation of necessary drawings. 2 lectures, 2 laboratories.

Aero 457, 458 Aeronautical Engineering Laboratory (3) (3)

Use of laboratory instruments to develop the technique of obtaining engineering measurements, special assigned problems in the field of aeronautics. 1 lecture, 2 laboratories. Prerequisite: Aero 303

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

Selection and completion of a project which is 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.

AGRICULTURAL BUSINESS MANAGEMENT

ABM 101 Introduction to Agricultural Business Management (3)

Changes occurring in agriculture, careers in commercial agricultural businesses and public agricultural service agencies, development and growth of farm related industries, kinds of agricultural businesses, operational characteristics of commercial agricultural industries. 3 lectures.

ABM 102 Agricultural Marketing Programs in California (3)

California marketing orders and agreements, integration and contract farming; their implications and effects on farming and marketing institutions. 3 lectures.

ABM 103 Agricultural Business Organization (3)

Development, types and forms of farm related businesses. Agricultural businesses considered from standpoint of primary functions, services and problems including such factors as business organization, records, information, location, production, business with banks, labor and government. Emphasis on California farm related industries. 3 lectures.

ABM 201 Agricultural Business Sales and Service (3)

Growth and opportunities in agricultural sales. Factors involved in developing sales program for the farm operation. Application of successful selling principles and practices in providing farm operators with agricultural materials, supplies, equipment and services. Consideration given to sales and service for farm related businesses and non-agricultural customers. Selling aspects involved in marketing of farm products by farm related businesses. 3 lectures.

ABM 202 Agricultural Cooperative Organization and Management (3)

Purpose, types and organization of cooperatives. Emphasis on California agricultural cooperatives, their characteristics, operation and problems. 2 lectures, 1 two-hour laboratory.

ABM 203 Agricultural Business Credit and Finance (3)

Investment, finance and credit requirements of agricultural businesses serving production, processing and distribution channels of agricultural products and services. Financial principles and credit management as applied to agricultural businesses; financial procedures and problems in establishing and managing the farm-related business. 3 lectures. Prerequisite: Actg 221 or consent of instructor.

ABM 211 Fair Management (3)

Principles and procedures in organizing, managing and promoting fairs. Emphasis on California and Western fairs. Career opportunities, programs and problems in fair management and growth of fairs in America. A two-day field trip is included to a county or district fair. 3 lectures.

ABM 230 General Agricultural Business Management (3)

Agricultural business growth, opportunities, functions and services, organization and operation. Emphasis on California agricultural businesses and industries. A general course for non-Agricultural Business Management majors. 3 lectures.

ABM 241 Agricultural Business Machines Practices (1)

Evolution, application, and costs of calculator type machines. Basic calculator procedures, practices, and techniques needed to work agriculturally related statistical problems. 1 activity.

ABM 301 Agricultural Business Management and Government Policy (3)

Agricultural business policy, objectives and formulation, resource allocation and production adjustments; government subsidies, acreage controls, storage, crop insurance, forward prices, consumer subsidies, economic, social and political influences. 3 lectures. Prerequisite: Ec 211

ABM 302 Agricultural Business Sales Management (3)

Organizing and coordinating agricultural machinery, crop, livestock, poultry, fertilizer, insecticide and other farm and farm related sales and service programs. Planning, policies, pricing, sales control records, training salesmen, advertising, supervising salesmen, and evaluating sales performance as related to needs and demands of farm and farm related agricultural businesses. 3 lectures. Prerequisite: ABM 201

ABM 303 Agriculture—Consumer Relationships (2)

Basic facts, public opinion and ways of developing greater understanding of agriculture, its nature, characteristics, problems and relationship to non-farm persons. Consumer education programs and procedures. 2 lectures.

ABM 305 Farm Group and Commodity Organizations (2)

Survey of farmers' efforts to study and seek solutions to individual and industry-wide problems through organized group effort. Major farm organizations, policies and services to members. 2 lectures.

ABM 306 Government Agricultural Service Agencies (2)

Programs and services performed by government agencies on behalf of farm and off-farm agricultural industries. Designed for students who may use services of, who may advise others of such services, or who may seek a career in such agencies. 2 lectures.

ABM

ABM 321 Agricultural Property Management and Sales (4)

Land economic, legal and real estate principles in the investment, development, leasing, mortgaging and transferring of agricultural and urban real estate. 3 lectures, 1 two-hour laboratory.

ABM 322 Advanced Agricultural Business Management (4)

Agricultural business management with primary emphasis on economic analysis; application of economic principles to the solution of basic pricing, output, and resource use problems encountered by the individual agricultural business firm. 3 lectures, 1 two-hour laboratory. Prerequisite: Ec 211

ABM 323 Advanced Agricultural Business Management (4)

Agricultural business management with primary emphasis on cost accounting procedures, policy formation, financial, fiscal and material resources management. Includes budgets, business statements and other planning and control procedures. Agricultural business insurance, taxation, office management, and related phases in management of the agricultural business firm. 3 lectures, 1 two-hour laboratory. Prerequisite: Actg 222 and ABM 322 or consent of instructor.

ABM 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: Permission of department head.

ABM 402 Agricultural Business Communication (3)

Principles, methods and materials for communicating ideas, information and skills to management, staff members, stockholders, customers and general public. Agricultural business public relations programs. Organization and presentation of surveys, studies, reports and publications. 2 lectures, 1 two-hour laboratory. Prerequisite: Eng 218 and senior standing.

ABM 403 Agricultural Labor Relations and Personnel Management (3)

Agricultural labor trends and problems as determined by changes occurring in farming and farm related industries. Labor-management relations in agriculture; principles and procedures in organizing and managing the agricultural business personnel program. 3 lectures. Prerequisite: Senior standing.

ABM 412 Wholesaling and Retailing Agricultural Commodities (3)

The field of wholesaling and retailing agricultural commodities including auctions, commission houses, commission merchants, food brokers, carlot receivers, jobbers, shippers and supply houses. Principles of buying and selling; terms and trade customs. 3 lectures. Prerequisite: Ec 211, FM 304

ABM 421 Agricultural Business Operations Analysis (4)

Principles and procedures in agricultural business operations analysis and research. Evaluation of programs and problems to achieve optimal decisions. Production and financial data, statistics, pricing, costs, inventories, production level, and plant expansion or contraction. 3 lectures, 1 two-hour laboratory. Prerequisite: ABM 322, Stat 212

ABM 427 Agricultural Estate Planning (4)

Principles and procedures in agriculture estate planning and conservation. Determining agriculture estate assets, taxes, property valuation, property transfers, beneficiaries and needs, gifts, insurance, business estate, employee estate, wills, trusts, and administration of trusts and estates. 3 lectures, 1 activity period. Prerequisite: ABM 321

ABM 443 Field Studies in Agricultural Business Management (2)

California commercial agricultural businesses. Visitation to selected industries. Organization, operation, services and problems considered. One week in field and one week laboratory analysis and evaluation of data obtained on the trip. Prerequisite: Senior standing or consent of instructor.

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

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

ABM 463 Undergraduate Seminar (2)

Student presentation and leadership; group participation under faculty supervision on new agricultural business developments. 2 lectures.

ABM 515 International Agri-Business Marketing (3)

Problems and techniques of U.S. international marketing. Sales promotion, advertising, and market research for agricultural commodities. Tools, equipment, and supplies for agriculture in the developing countries. 3 lectures. Prerequisite: FM 304, 307 or consent of instructor.

ABM 516 Communication for Change in Developing Countries (3)

Analysis of literature, techniques and procedures for planning and carrying out agricultural information programs in developing countries. Current relevant information for foreign agricultural producers. 3 lectures. Prerequisite: FM 307

ABM 581 Graduate Seminar in Agricultural Business Management (3)

Current trends and characteristics of agricultural business and industry. Opportunities and requirements for becoming established in farm-related businesses. 3 lecture-discussions.

AGRICULTURAL EDUCATION

Ag Ed 202 Introduction to Agricultural Education (2)

Overview of agricultural education programs including goals and purposes. Kinds of classes and types of programs. Qualifications essential to success in teaching agriculture. Visits to high school agriculture departments. 2 lectures.

Ag Ed 403 Teaching Plans in Agricultural Education (3)

Preparation for student teaching. Orientation to classroom situation. Development of teaching units and daily lessons. Class demonstrations in teaching procedures. 1 lecture, 2 activity periods.

Ag Ed 520 Program Development in Agricultural Education (3)

Study of career opportunities in agriculture. Program development in such areas as the Future Farmers of America. Supervised practice. Development of up-to-date approaches in an integrated program. Operating policies and procedures. 3 lectures.

Ag Ed 521 Curriculum and Methods in Agricultural Education (3)

Principles and methods of determining course objectives, content, and calendar. Methods, procedures, and materials adapted for use by the teacher in classroom, shop, and field instruction. Concurrent with student teaching. 3 lectures.

Ag Ed 522 Group Study in Agricultural Mechanics (3)

Agricultural mechanics in the vocational agriculture programs. Organizing a course of study and implementation of program. Demonstrations, practice teaching and analysis of teaching techniques. 1 lecture, 2 laboratories.

Ag Ed 523 Adult and Continuation Education in Agriculture (2)

Organization, history, philosophy, administration and teaching of classes for out-of-school youth and adults. Surveys and plans for development of rural and urban adult education programs. Young Farmer program. Techniques and methods of leadership. 2 lectures.

Ag Engineering

Ag Ed 525 Student Teaching in Agricultural Education (3-12)

One quarter conducted under the direction of a selected supervising teacher of agriculture. Participation in all phases of the agricultural education program. Principles and practices in departmental organization and administration. Prior approval is necessary.

Ag Ed 580 Special Problems in Agricultural Education (1-3)

The student will select, plan, and develop under direction and supervision a specific problem of value to the program of agricultural education. Research, planning, and development may be through group or individual study. Total credit limited to nine units with not more than three units in any one quarter.

Ag Ed 621 (A-Z) Technical Agricultural Developments (1½)

Group study of new scientific and technical developments in agriculture. Offered during a one-week summer period for teachers of agriculture.

Ag Ed 631 (A-Z) Professional Conference in Agriculture (1½)

A series of lectures, seminars, and discussions of problems in agricultural education and developments in agriculture led by specialists in the field. For professional improvement of teachers of agriculture. Offered during a one-week summer period.

AGRICULTURAL ENGINEERING

AE 100 Introduction to Agricultural Engineering (1)

Agricultural Engineering as a profession. Technical areas and job opportunities. Departmental orientation. 1 lecture.

AE 121 Agricultural Mechanics (2)

Identification and use of tools and materials; tool sharpening and care; concrete mixes and materials; simple electric wiring; metal work; pipe fitting; basic wood-working; estimating quantities and costs. 1 lecture, 1 laboratory.

AE 122 Agricultural Mechanics (2)

Design, construction and repair of production equipment for specific farming enterprises. Construction of livestock, dairy, crops, soils, poultry and horticultural equipment. Students register for this course in sections according to their specific major. 1 lecture, 1 laboratory. Prerequisite: AE 121 or demonstrated equivalent ability.

AE 128 Agricultural Mechanics (2)

Selection of materials for construction. Plans interpretation and bills of materials. Development of skills in wood and metal working. Concrete proportioning and quality tests. 1 lecture, 1 laboratory.

AE 130 Irrigation Practices (2)

Application of good irrigation practices on the farm. Choice and evaluation of methods; soil, water, and plant relationships; when and how much water to apply; water measurement; water quality and drainage; elements and operation of irrigation systems. 1 lecture, 1 laboratory. Prerequisite: SS 121, Math 103

AE 131 Agricultural Surveying (2)

Introduction to basic surveying techniques as applied to agriculture. Keeping field notes; land measurement by tape; differential and profile leveling; contour and plane table mapping; land surveying and identification. 1 lecture, 1 laboratory. Prerequisite: Math 102

AE 133 Agricultural Drafting (2)

A basic course in technical drawing oriented toward working drawings of farm shop projects. Freehand sketching and instrument techniques. Multiview projection and pictorial drawings. 1 lecture, 1 laboratory.

AE 134 Agricultural Electrification (3)

Fundamentals of electric wiring and code regulations; selection, installation and maintenance of electric motors as used in agriculture. For students other than degree majors in Agricultural Engineering or Mechanized Agriculture. 2 lectures, 1 laboratory. Prerequisite: Math 103 or 113

AE 141 Agricultural Tractors and Equipment Skills (2)

Skills in the practical operation of tractors and equipment. Supervised operational practice on modern farm and utility industrial equipment in production agriculture and light earth moving operations. 2 laboratories.

AE 142 Agricultural Power and Machinery Management (4)

Cost analysis of power and machinery. Evaluation of agricultural tractors and machinery performance. Power applications and hydraulic systems. Evaluation of performance of tillage, seeding and planting, weed control, hay and grain harvesting, and farm processing equipment. Emphasis on management. Selection, operation, maintenance, and cost of use. 3 lectures, 1 laboratory. Prerequisite: Math 102 or 113

AE 145 Survey of Aerial Photogrammetry (3)

Object recognition, three-dimensional equipment, and interpretation. Print alignment, stereoscopic viewing, scales, elevation determination, and application. Familiarization with geological, agricultural, and engineering surveys. Construction data, topographic detail, drainage elevation and control. Color photo techniques and uses. 2 lectures, 1 laboratory. Prerequisite: Math 103 or 114

AE 228 Cotton Ginning (4)

Plant layout and materials flow patterns. Function, operation, trouble shooting, maintenance and repair of ginning equipment. Electrical, pneumatic and hydraulic systems. Product quality control; sampling procedures and mechanisms. 3 lectures, 1 laboratory.

AE 230 Agricultural Blacksmithing (2)

Fundamentals of forging and its application to agriculture. New and repair work involving bending, shaping, hardening, tempering, and annealing. 1 lecture, 1 laboratory.

AE 231 Agricultural Building Construction (3)

Development of practical skills in carpentry and light construction. Selection of materials. Agricultural buildings repaired, constructed, or modified during laboratory periods. 1 lecture, 2 laboratories. Prerequisite: AE 121 or AE 128

AE 234 Agricultural Power Transmission (3)

Elements of the transmission, measurement and utilization of power in agriculture. Problem solution, engineering reports, graphical studies, pumping machinery and engine cycles. 2 lectures, 1 laboratory. Prerequisite: AE 142

AE 236 Principles of Irrigation (4)

Fundamental characteristics of soil, water, and plants as they affect irrigation practices: consumptive use; water rights, supplies and schedules; water quality and salinity; irrigation methods and evaluation. 3 lectures, 1 laboratory. Prerequisite: Math 141, SS 121

AE 237 Engineering Surveying (2)

Selection, care and use of tapes, levels and transits. Keeping field notes; land measurement by tape; differential and profile leveling, and the plotting of profiles. Introduction to the transit; field operation; introduction to traverses. 1 lecture, 1 field period. Prerequisite: ME 151 or equivalent; Math 115

AE 238 Engineering Surveying (2)

Use of the transit: traverses, coordinates, triangulation, area and balanced survey calculations. Cross sections and volumes; contour interpolation; stadia and plane table operation; topographic mapping. 1 lecture, 1 field period. Prerequisite: AE 237

Ag Engineering

AE 239 Engineering Surveying (2)

Parabolic curves, circular curves, cross sectioning, setting slope stakes, measuring earth volume, cuts and fills as applied to road beds, public land surveys, photogrammetry. 1 lecture, 1 field period. Prerequisite: AE 238

AE 312 Hydraulics (4)

Static and dynamic characteristics of liquids, flow in open and closed channels, uniform and non-uniform flow, flow measurement, pumps. 3 lectures, 1 laboratory. Prerequisite: Phys 132, ME 211, Math 142

AE 315 Hydrology (3)

Collection, organization and use of precipitation and runoff data, flood frequency and economics of structures, stream gauging and use of hydrograph, principles of groundwater management and flood routing. 3 lectures. Prerequisite: Math 141 or consent of instructor

AE 320 International Agriculture Mechanization (3)

Factors essential to sound mechanization of agriculture in developing nations abroad. Mechanization programs and projects for agricultural development. Manpower development and management planning for effective utilization of mechanical equipment in agriculture abroad. 3 lectures. Prerequisite: AE 142

AE 321 Agricultural Equipment Industry Management (4)

Management and operation of the farm equipment industry. Study of sales, service, parts and product education policies on manufacturer, distributor and dealer level. 2 lectures, 2 laboratories. Prerequisite: AE 142

AE 322 Principles of Agricultural Machinery (3)

Principles of selection and evaluation of agricultural power units and machines. Soil-equipment mechanics and tractor-implement combinations. 2 lectures, 1 laboratory. Prerequisite: AE 142, 234

AE 323 Agricultural Products Handling (3)

The application of product handling techniques and equipment to the processing of agricultural commodities. 2 lectures, 1 laboratory. Prerequisite: Math 103 or 113 or 141, junior standing or consent of instructor

AE 324 Principles of Agricultural Electrification (3)

Principles of wiring buildings and farmstead wiring layout. Materials, code regulations, electrical measurements and rates applicable to various farm uses. Power distribution and application of DC and AC circuit fundamentals to agricultural situations. 2 lectures, 1 laboratory. Prerequisite: Physics 123 or 133

AE 325 Agricultural Electric Power and Controls (3)

Single-phase and three-phase electric motors and protective devices for agricultural use. Identification, selection, installation, and maintenance of various types. Operating characteristics and drives. Applications of electronic controls to agriculture. 2 lectures, 1 laboratory. Prerequisite: AE 324

AE 331 Irrigation Systems Design (3)

Choosing adapted irrigation methods, design of surface and sprinkler irrigation systems, land grading calculations for optimum grades and minimum soil moving consistent with economics. Soil conditions, earth moving equipment and costs. 2 lectures, 1 laboratory. Prerequisite: AE 236 and 312, or AE 340 and approval of instructor

AE 332 Agricultural Building Planning (3)

Functional planning of buildings. Farmstead layouts. Environmental factors affecting crop and animal housing. Working drawings and cost estimates. 2 lectures, 1 laboratory. Prerequisite: Junior standing and a course in drafting.

AE 333 Engineering Properties of Agricultural Materials (3)

Principles of analyzing the mechanical, electrical, thermal, photo-dynamic, rheological and sonic responses of agricultural products, including soil mechanic fundamentals. 2 lectures, 1 laboratory. Prerequisite: AE 338, Chem 122, Phys 123 or 133, or consent of instructor.

AE 335 Agricultural Power (3)

Principles of spark ignition and compression ignition engines, including liquefied petroleum gas equipment, and related accessories. Service, trouble-shooting and repair procedures. 2 lectures, 1 laboratory. Prerequisite: Phys 121 or consent of instructor.

AE 336 Agricultural Power (3)

Thermodynamic principles as applied to internal combustion engines. Theory of combustion. Fuels and lubricants. Power and its measurement. Factors affecting horsepower output and engine efficiency. Power transmission. Automotive electrical systems. 2 lectures, 1 laboratory. Prerequisite: AE 335, Phys 133

AE 338 Dynamic Measurement (3)

Types and application of transducers, receivers, recorders and automatic controls in agriculture and agricultural processing. 2 lectures, 1 laboratory. Prerequisite: AE 323, Phys 133, junior standing or consent of instructor.

AE 340 Irrigation (4)

Principles and practices of irrigation. Soil, water, and crop relationships; soil moisture stress and crop production; consumptive use rates and irrigation schedules; water quality, salinity and drainage; evaluation of irrigation methods and systems; flow of water in pipes and canals; water measurements; wells and pumps. For non-majors. 3 lectures, 1 laboratory. Prerequisite: Math 103 or 113, SS 121

AE 341 Gasoline Engine Diagnosis (2)

Use of modern engine testing equipment in the evaluation of engine components and accessories such as: cylinder condition, ignition systems, electrical systems, and fuel systems. 1 lecture, 1 laboratory. Prerequisite: AE 335 or equivalent

AE 342 Diesel Engine Diagnosis (2)

Detailed study of diesel fuel systems commonly used in agriculture. The use of modern test and service equipment in evaluating and servicing these systems. 1 lecture, 1 laboratory. Prerequisite: AE 335 or equivalent

AE 344 Agricultural Equipment Projects (3)

Design and construction of special agricultural equipment related to any agricultural enterprise. 1 lecture, 2 laboratories. Prerequisite: AE 122 or 128; ET 151 or equivalent.

AE 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: Permission of department head.

AE 414 Irrigation Engineering (4)

Problems of irrigation water supply and distribution found in irrigation districts or large farms; influence of soils, crops and climate on frequency, rate and duration of water delivery; design of open and closed conduits, float valves, pumps and reservoirs; costs and engineering economics of irrigation systems for efficient water delivery and use. 3 lectures, 1 laboratory. Prerequisite: AE 312, 331

Ag Engineering

AE 421 Agricultural Machine Design (3)

Design and construction of specialized farm equipment. 1 lecture, 2 laboratories. Prerequisite: ET 246, MP 142, WM 142, ME 212, Aero 207

AE 422 Agricultural Equipment Engineering (3)

Analysis and design of equipment with emphasis on man-machine-plant-automata relationships and concepts. 2 lectures, 1 laboratory. Prerequisite: AE 322, ME 212

AE 425 Utility-Industrial Equipment (4)

Cost analysis of utility and industrial equipment with emphasis on management, selection, operation and maintenance. Evaluation of performance of bulldozers, earth-moving equipment, cranes, air compressors and rigging. 3 lectures, 1 laboratory. Prerequisite: IE 414

AE 431 Closed Circuit Hydraulics (3)

Proper selection and maintenance of machine components using standardized design procedures and manufacturer's design literature. 2 lectures, 1 laboratory. Prerequisite: AE 234

AE 433 Agricultural Structures Design (3)

Design of typical agricultural buildings with emphasis on wood and metal construction. Stress solutions of trusses by analytic and graphic methods. Working drawings. 2 lectures, 1 laboratory. Prerequisite: AE 332, Aero 207

AE 434 Reinforced Concrete (3)

Mechanics of reinforced concrete. Design of beams, columns, floor systems, foundations and retaining walls. 2 lectures, 1 laboratory. Prerequisite: AE 433

AE 435 Drainage (3)

Flow of water in porous media; intrinsic permeability and hydraulic conductivity; flow nets; wells and groundwater; design of subsurface drains. 2 lectures, 1 laboratory. Prerequisite: AE 236 and AE 312, or AE 340 and approval of instructor.

AE 437 Conservation Engineering (3)

Principles of soil and water conservation including the fundamentals of soil mechanics used in the design of compacted earth fills. Practice in the design of important types of soil and water conservation structures. 2 lectures, 1 laboratory. Prerequisite: AE 312, SS 202.

AE 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.

AE 463 Undergraduate Seminar (2)

Group discussion of current agricultural engineering topics presented by individual members of the class. Topics or papers presented by guest speakers. Placement opportunities and requirements. 2 lectures.

AE 520 Special Problems and Topics (1-3)

Individual or group investigation, research, studies or surveys of selected problems. Total credit limited to 3 units. Prerequisite: consent of instructor.

AE 521 Engineering of Agricultural Equipment (3)

Harvesting machines analyzed from the mechanical, operational, and economic standpoint. Emphasis on optimum harvesting systems. 2 lectures, 1 laboratory. Prerequisite: AE 333, 422 or equivalent.

AE 533 Advanced Irrigation System Design (4)

Design and economic evaluation of complex sprinkler and surface irrigation systems. 3 lectures, 1 laboratory. Prerequisite: AE 331 or equivalent.

AE 581 Graduate Seminar in Agricultural Engineering (3)

Group study of current problems and recent developments in the field. Relationship of Agricultural Engineering to the teaching of vocational agriculture. 3 lectures.

AE 599 Engineering Report (2) (2) (5)

Directed study with limited supervision of important, practical engineering problem-solving. Preparation of a comprehensive report. Total credit limited to 9 units with maximum of 5 units per quarter. Prerequisite: consent of instructor.

ANIMAL HUSBANDRY

AH 101 Feeds and Feeding (4)

Simple use of food nutrients. Identification and classification of feeds for each class of livestock. The digestion and utilization of feeds. Feeding standards and computation of simple rations for livestock. Economy in feeding and purchasing feeds by nutritive values. 3 lectures, 1 laboratory.

AH 121 Market Beef Production (4)

Breeds, market classes, and grades of beef cattle. Selection of feeder cattle. Management practices in purchasing and fattening cattle using farm grown feeds. Study of cattle feeding operations carried on at the college. Marketing of beef cattle. 3 lectures, 1 laboratory. Prerequisite: AH 101

AH 122 Elements of Swine Production (4)

History, development and importance of swine industry. Types, breeds, market classes and grades of swine. Basic principles and practices of swine feeding and management. 3 lectures, 1 laboratory.

AH 123 Elements of Sheep Production (4)

Survey of the types of sheep operations in California. Breed study, market classes, and grades identification. Commercial fattening of lambs in dry lot and irrigated pasture programs. Calendar of operations for the various types of sheep enterprises. 3 lectures, 1 laboratory.

AH 131 Basic Equitation (3)

Grooming, saddling, bridling, mounting, seat and hands. Horsemanship both under saddle and bareback. Basic care of the horse. Study of types of horse gear and equipment. Designed to teach basic riding to students with no previous experience. 1 lecture, 2 laboratories.

AH 221 Sheep Management (4)

Detailed study of managerial practices for both commercial and purebred sheep enterprises. Performance testing and carcass evaluation techniques. The preparation and merchandising of the wool clip. Introduction to wool processing. 3 lectures, 1 laboratory. Prerequisite: AH 102, 123

AH 222 Commercial Beef Management (4)

Care and management of a breeding herd of commercial cattle in California. Range and farm lands suited to beef production. Factors affecting cost of production. Improvement of breeding herd. Trends in the industry. 3 lectures, 1 laboratory. Prerequisite: AH 102, 121

Animal Husbandry

AH 223 Swine Management (4)

Management practices involved in commercial and purebred swine enterprises. Methods of production and marketing, performance testing programs and carcass evaluation techniques. Nutritional requirements, rations, diseases and parasites, facilities and equipment. 3 lectures, 1 laboratory. Prerequisite: AH 102, 122

AH 226 Livestock Judging (3)

Application of visual appraisal techniques to the selection of beef cattle, sheep, swine and horses. 1 lecture, 2 laboratories.

AH 229 Range Management (4)

Characteristics of rangeland, identification of range plants, management practices to maintain range resources and increase production of forage and livestock. 3 lectures, 1 laboratory. Prerequisite: SS 121, Bot 121, AH 121 or 230

AH 230 General Animal Husbandry (4)

For non-animal husbandry majors. Selection, feeding, and management of sheep, swine, and cattle, and their uses on California farms. 3 lectures, 1 laboratory.

AH 232 Elements of Horse Management (3)

Status of the horse industry. Breeds of horses and their uses. Anatomy and parts of the horse, horse judging. Study of good and faulty conformation. Unsoundnesses, ailments and their treatment. Determination of age. Early history of the horse. 2 lectures, 1 laboratory. Prerequisite: AH 101

AH 234 Horseshoeing (2)

Fundamentals of horseshoeing, anatomy and physiology of the horse's foot, pastern, and legs. Trimming feet, fitting and nailing shoes. Normal shoeing, corrective shoeing. 1 lecture, 1 laboratory combined.

AH 302 Applied Animal Nutrition (3)

Feedstuff evaluation and analysis. Advancements in feedstuff evaluation and application to ration formulation. Principles and practices in livestock ration formulation. Linear programming principles as applied to computer formulated rations. 2 lectures, 1 laboratory. Prerequisite: AH 101, Chem 226

AH 304 Animal Breeding (3)

Application of genetics to the improvement of farm animals. Improving production through a study of mating systems including outbreeding, inbreeding, selection techniques, performance testing and evaluating, herd records, indexing and progeny testing. Setting up and organizing improved breeding programs using modern techniques and equipment. 3 lectures. Prerequisite: Bio 303

AH 323 Beef Husbandry (4)

Purebred cattle business including selection of foundation stock, herd bulls; breeding programs; pedigrees; facilities and equipment; feeding breeding herd, sale cattle, show cattle; marketing purebred cattle; and general management problems. 3 lectures, 1 laboratory. Prerequisite: AH 101, 121, 222

AH 329 Range Ecology (3)

Ecological factors of range plant environment, succession, application of ecology to rangeland. 2 lectures, 1 laboratory. Prerequisite: AH 229

AH 332 Range Technology (4)

Fundamentals of rangeland survey and inventory. Application of ecology in range evaluation. Analysis of range condition and capacity. Development of plans for effective improvement and utilization of rangeland. 3 lectures, 1 laboratory. Prerequisite: AH 229

AH 333 Horse Husbandry (3)

Management of the breeding farm. Farm layout. Inheritance, pedigrees, diseases, breeding problems, nutrition, study of estrous cycles, and servicing the mare. Handling stallions. Sale preparation. Breeding and feeding records, office procedure, selection of breeding stock. 2 lectures, 1 laboratory. Prerequisite: AH 232

AH 334 Feed Mill Operation (3)

Study of general operation of a feed mill including a survey of the industry, buying, storing, grinding, weighing, mixing, packaging, handling, and delivery of formula feeds. Also a study of flow of materials, preventive maintenance and safety in a mill. 2 lectures, 1 laboratory. Prerequisite: AH 101 and 1 year production courses, or AH 230, PH 230 or DH 230

AH 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: Permission of department head

AH 401 Reproductive Physiology (3)

Intensive study of reproductive efficiency of farm animals. Anatomy and physiological factors involved in reproduction. Male and female systems, pregnancy, estrual behavior, semen collection and evaluation, artificial insemination, pregnancy testing, and hormone therapy. 2 lectures, 1 laboratory. Prerequisite: VS 123

AH 402 Animal Nutrition (4)

The metabolism of proteins, carbohydrates, fats, minerals, and vitamins. Relationship of proper nutrition to livestock production. 3 lectures, 1 laboratory. Prerequisite: AH 302 or equivalent, Chem 328

AH 434, 435 Specialized Horse Enterprises (3) (3)

Early schooling of the young horse through advanced training. Use of the snaffle bit, hackamore, half-breed and Spanish bits. Gentling and ground work. Training in collection, turning, backing, leads, trailer loading, rope work, cattle work. For advanced students. 1 lecture, 2 laboratories. Prerequisite: AH 333 or appropriate experience.

AH 441 Advanced Livestock Judging (2)

Intensive practice in livestock judging in preparation for livestock judging team to compete in intercollegiate contests. 2 laboratories. Prerequisite: AH 226

AH 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.

AH 463 Undergraduate Seminar (2)

Major developments in the chosen field of the student. Discussion of new developments, policies, practices, and procedures. Each individual is responsible for the development and presentation of a topic in his chosen field. 2 lectures.

AH 580 Seminar in Animal Nutrition (3)

Current findings and problems in the field of animal nutrition. Effects of new experimental research on the livestock industry. 3 lectures.

AH 581 Graduate Seminar in Animal Production (3)

Current findings and research problems in the field and their application to the industry. 3 lectures.

Anthropology/Architecture

ANTHROPOLOGY

Ant 201 Cultural Anthropology (3)

The meaning and significance of culture to human beings. Examination of how cultures differ in their impact on behavior. How cultures develop and change. 3 lectures.

ARCHITECTURE AND ARCHITECTURAL ENGINEERING

Arch 106 Materials of Construction (3)

The use and application of building materials, structural makeup of buildings. 3 lectures.

Arch 111 Introduction to Design (2)

Familiarization with the professional fields of architecture, engineering and city planning. Introduction to the design process and development as a basis for architectural analysis. 2 lectures.

Arch 132 Introduction Design (2)

Continuation of Arch 111 stressing critical evaluation of man's environment. 1 lecture, 1 laboratory. Prerequisite: Arch 111 or consent of school.

Arch 140 Descriptive Drawing (1)

Exercises in drawing without mechanical aids. Total credit limited to 3 units, not more than 1 unit in any one quarter. 1 laboratory.

Arch 143 Introduction to Design (2)

Continuation of Arch 132. Study of visual phenomena with application to elementary composition dealing with line, area, color and materials. 2 laboratories. Prerequisite: Arch 132 or consent of school.

Arch 144 Introduction to Drawing and Perspective (3)

Basic techniques used in graphic communication. Orthographic and isometric projection. Mechanical perspective, shades and shadows. 3 laboratories.

Arch 145, 146 Delineation (2) (2)

Three-dimensional representations with various drawing media which enable the student to express his architectural ideas. 2 laboratories. Prerequisite: Arch 140, 144 or consent of school.

Arch 147 Graphics (7)

Covers material in Arch 144, 145, 146. Primarily for transfer students. 7 laboratories.

Arch 148 Introduction to Design (6)

Covers material in Arch 111, 132, 143. Primarily for transfer students. 3 lectures, 3 laboratories.

Arch 205, 206 Strength of Materials (3) (3)

Physical properties of construction materials. Moment and shear diagrams; axial and eccentric loading; deflection. Sizing of structural members of homogeneous and compound materials. 3 lectures. Prerequisite: Phys 131, Math 142 or consent of school.

Arch 207 Strength of Materials (6)

Covers material in Arch 205, 206. Primarily for transfer students. 6 lectures.

Arch 231, 232, 233 Architectural Practice (3) (3) (3)

Construction techniques and working drawings for wood frame and steel frame structures. Theory and application of laws and codes affecting buildings. Theory and application of cost estimating procedures. 1 lecture, 2 laboratories. Prerequisite: Arch 106 or consent of school.

Arch 234 Architectural Practice (9)

Covers material in Arch 231, 232, 233. Primarily for transfer students. 3 lectures. 6 laboratories.

Arch 237, 238 Architectural Photography (2) (2)

Photographic and presentation techniques applicable to architectural subjects. 1 lecture, 1 laboratory. Prerequisite: Arch 144, Jour 221 or consent of instructor.

Arch 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 laboratories.

Arch 241, 242, 243 Watercolor (1) (1) (1)

Outdoor sketching with watercolor. 1 laboratory. Prerequisite: Arch 146

Arch 244, 245, 246 Advanced Delineation (2) (2) (2)

Architectural presentation for third, fourth, and fifth year students in Architecture. Development of further proficiency in drawing techniques through projects and critiques. 2 laboratories. Prerequisite: Arch 146

Arch 250 Engineering Problems—Digital Computers (1)

Solution of selected engineering problems by means of digital computers. 1 laboratory. Prerequisite: Math 142

Arch 251, 252, 253 Basic Design (3) (3) (3)

Continuation of Arch 143. Development of design skills through studies of spatial problems of increasing architectural complexity. Circulation, flow, and human needs with respect to architecture. One designated field trip required. 3 laboratories. Prerequisite: Arch 143, 146 or consent of school.

Arch 304 Stress Analysis (3)

Stress analysis of statically determinate and indeterminate structures. 3 lectures. Prerequisite: Arch 206 or consent of school.

Arch 305, 306 Steel and Timber Structures (3) (3)

Design of steel members and connections, ties, trusses, plate girders, and determinate frames. Vertical and lateral loading. Light frame wood buildings, trusses, glued laminated wood arches, and connections. 3 lectures. Prerequisite: Arch 304 or consent of school.

Arch 307 Stress Analysis, Steel & Timber Structures (9)

Arch 307 will cover material presented in Arch 304, 305, and 306. 9 lectures. Prerequisite: Arch 206 or consent of school.

Arch 312 Home and Community Design (3)

For students not majoring in architecture. Historical development of the home and city and the effect of location, climate, social and technological factors on homes and cities. Considerations and design methodology; furniture, landscape, and relation of home to community environment. 3 lectures.

Arch 314, 315, 316 Design Theory (2) (2) (2)

For engineering students. Studies in architectural design with emphasis on structural relationships. 2 lectures. Prerequisite: Arch 233, 253

Architecture

Arch 317, 318, 319 History of Architecture (3) (3) (3)

Periods of architecture; philosophies and conditions which influenced them. 3 lectures. Prerequisite: Eng 105

Arch 320 Color and Environment (2)

Theory and systemization of visible spectrum as it applies to architectural environment. Includes visual and psychological effects of color. Exercises pertain primarily to interior design. 1 lecture, 1 laboratory. Prerequisite: Arch 253, Psy 202

Arch 321 Photography of Historic Structures (2)

Photographic techniques used in the documentation of historic sites and structures. Emphasis on use of the camera as a recording instrument. 1 lecture, 1 laboratory. Prerequisite: Basic skills and consent of instructor.

Arch 322, 323 Model Analysis (2) (2)

Development of structural understanding by non-mathematical methods through the observation of models under load conditions. Introduction to model techniques of stress determination. 1 lecture, 1 laboratory. Prerequisite: Arch 206

Arch 324 Architectural Acoustics (2)

Design of hearing conditions in architectural spaces; sound distribution and diffusion; properties of structures and surface materials; room shapes as affecting acoustics with architectural considerations paramount. 2 lectures. Prerequisite: Phys 132, Arch 253

Arch 325, 326 Architectural Lighting (2) (2)

Influence of natural and artificial light on space, form, the human being and his architectural environment. Design of artificial lighting environments, sources of illumination, effects on textures, colors, illusions and moods, reflectance, absorption, glare control, diffusion and distribution, lighting economics, analysis of fixtures, controls. 1 lecture, 1 activity. Prerequisite: Phys 133 and Junior standing.

Arch 341, 342, 343 Architectural Practice (2) (2) (2)

Continuation of Arch 233. Masonry and concrete structures. Theory and application of specifications. Coordination with Architectural Design. 2 laboratories. Prerequisite: Arch 233, 253; Concurrent: Arch 351, 352, 353

Arch 344 Stress Analysis Laboratory (1)

Standard tests of structural materials and structural components. Use of test equipment and strain gages. 1 laboratory. Prerequisite: Arch 206

Arch 347, 348, 349 Design for Planners (2) (2) (2)

Three dimensional design with emphasis on spatial relationships and urban forms. The physical city. Effect of color, texture and scale, open spaces. Landscaping and architecture. 2 laboratories. Prerequisite: CRP 243, Arch 253

Arch 350 Advanced Descriptive Drawing (2)

Advanced programs in descriptive drawing as continuation of Arch 140. 2 laboratories.

Arch 351, 352, 353 Architectural Design (4) (4) (4)

Continuation of Arch 253. Development of logical analysis and creative abilities through application of skills to the solution of architectural problems. 4 laboratories. Prerequisite: Arch 206, 233, 253

Arch 357 Industrial Presentation Techniques (2)

Graphic presentation for industrial engineers. Symbols, techniques, and freehand drawing. Construction drawings and flow diagraming. 2 laboratories.

Arch 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.

Architecture

Arch 401, 402, 403 Design Theory (2) (2) (2)

Continuation of Arch 316. 2 lectures. Prerequisite: Arch 316

Arch 404, 405, 406 Concrete and Masonry Structures (2) (2) (2)

Elements and design of concrete and masonry structures. Vertical and lateral loading in multi-story buildings. 2 lectures. Prerequisite: Arch 306, 344; Math 143; Phys 133

Arch 407 Plastic Design of Steel Structures (3)

Theory of plastic design, structural engineering methods used to design steel frameworks with plastic theory. 3 lectures. Prerequisite: Arch 306

Arch 409 Foundation Engineering (2)

Fundamentals of foundation engineering, evaluation of soil reports, principles of determination of bearing capacity, soil classification, selection of types of foundations, evaluation of expansive properties of foundation soils, discussion of basic laboratory tests. 2 lectures. Prerequisite: Arch 206

Arch 411 Matrix Analysis of Structures (2)

Analysis of structural systems by matrix algebra techniques primarily applicable to solution by digital computers. 2 lectures. Prerequisite: Arch 250, 306, Math 204

Arch 412 Dynamics of Framed Structures (2)

Analysis of stresses and deflections in structures subjected to dynamic loads. Emphasis is on matrix algebra development primarily applicable to solution of problems by digital computer. 2 lectures. Prerequisite: Arch 250, 306, Math 204

Arch 414, 415, 416 General Engineering (2) (2) (2)

Topics which serve to supplement and unify the professional engineering background. 2 lectures. Prerequisite: Arch 306, 344; Math 204; Chem 124; Phys 133

Arch 417, 418, 419 History of Architecture (2) (2) (2)

Arch 319 continued. Periods of architecture; philosophies and conditions which influenced them. 2 lectures. Prerequisite: Arch 319

Arch 421, 422 Soil Mechanics and Foundations (3) (3)

Principles and applications of soil mechanics; types of foundation construction; design of foundations for buildings and bridges. 2 lectures, 1 laboratory. Prerequisite: Arch 306; Math 204, 241; Phys 133; Chem 124

Arch 423 Advanced Foundation Engineering (2)

Analysis of foundation systems for large buildings, bridges, etc. Evaluation of test results, model analysis, special topics relative to foundation engineering, advanced work in triaxial testing, pore pressure effects, and slope stability analysis. 2 lectures. Prerequisite: Arch 422 or Arch 424

Arch 424 Soil Mechanics and Foundations (6)

Covers material in Arch 421, 422. Primarily for transfer students. 4 lectures, 2 laboratories.

Arch 426 Experimental Stress Analysis (3)

Stress determination by model analysis. Brittle coatings, photoelastic methods and strain gauges. Advanced topics. 2 lectures, 1 laboratory. Prerequisite: Arch 444

Arch 441, 442, 443 Professional Practice (2) (2) (2)

Comprehensive projects in architecture involving office organization. Contract documents. Ethics. Drawings for buildings with coordinated engineering and specifications. Field trips. 2 activities. Prerequisite: Arch 306, 343

Architecture/Art

Arch 444, 445, 446 Structural Design (5) (5) (5)

Stress analysis of long-span structures, arches, influence lines, built-up girders, multiple-storied rigid frame structures, prestressed concrete, shells and domes. Dams and bridges. Advanced topics from current engineering practice. One designated field trip required. 5 laboratories. Prerequisite: Arch 306, 316, 343, 344; Math 204, 241

Arch 447, 448, 449 Design for Planners (2) (2) (2)

Continuation of Arch 347, 348, 349 dealing with problems of increasing size and complexity. 2 laboratories. Prerequisite: CRP 243, 303, 353

Arch 451 Architectural Design (5)

Continuation of Arch 353. Problems of increasing architectural complexity with emphasis placed on comprehensive solutions. 5 laboratories. 15 units required, no more than 5 units per quarter. Prerequisite: Arch 306, 343, 353

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

Selection and completion of a comprehensive type project under faculty supervision. Problems to involve the students' technical and creative skills. Construction encouraged. 120 hours minimum total time. Prerequisite: Arch 306, 343

Arch 463 Undergraduate Seminar (2)

Discussion and lectures on problems of practice and the building industry. Professional ethics. Students present organized material on some subject of interest in architectural engineering or architecture. 2 activities. Prerequisite: Senior standing

Arch 551 Architectural Design (5)

Continuation of Arch 451. Stressing professional initiative and responsibility in integrating architectural design theory and practice with fields influencing the shaping of the total environment. 5 laboratories. 15 units required, no more than 5 units per quarter. Prerequisite: Arch 349, 406, 443, and 15 units of Arch 451

Arch 571, 572, 573 Design Project (2) (2) (2)

A comprehensive architectural design project chosen by the student which will challenge his technical, creative and organizational abilities. Project to involve community or field contact on a team basis. Construction or projects involving other disciplines encouraged. 2 laboratories. Concurrent: Arch 551, 552, 553

ART

Art 201 Fundamentals of Drawing (3)

Analysis and practice in functional drawing, basic design, and study of form. Development of individual techniques. 3 activity periods.

Art 211, 212 Art History (3) (3)

The chronological study of the significant art and artists in world history. In addition to painting and sculpture, considerable emphasis will be given to the applied arts of each period. 3 lectures.

Art 231 Introduction to Art (3)

Designed to further understanding of painting, sculpture and graphic arts. Development of vocabulary and useful criteria for evaluation. 3 lectures.

Art 232 Orientation to Art Materials (3)

Manipulation and experimentation with a wide variety of art media and techniques. Evaluation of expressive and design qualities in group and individual projects. 3 activity periods.

Art 233 Orientation to Crafts (3)

Basic projects with various craft materials such as clay, glass, papier-mache, metal, textiles, wood, and leather. Emphasis on design as presented through materials and their properties. Lectures, discussions, demonstration projects, and evaluative criteria applied to craft materials. 3 activity periods.

Art 255 Art in Industry (2)

Fundamental design problems common to all phases of industry and commerce, and fine arts. Developing vocabulary and criteria for evaluation of specific items in terms of design principles and current practice. 2 lectures.

Art 321 Applied Color and Design (3)

Study of lines, planes, masses, textures, color, and aspects of space as elements in the structure of the plastic arts. Balance, rhythm, and proportion of any two or more of these elements as utilized in the fine and applied arts. Experience in simple media. 2 lectures, 1 activity period. Prerequisite: Art 231 or consent of instructor.

Art 324, 325, 326 Advanced Crafts (2) (2) (2)

Applied principles of general design and color theory in ceramics, metal work, textile design, simple woodworking, and other craft materials. Emphasis on skill development, material handling, and current methods of applied design. 2 activities. Prerequisite: Art 233 or 321, or consent of instructor.

Art 340, 341 Painting Techniques (2) (2)

Physical characteristics of painting media, creative understanding of pictorial space and color. 2 laboratories. Prerequisite: Art 321, 345, or consent of instructor.

Art 345 Advanced Drawing (3)

Development of methods and techniques in the figurative study of form and structure. Emphasis on relating drawing to individual solutions of problems. 3 activities. Prerequisite: Art 201 and consent of instructor.

Art 347 Sculpture (2)

Introduction to the elements of three dimensional form through the exploration of sculptural techniques. Technical problems in modeling, casting, carving, welding, and other techniques of assembly. 2 activities.

Art 348 Art Metal (2)

Experience in design and creation of jewelry, small sculpture and holloware. Classroom work in copper, brass, silver and gold includes cutting, joining, tooling, and casting techniques. 2 activities.

Art 349 Ceramics (3)

Introduction to ceramic materials and processes; design, slab, coil and wheel forming, glazing; related instruction and evaluation. 3 activities. Prerequisite: Art 233 or consent of instructor.

Art 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 and consent of instructor.

Art 421 Curriculum and Instructional Procedures in Art (3)

Content, organization and scope of art curriculum in elementary and secondary schools. Evaluation of teaching approaches and procedures that encourage creativity in the arts. 3 lectures.

Art 425 Contemporary Art (3)

Principles of art as expressed in contemporary culture, particularly in the fine and graphic arts. Influence of art expression in developing and expressing individual personality. 3 lectures.

Audiovisual/Bacteriology

AUDIOVISUAL EDUCATION

AV 329 Commercial Illustration (3)

Preparation and evaluation of original art copy for commercial use. Laboratory problems in drawing, layout, lettering for single and multiple color runs. Study of various approaches to registration; uses of color and texture in art copy. 1 lecture, 2 activity periods.

AV 400 Special Problems in Audiovisual Production (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: AV 431, AV 432 or consent of instructor.

AV 431 Audiovisual Instruction: Methods and Materials (3)

Visual and auditory methods and materials of value in classroom teaching in elementary and secondary schools. Lecture, lecture-demonstration, discussion, previewing, and laboratory work. Planning and correlating use of audiovisual techniques in the classroom. 2 lectures, 1 laboratory. Prerequisite: Ed 312 or consent of instructor.

AV 432 Audiovisual Methods in Business and Industry (3)

Industrial uses of visual and auditory materials in planning training aids, mass communication materials, demonstrations, mockups, models, and conference leading techniques. Planning, previewing, and skill development for business and industry. 2 lectures, 1 laboratory. Prerequisite: Psy 302 or consent of instructor.

AV 433 Audiovisual Production Workshop (3)

Analysis of advanced problems of instruction, production of materials in relation to these problems, using audiovisual materials and methods. Skill development in problem-solving through contact with materials, equipment, and methods employed in audiovisual communication. 2 lectures, 1 laboratory. Prerequisite: AV 431 or 432, or consent of instructor.

BACTERIOLOGY

Bact 221 General Bacteriology (4)

Morphology, metabolism, classification and identification; bacteriology of air, soil, water, and foods with applications to industry, agriculture, medicine, and public health. 2 lectures, 2 laboratories. Prerequisite: One quarter of college chemistry or Bot 121 or Zoo 131

Bact 322 Dairy Bacteriology (4)

Advanced course for practical work demonstrating the domestic and industrial importance of micro-organisms involved in milk and dairy products: milk, milk powders, fermented milks, evaporated and condensed milks, butter, cheese, cheese starters, and ice cream. 2 lectures, 2 laboratories. Prerequisite: Bact 221

Bact 333 Industrial Microbiology (4)

Sanitary and industrial applications of microbiology stressing food, dairy, water, air and sewage; practical aspects of environmental sanitation emphasized. 2 lectures, 2 laboratories. Prerequisite: Bact 221

Bact 342 Sanitary Inspection and Control (2)

Domestic and commercial contamination, epidemiology, stressing practical applications of hygienic practices and methods of correcting and eliminating health hazards. 2 laboratories. Prerequisite: Bact 221

Bact 402 General Virology (3)

Characteristics and classification of animal viruses. Methods for collection of specimens, cultivation and identification of pathogenic viruses. 3 lectures. Prerequisite: Bact 221

Bact 421 Food Microbiology (4)

Physiological activities of microorganisms involved in the preparation, preservation, deterioration and toxicity of foods and related products. Sanitary and public health implications. 2 lectures, 2 laboratories. Prerequisite: Bact 221. Recommended: Chem 226

Bact 423 Public Health Microbiology (4)

Detailed study of pathogenic yeasts, molds, viruses, and bacteria in relation to public health. 2 lectures, 2 laboratories. Prerequisite: Bact 221

Bact 436 Marine Microbiology (4)

Harmful and beneficial marine bacteria and allied microorganisms. Role played by marine microorganisms as biochemical, geological and hydrobiological agents. 2 lectures, 2 laboratories. Prerequisite: Bact 221

Bact 590 Seminar in Bacteriology (1)

Problems and topics in advanced bacteriology selected according to the interest and needs of the students enrolled. Maximum of 3 units. Prerequisite: Graduate status and evidence of satisfactory preparation in bacteriology.

BIOLOGY

Bio 100 Agricultural Biology (3)

Basic biological principles applied to agriculture. This course may not be substituted for General Zoology or General Botany. 2 lectures, 1 demonstration and discussion hour. Not open to degree students for degree credit.

Bio 101 General Biology (3)

Characteristics of living things; cellular composition and organization; functional approach to organ systems of man. 3 lectures. Not open to students who have taken Bot 121 or Zoo 131

Bio 102 General Biology (3)

Endocrine system; reproduction; heredity and environment; social implications of biological principles. 3 lectures. Prerequisite: Bio 101

Bio 103 General Biology (3)

Disease; plants, animals and man; balance of nature, conservation of resources; history of man. 3 lectures. Prerequisite: Bio 102

Bio 110 Applied Biology (3)

Basic principles of cellular biology, heredity, environmental relationships and evolutionary development of living things with emphasis on man. Applications to engineering and industry. Not open to students with credit in general biology, general botany, or general zoology. 3 lectures.

Bio 127 Natural History (3)

Scope of natural history; formation and identification of features in the physical environment; natural history survey of arachnids, myriapods, and insects. 1 lecture, 2 laboratories.

Bio 128 Natural History (3)

Natural history survey of the plant and animal kingdom; field study and identification of marine intertidal organisms. 1 lecture, 2 laboratories.

Bio 129 Natural History (3)

Principles of field biology and ecology; laboratory and field study of wildflowers, land communities, and freshwater communities; emphasis is on California natural history. 1 lecture, 2 laboratories. Prerequisite: Bio 128

Biology

Bio 242 Biological Techniques (3)

Problem recognition, scientific method, scientific literature, instrumentation, and the preparation of specimens for scientific study. 1 lecture, 2 laboratories. Prerequisite: Bot 121, Zoo 131 or Bio 129

Bio 255 Microtechnique (2)

Methods of preparing plant and animal tissues for microscopic study with emphasis on paraffin embedding techniques and staining. 2 laboratories. Prerequisite: Bot 122 or Zoo 132

Bio 303 Genetics (3)

Principles of heredity and variation. 3 lectures. Prerequisite: one quarter of college biology and two quarters of college mathematics.

Bio 304 Advanced Genetics (2)

Recent advances in genetics and cytogenetics. 2 lectures. Prerequisite: Bio 303

Bio 313 Radiation Biology (2)

Interaction and effect of radiation on living cells and organisms. Review of production and characteristics of non-ionizing and ionizing radiation, isotope characteristics useful in the study of bio-systems, health hazards, and health safety problems. 2 lectures. Prerequisite: Phys 123, Chem 121 or 124 and one of the following: Bio 101, 110, Bot 121, Zoo 131

Bio 315 Evolution (2)

Modern concepts of evolutionary mechanisms. 2 lectures. Prerequisite: Bio 303

Bio 325 General Ecology (3)

Study of the interrelationships between plants and animals and their environment in terrestrial, marine, and freshwater situations. 2 lectures, 1 laboratory. Prerequisite: Bio 129 or both Bot 122 and Zoo 132

Bio 328 Marine Biology (4)

Biological and environmental studies of marine organisms, with emphasis on their economic importance. 2 lectures, 2 laboratories. Prerequisite: Bio 129 or both Bot 122 and Zoo 133, or consent of instructor.

Bio 331 Biosystematics (3)

Major principles of classification, taxonomy, speciation, and nomenclature. Designed primarily for biology majors. Term report required. 2 lectures, 1 laboratory. Prerequisite: Ent 126, Bio 129 or both Bot 123 and Zoo 133

Bio 343 Radiation Laboratory Techniques (2)

Demonstrations and exercises in the use of radioisotopes and the operation of radiation detecting instruments. 2 laboratories. Prerequisite: Bio 313 (may be taken concurrently).

Bio 344 Genetics Laboratory (2)

Laboratory techniques in genetics. 2 laboratories. Prerequisite: 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: Permission of the department head.

Bio 423 General Cytology (4)

Detailed study of the structure and function of animal and plant cells. 3 lectures, 1 laboratory. Prerequisite: Bio 303 and either Zoo 133 or Bot 123

Bio 424 Electron Microscopy (3)

Biological applications of electron microscopy including techniques of specimen preparation, design of experiments, interpretation of results and limitations. 1 lecture, 2 laboratories. Prerequisite: Zoo 131, Bot 121 or instructor's consent.

Bio 431 General Physiology (4)

The functioning, control, and integration of physiological phenomena at various levels from cell to organism. 2 lectures, 2 laboratories. Prerequisite: Chem 226; Bot 122 or Zoo 132

Bio 437 Marine Resources (4)

Present and potential biological and physical resources of the sea with consideration of means for their best utilization. Identification and ecology of pertinent organisms. 3 lectures, 1 laboratory. Prerequisite: Bot 122 and Zoo 133

Bio 442 Quantitative Biology (3)

Design of biological experiments with emphasis on their statistical and computer analysis. 3 lectures. Prerequisite: Junior standing in biology and Math 212

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

Projects are selected from typical problems which graduates may meet in areas of their future employment. Results are presented in both oral and written reports. Minimum 120 hours total time.

Bio 463 Undergraduate Seminar (2)

Study and discussion of recent developments in the field of biology. 2 meetings. Prerequisite: Senior standing.

Bio 500 Investigations in Biology (2)

Non-thesis research in a specific area of biology, selected with the approval of, and conducted under the supervision of, a faculty member of the Biological Sciences Department. Maximum credit allowed 2 units. Prerequisite: graduate standing and consent of instructor.

Bio 515 History of Biology (3)

Critical survey of the historical development of experimental designs for the solution of biological problems. 3 lectures. Prerequisite: Graduate standing.

Bio 521 Curriculum and Methods in Biological Sciences (3)

Objectives, content, techniques, materials, and recent trends of successful instruction in secondary school biology. 3 lectures. Prerequisite: Graduate standing; evidence of satisfactory preparation in biology, botany and zoology.

Bio 524 Developmental Biology (3)

Developmental phenomena of higher and lower plants, vertebrate and invertebrate animals at the molecular, cellular, histological and organ levels. Each quarter will emphasize a different biological description. 3 units per quarter. May be repeated to a maximum of 9 units. 2 lectures, 1 laboratory. Prerequisite: Graduate standing and evidence of satisfactory preparation in biology.

Bio 535 Bioanalysis (3)

Clinical aspects of hematology, serology, immunology, parasitology, and clinical chemistry. Preparation of bio-technologists for state examinations and clinical and industrial laboratory work. 2 lectures, 1 laboratory.

Bio 590 Seminar in Biology (1)

Problems and topics in advanced biology selected according to the interest and needs of the students enrolled. Maximum of 3 units. 1 lecture. Prerequisite: Graduate status and evidence of satisfactory preparation in biology.

Botany

Bio 599 Thesis (3) (3) (3)

Individual research under the general supervision of the staff, leading to a graduate thesis of suitable quality. Prerequisite: Graduate standing and consent of instructor.

BOTANY

Bot 121 General Botany (4)

Introduction to structures and functions of seedbearing plants. 2 lectures, 2 laboratories.

Bot 122 General Botany (4)

Structure and relationships of plant groups from bacteria to angiosperms, emphasis on nonseedbearing plants of economic importance. 2 lectures, 2 laboratories. Prerequisite: Bot 121

Bot 123 General Botany (4)

Introduction to classification and identification of vascular plants, emphasizing the families of major economic importance; field and herbarium techniques. 2 lectures, 2 laboratories. Prerequisite: Bot 121

Bot 238 Native Plant Materials (3)

Identification, habits of growth, cultural requirements and landscape use of native California plants suitable for landscape purposes. 2 lectures, 1 laboratory. Prerequisite: Bot 123

Bot 322 Introductory Plant Physiology (4)

A consideration of the principal physiological processes of plants including water relations, mineral nutrition, photosynthesis, respiration, and growth of the plant. 3 lectures, 1 laboratory. Prerequisite: Bot 121 and Chem 226

Bot 323 Plant Pathology (4)

Comprehensive study of the causes and effects of disease in plants. Designed to lead to an understanding of the science and modern control methods. 3 lectures, 1 laboratory. Prerequisite: Bot 122 or Bot 123

Bot 326 Plant Ecology (4)

Effects on plant growth and development of the following environmental factors: soil, water, temperature, light, atmosphere, topography, organisms, and fire. 3 lectures, 1 laboratory. Prerequisite: Bot 123

Bot 334 Morphology of Vascular Plants (4)

Phylogenetic relationships of the plant kingdom as illustrated by comparative morphology of the vascular plants including living and fossil forms. 2 lectures, 2 laboratories. Prerequisite: Bot 123

Bot 335 Plant Anatomy (4)

Microscopic study of vascular plants dealing with the origin, development and structure of cells, tissues and organs. 2 lectures, 2 laboratories. Prerequisite: Bot 122

Bot 337 Algology (4)

Classification of marine and fresh-water algae. Consideration of ecological, physiological and economic aspects. 2 lectures, 2 laboratories. Prerequisite: Bot 122

Bot 343 Advanced Plant Taxonomy (3)

Systems of plant classification and principles on which they are based; use of morphology, cytogenetics, and ecology in classification; rules of botanical nomenclature. 2 lectures, 1 laboratory. Prerequisite: Bot 123

Bot 426 Mycology (4)

Comparative morphology and nuclear behavior of the fungi. A summary of the science with special attention given to forms important in agriculture, medicine and industry. 2 lectures, 2 laboratories. Prerequisite: Bot 122, Zoo 132, or consent of instructor.

Bot 531 Advanced Plant Pathology (4)

Relationships of plant hosts with their parasites. Methods and materials used in diagnosis of plant diseases and in plant disease research. 2 lectures, 2 laboratories. Prerequisite: Bot 323

Bot 590 Seminar in Botany (1)

Problems and topics in advanced botany selected according to the interest and needs of the students enrolled. Maximum of 3 units. 1 lecture. Prerequisite: Graduate status and evidence of satisfactory preparation in botany.

BUSINESS ADMINISTRATION

Bus 101 The Business Enterprise (4)

Orientation to the Business Administration program. Examination of the business enterprise, stressing its historical, environmental, and economic setting. Business organization and functions. 4 lectures.

Bus 103 Business Reports (3)

Organization and presentation of different types of business reports, including source determination, investigation, writing, and distribution. 3 lectures.

Bus 141, 142 Typing (1) (1)

Designed to teach the fundamentals of the touch system in the shortest time. Training in making out business forms and writing business letters. 3 one-hour periods.

Bus 206 Purchasing (3)

The purchasing function as it applies primarily to manufacturers, utilities and institutions. Representative cases in each major area are studied and emphasis is given to the function of the purchasing department of the company in relation to and in cooperation with other major divisions of the enterprise. 3 lectures.

Bus 301 Business Law Survey (3)

An overview of the field of business law patterned to needs of non-majors. Scope is the same as for Bus 307-308, though in less depth. 3 lectures. Not applicable for credit in Business Administration curriculum. Junior standing or consent of instructor.

Bus 307 Business Law (4)

American law sources, courts, contracts, agency, bailments, carriers, and sales law. 4 lectures. Prerequisite: Junior standing or consent of instructor.

Bus 308 Business Law (4)

Negotiable instruments, partnerships, corporations, real property, personal property, domestic relations, community property, wills and administration, trusts, insurance, suretyship, bankruptcy. 4 lectures. Prerequisite: Bus 307

Bus 319 Business Research (3)

Information gathering principles and techniques used in study and analysis of business activities. 3 lectures. Prerequisite: Math 212 or consent of instructor.

Bus 321, 322 Business Applications of Data Processing (3) (3)

Using the computer in business operations. Flow charting and programming languages applied to sub-systems and total systems problems. 2 lectures, 1 two-hour laboratory.

Chemistry

Bus 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.

Bus 401 Techniques for Teaching Business Subjects (3)

Organization and correlation of materials and techniques in business. Organization of course outlines, teaching units, and instruction sheets. 3 lectures.

Bus 404 Business and Government (3)

Development of legal controls of business, with emphasis on problems in constitutional and administrative area; legal aspects of business organization; anti-trust laws and competition; securities regulation; consumer protection. 3 lectures. Prerequisite: Bus 301 or 307 or consent of 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. Required minimum of 120 hours.

Bus 463 Undergraduate Seminar (2)

Seminar in developments in business with emphasis on business ethics and morals. 2 meetings. Prerequisite: Senior standing or special permission.

Bus 473 Business Problems (3)

Current business problems. Study in depth of a specific business area in preparation for employment. Problem definition, investigation, analysis and decision. 3 lectures. Prerequisite: Consent of instructor.

CHEMISTRY

Chem 106 Introductory Chemistry (3)

Metric system, density, chemical symbols, chemical formulas, nomenclature, kinetic-molecular theory, chemical equations, gas laws, the concept of the mole, molarity, normality and stoichiometric calculations. An introductory course in chemistry, not open to students who have credit for a college chemistry course. 3 lectures. Prerequisite: Math 103 or equivalent.

Chem 121 General Inorganic Chemistry (4)

Fundamental principles including atomic structure, bonding, nomenclature, chemical equations, states of matter, solutions, some non-metals. Not open to students with credit for Chem 124. 3 lectures, 1 laboratory. Prerequisite: Chem 106 or recommendation of faculty adviser.

Chem 122 General Inorganic Chemistry (4)

Electrochemistry, equilibria, non-metals with application to fertilizers, colloids, an introduction to metals and nuclear chemistry. Not open to students with credit for Chem 125. 3 lectures, 1 laboratory. Prerequisite: Chem 121

Chem 124 General Chemistry (4)

General principles including atomic structure, nuclear chemistry, and oxidation-reduction. Primarily for engineering majors. Not open to students with credit for Chem 121. 3 lectures, 1 laboratory. Prerequisite: Chem 106 or recommendation of faculty adviser.

Chem 125 General Chemistry (4)

Continuation of Chem 124. Introduction to the carbon compounds emphasizing fuels and synthetic polymers. Not open to students with credit for Chem 122. 3 lectures, 1 laboratory. Prerequisite: Chem 124

Chem 126 General Chemistry (4)

Chemical equilibria, compounds of the metals, qualitative analysis of the metal ions in the laboratory. 3 lectures, 1 laboratory. Prerequisite: Chem 122 or 125

Chem 143 General Chemistry Laboratory (1)

Additional laboratory to be taken with Chem 126. Includes semi-micro qualitative study of the nonmetals. 1 laboratory. Prerequisite: Chem 122 or 125

Chem 226 Organic Chemistry (4)

The fundamental concepts of organic chemistry with applications to agricultural and industrial processes. 3 lectures, 1 laboratory. Prerequisite: Chem 122 or 125

Chem 327 Organic Chemistry (5)

A more complete study of the types of organic compounds along with some reaction mechanisms. The laboratory is largely organic preparation. 3 lectures, 2 laboratories. Prerequisite: Chem 226

Chem 328 Biochemistry (4)

Fundamental chemistry of carbohydrates, proteins, fats, vitamins, enzymes and hormones as applied to their function in plant and animal metabolism. Special reference to the chemistry involved in the use, analysis and manufacture of feeds, foods and other agricultural products. 3 lectures, 1 laboratory. Prerequisite: Chem 226

Chem 329 Biochemistry (4)

Applied cellular biochemistry, nucleic acids, protein synthesis, virus, molecular geometry, antimetabolites, antibiotics, hormones, pharmacodynamics and laboratory animal techniques. 3 lectures, 1 laboratory. Prerequisite: Chem 328

Chem 331 Quantitative Analysis (4)

Analytical techniques of industrial significance stressing titrimetric procedures in the laboratory based on acidimetry, alkalimetry and redoximetry. Applications of chemical equilibrium and methods of problem solving. 2 lectures, 2 laboratories. Prerequisite: Chem 126

Chem 332 Quantitative Analysis (4)

Analytical techniques stressing procedures based upon titrimetric precipitometry, gravimetric analysis and continuation of redoximetry. Properties of precipitates and colloids as applied to industrial analytical chemistry. 2 lectures, 2 laboratories. Prerequisite: Chem 331

Chem 335 Quantitative Physiological Chemistry (3)

Quantitative determination of metabolites in biological fluids. Medical laboratory techniques in analysis of serum, blood and urine for glucose, nitrogenous substances, electrolytes, hormones, enzymes; blood gas analysis and blood pH determination. 1 lecture, 2 laboratories. Prerequisite: Chem 328

Chem 337 Biophysical Chemistry (4)

Physical methods for studying biological systems. A study of biopolymers and cellular organelles based on bioenergetics. 3 lectures, 1 laboratory. Prerequisite: Phys 123, Chem 328, 331

Chem 338 Organic Chemistry (5)

A continuation of Chem 327, including carbohydrates, sulfur compounds, heterocyclic compounds, natural products, stereochemistry, steroids, reaction mechanisms, organic preparations in the laboratory. 3 lectures, 2 laboratories. Prerequisite: Chem 327

Chem 342 Laboratory Glassblowing (1)

Techniques of glassblowing applied to the making of simple laboratory apparatus. 1 laboratory. Prerequisite: Chem 121 or 124

Chemistry

Chem 343 Qualitative Organic Analysis (4)

The experimental determination of the identity of organic compounds. Special reference to those compounds used in agriculture. 1 lecture, 3 laboratories. Prerequisite: Chem 327

Chem 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: Permission of the department head.

Chem 402 Inorganic Chemistry (3)

A systematic study of important elements based on periodic grouping and atomic structure with emphasis on chemical bonding, coordination compounds, and acid-base relationships. 3 lectures. Prerequisite: Chem 413 and 443

Chem 403 Advanced Organic Chemistry (3)

A detailed study of the mechanisms of organic reactions and related topics. 3 lectures. Prerequisite: Chem 327, 412 and 442

Chem 412 Physical Chemistry (3)

Physical and molecular constitution of gases; kinetic theory; atomic structure; elementary chemical thermodynamics and thermochemistry; chemical statistics; introduction to phase equilibria. 3 lectures. Prerequisite: Phys 123 or 133, Chem 126, Math 141

Chem 413 Physical Chemistry (3)

Phase equilibria, solutions; distillation theory; colligative properties; electrochemistry with analytical applications; non-ideal systems, chemical kinetics, radioactivity. 3 lectures. Prerequisite: Chem 412

Chem 434 Advanced Biochemistry (4)

Intermediary metabolism, hereditary molecular diseases, enzyme kinetics, bioenergetics, photosynthesis. Agricultural and industrial applications. 3 lectures, 1 laboratory. Prerequisite: Chem 329

Chem 435 Food Analysis (4)

Techniques used commercially in the chemical analysis of seed and cereal crops, fruit and vegetable crops, forage crops, meat and meat products, milk and dairy products, eggs and poultry products. Vitamin determinations, microbiological assay, quality control, taste testing, legal specifications, grading and labeling. 3 lectures, 1 laboratory. Prerequisite: Chem 328

Chem 436 Agricultural Chemicals (4)

Chemistry of fungicides, insecticides, rodenticides, plant growth regulators, soil conditioners, and fertilizers. Special reference to the analysis, manufacture, toxicology, legal specification, and regulations. 3 lectures, 1 laboratory. Prerequisite: Chem 328

Chem 437 Physical Chemistry (4)

Physical chemistry of the liquid and solid states. Chemical bonding and molecular structure; spectroscopy, diffraction, electrical and magnetic properties of molecules. Surface chemistry and catalysis. 3 lectures, 1 laboratory. Prerequisite: Chem 413 and 443 or consent of instructor.

Chem 439 Instrumental Analysis (4)

Optical, electroanalytical and other techniques of modern instrumental analysis. Current industrial applications. Laboratory work in instrumental methods is emphasized. 2 lectures, 2 laboratories. Prerequisite: Chem 332, 413 and 443

Chem 442 Physical Chemistry Laboratory (1)

Experimental studies of gases, solutions, thermochemistry and chemical equilibria. 1 laboratory. Corequisite: Chem 412

Chem 443 Physical Chemistry Laboratory (1)

Experimental studies of phase rule, electrochemistry and chemical kinetics. 1 laboratory. Corequisite: Chem 413

Chem 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.

Chem 463 Undergraduate Seminar (2)

Oral presentations of current developments in chemistry based on periodical literature. 2 meetings.

Chem 513 Advanced Inorganic Chemistry (3)

Selected topics concerning the structures and related properties of inorganic compounds. 3 lectures. Prerequisite: Graduate standing.

CITY AND REGIONAL PLANNING

CRP 211, 212 Introduction to Urban Environment (3) (3)

History and analysis of social and technological factors which have influenced the physical growth of cities. Philosophical approaches. Problems of growth and the development of various theories of city planning. Recommended for all majors. 3 lectures. Prerequisite: Eng 105

CRP 243 Introduction to Urban Environment (3)

Design applications of CRP 211, 212. 3 laboratories. Prerequisite: CRP 212

CRP 301, 302, 303 Planning Theory (2) (2) (2)

Planning theory and related topics. Environmental engineering and public health. 2 lectures. Prerequisite: CRP 243, Arch 253

CRP 304 Zoning (2)

Zoning theory and legal background. Historical and current land districting practices. Zoning as a device to guide urban growth; the zoning ordinance, the districting plan; relationship to the general plan. Economic and social ramifications. New concepts. 2 lectures.

CRP 351, 352, 353 Planning Laboratory (4) (4) (4)

Case study application of planning theory to the community, its components, and to the city and the region. Relationships of city spaces and structures. Re-development. Field trips. Individual, team, and interdisciplinary approaches. Computer applications. 4 laboratories. Prerequisite: CRP 243, Arch 253

CRP 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.

CRP 401, 402, 403 Planning Theory (2) (2) (2)

Advanced planning theory and related topics. Law and human ecology. 2 lectures. Prerequisite: CRP 243, 303, 353

CRP 411 Implementation Techniques (2)

Procedures in enlisting and sustaining community interest in city and regional plan implementation. Field trips. 2 lectures. Prerequisite: Arch 349

Computer Science

CRP 418 New Town Planning (2)

History, present situation and future of new town planning in the United States. Relationship to other countries. 2 lectures. Prerequisite: Arch 243.

CRP 451, 452, 453 Planning Laboratory (4) (4) (4)

Continuation of CRP 351, 352, 353. 4 laboratories. Prerequisite: CRP 243, 303, 353

CRP 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.

CRP 463 Undergraduate Seminar (2)

Discussion and lectures on problems of the planning field. Students to select current topics, research, organize material, arrange for exhibits, guest speakers and present topics in open meetings. 2 meetings.

CRP 465 Housing Seminar (2)

Survey of urban housing in the industrial age; qualitative analysis of aspects of planning the individual unit and the position of housing units within the urban fabric; problems of housing rehabilitation; investigation of criteria for programming housing; examination of organizational forms of housing; housing needs in various population groups. 2 lectures. Prerequisite: Soc 313 and 4th year standing.

COMPUTER SCIENCE

CSc 100 Data Processing (2)

Functions and applications of automatic data processing equipment. Fundamentals of high speed processing of information and computation, with applications to analysis and information retrieval for decision making. Analysis and discussion of typical situation problems. 2 lectures.

CSc 101 Fortran Programming (1)

Emphasis on programming techniques for mathematical analysis. Business and science applications. 1 activity.

CSc 102 Programming of Data Processing Equipment (2)

Machine and symbolic languages as used for programming the digital computer. Programming of problems from the fields of business, agriculture, and applied sciences. 1 lecture, 1 activity.

CSc 218 Boolean Algebra and its Applications (3)

Boolean Algebra; applications to the algebra of propositions; applications to switching, control, and computation circuits. 3 lectures.

CSc 219 Linear Programming (3)

Introduction to linear programming, the simplex and the dual problems. Use of linear programming techniques to solve scheduling problems and transportation problems. 3 lectures. Prerequisite: 6 units of college mathematics.

CSc 221 Digital Computer Programming (3)

Coding of general purpose and special purpose digital computers, preparation of programs for general purpose computers, sub-routines. 3 lectures. Prerequisite: Any computer programming course.

CSc 304 Digital Computer Programming (3)

Principles and techniques of programming for a large modern digital computer. Assembly program usage, subroutines, timing problems, and data processing. 3 lectures. Prerequisite: CSc 221 or consent of instructor.

CSc 332 Introduction to Numerical Methods (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: Math 242 or consent of instructor.

CSc 333 Numerical Analysis (3)

Continuation and expansion of CSc 332. Methods for the solution of equations and systems of equations, interpolation, the solution of ordinary and partial differential equations; emphasis on methods suitable for the application of electronic digital computers. 2 lectures, 1 activity period. Prerequisite: CSc 332 and ability to program in Fortran.

CSc 350 Systems Analysis (3)

Analysis of administrative and management problems to develop systems utilizing automatic data processing equipment. New and improved procedures, methods and organizational structure to obtain desired objectives. 3 lectures. Prerequisite: Bus 321 or a course in computer programming.

CSc 351 Algorithmic Compilers (3)

Formal languages, their decomposition and compiling. Binding and localizing variables using block structures in the analysis of compilers. Dynamic allocation of storage between sections of a process. 3 lectures. Prerequisite: CSc 304 or equivalent.

CSc 451 Programming Languages (3)

Selected digital computer programming languages and their adaptability to various fields of application. 3 lectures. Prerequisite: CSc 304 or equivalent.

CSc 452 Computer Programming Systems (3)

Design of assembly systems, macro instructions, program intercommunication and linkage. Structure and use of program libraries. Input and output programming systems, debugging systems and source language debugging. Assembly systems and software. Batch processing and executive systems. 3 lectures. Prerequisite: CSc 304 or equivalent.

CSc 453 Multi-programming and Multi-processor Systems (3)

Interrupt, sequential, and multi-programming systems. Priorities and scheduling. Time sharing systems. Use of bulk memory. Simple two-processor systems and programming. System and language requirements. 3 lectures. Prerequisite: CSc 452 or equivalent.

CSc 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.

CSc 463 Undergraduate Seminar (2)

Reports and discussions by students through seminar methods, based on their senior projects and on other topics relating to computer usage and programming which are of interest to persons preparing for a career in computer science. 2 activity periods.

CSc 531 Numerical Analysis (3)

Numerical solution of differential equations, linear systems, error and analysis, convergence, and stability. Methods suitable for digital computer applications. 3 lectures. Prerequisite: CSc 333

Conservation/Crops

CONSERVATION

Cons 311 Introductory Conservation (2)

Basic principles and problems of conservation. Organization, control and inter-relationships of government and private agencies dealing with the conservation of natural resources. 2 lectures. Prerequisite: Junior standing.

Cons 431 Game Management (4)

General principles, problems and techniques of increasing the harvest of waterfowl, upland game and big game. The identification and life histories of important western game species. 3 lectures, 1 laboratory. Prerequisite: Bio 325 or AH 229 or Zoo 326

Cons 433 Inland Fisheries (4)

Habitat improvement, harvesting and propagation of trout and warmwater fish. Identification and life histories of important western species. Farm pond management. 3 lectures, 1 laboratory. Prerequisite: Bio 325 or Chem 226

CROPS PRODUCTION

CP 100 General Agriculture Pest Control (4)

Identification and control of common pests of agriculture. Safe use of pest control materials. Natural and chemical control of injurious insects, rodents, birds and diseases in the field and in storage. 3 lectures, 1 laboratory. For technical students only.

CP 123 Forage Crops (4)

Production, harvest, and utilization of principal California forage crops. Identification and utilization of forage plants studied in the field. A one-day field trip is required. 3 lectures, 1 laboratory. Prerequisite: Bot 121

CP 131 Concepts of Crop Production (4)

Production principles for field and vegetable crops. Fundamental botany, taxonomy and cultural practices. Soil tillage, fertilization, seed selection, planting and harvesting methods, irrigation, weed control, pest control, and crop rotation. Production practices for cotton and sugar beets. 3 lectures, 1 laboratory. Credit will not be allowed for both CP 131 and CP 230

CP 132 Combine Harvest Crops (4)

Production, adaptation, distribution, and utilization of major crops harvested by combine including cereals, large seeded legumes, milo, flax, corn, and safflower. Field trips to major California cereal production areas. 3 lectures, 1 laboratory. Prerequisite: CP 131 or VC 230

CP 133 Row Crops (4)

Adaptation, production, and utilization of major row crops such as potatoes, sweet corn, tomatoes, artichokes, garlic, onions, asparagus, and peas. 3 lectures, 1 laboratory. Prerequisite: CP 131 or VC 230

CP 221 Weed Control (4)

Identification, life histories, and control of common, noxious, and poisonous California weeds. Weed control chemicals and equipment for cultivated crops, irrigation systems, range, wastelands. 3 lectures, 1 laboratory. Prerequisite: Sophomore standing

CP 230 General Field Crops (4)

Production, harvest, and use of important cereal and field crops in California. Production areas, crop rotations, disease and pest control. 3 lectures, 1 laboratory. Credit will not be allowed for both CP 131 and 230

CP 231 Commercial Seed Production and Processing (4)

Production and processing of certified and commercial seed including seed analysis, germination, quality control, cleaning and storage techniques, and seed laws. 3 lectures, 1 laboratory. Prerequisite: CP 132 or 133

CP 303 Agricultural Code of California (3)

Services and procedures of the California Agricultural Code. Provisions of the Agricultural Code and other laws affecting agricultural industries, particularly plant industries. Grain warehouse inspection, seed inspection, county agricultural departments, plant quarantine and standardization. 3 lectures.

CP 304 Plant Breeding (4)

Application of principles of plant improvement through selection, hybridization, and utilization of hybrid vigor. 3 lectures, 1 laboratory. Prerequisite: Bio 303

CP 305 Agricultural Inspection and Services (3)

Purpose and functions of county departments of agriculture and the related functions within the State Department of Agriculture. Basic background material to qualify students for the eight specific County Inspectors Examinations. 3 lectures. Prerequisite: CP 303

CP 311 Principles of Pest Control (4)

Principles of controlling insects and vertebrate pests of importance to California field, fruit and vegetable crop production. Sprays, dusts, fumigants, poisons, sanitation, and cultural controls. Application methods and equipment will be stressed. 3 lectures, 1 laboratory.

CP 321 Crop Disease and Pest Control (4)

Study and field identification of disease and insect pests of field, fruit and vegetable crops. Prevention and control of specific insect, disease and nematode problems. Pesticide chemicals including formulations, compatibility and modes of action. 3 lectures, 1 laboratory. Prerequisite: CP 311, Ent 126, Bot 323

CP 322 Crop Technology (4)

Grades and laboratory tests for quality of California field crops. The effects of harvesting, storage, and quality control on market value and processing. 3 lectures, 1 laboratory. Prerequisite: CP 132, 133

CP 323 Tropical Crop Production (4)

Production distribution, adaptation and utilization of major field and vegetable crops of economic importance in tropical and subtropical areas. 3 lectures, 1 laboratory.

CP 325 Hay and Processed Forage Crops (3)

Intensive study of hay, dehydration and silage making procedures. Storage facilities, grades and market values, anti-oxidants and feed additives that affect bloat and feed quality. 2 lectures, 1 laboratory. Prerequisite: Chem 121

CP 330 Irrigated Pasture and Range (4)

Identification, production, utilization of irrigated pasture crops and range plants. A study of grazing systems and the merits of mixtures and non-mixtures. A field trip to a production area may be required. 3 lectures, 1 laboratory. Prerequisite: CP 131 or CP 230

CP 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: Permission of department head.

Crops/Dairy Husbandry

CP 410 Crops Physiology (3)

Practical studies in plant nutrition, soil-water-plant relationships, seed physiology, growth regulators, insecticide reactions, and controlled environments. 3 lectures. Prerequisite: Bot 122, SS 221, Bot 126 or 223, and Chem 328

CP 411 Experimental Techniques and Analysis (4)

Principal methods of experimental design and analysis of collected data. Field practice in planning and lay-out with emphasis on management of agronomic and soils experiments. 3 lectures, 1 laboratory. Prerequisite: Junior or senior standing and Math 103 or equivalent.

CP 421 Oil and Fiber Crops (4)

Culture, harvest, grading, and marketing of cotton, flax, safflower, castor beans, minor oil and fiber crops. Field trips to major centers of production and marketing are required. 3 lectures, 1 laboratory. Prerequisite: CP 131 or 230

CP 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.

CP 463 Undergraduate Seminar (2)

Oral presentation and leadership of group study on recent developments in the major field. 2 lectures.

CP 581 Graduate Seminar in Crop Production (3)

Group study and oral reports on current technical problems and research results pertaining to field and vegetable crops production or marketing. 3 lectures.

DAIRY HUSBANDRY

DH 101 Dairy 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 with special attention to dairy cattle, the use of byproduct feeds. 2 lectures.

DH 102 Feeding Dairy Cattle (2)

Balancing dairy cattle rations. Feeding practices and nutritional requirements. 2 lectures. Prerequisite: DH 101

DH 121 Elements of Dairying (4)

General introductory dairy course. General information on statistics and opportunities in the dairy industry. Composition and food value of dairy products. Common tests to determine quality of products. Principles and practices of the feeding and management of dairy cattle. 3 lectures, 1 laboratory.

DH 133 Fitting and Showing Dairy Cattle (2)

Selection, preparation, presentation of dairy cattle for shows, sales, and photographing. 1 lecture, 1 laboratory.

DH 142 Dairy Cattle Judging (2)

Selection of dairy cattle with consideration to breed characteristics and conformation. Correlation between type and production. 2 laboratories.

DH 221 Milk Production (4)

Factors affecting milk production. Dairy production problems and methods. Practice in many of the frequently used dairy production skills. 3 lectures, 1 laboratory. Prerequisite: DH 102, 121, 142

DH 222 Commercial Dairy Herd Management (4)

Commercial dairy practices from the standpoint of cost of feeding and management. Visits are made to successful dairy farms. 3 lectures, 1 laboratory. Prerequisite: DH 221

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. Producing and handling products. A general course for other than dairy majors. 3 lectures, 1 laboratory.

DH 233 Advanced Dairy Cattle Judging (2)

Advanced practice in the comparative judging of dairy cattle. Detailed scoring and classifying cattle on conformation with extensive training on giving oral reasons. Visits to breeding establishments and shows. Judging teams may be selected in this class. 1 lecture, 1 laboratory. Prerequisite: DH 142

DH 301 Advanced Dairy Cattle Feeding (2)

Nutrition requirements of dairy cattle. Successful, economical feeding practices. 2 lectures. Prerequisite: DH 102

DH 323 History of Breeds and Pedigrees (4)

Origin of modern dairy cattle breeds, organization of cattle clubs. Breed families and herds. Practice in compiling pedigrees. 3 lectures, 1 laboratory. Prerequisite: DH 221

DH 326 Purebred Dairy Herd Management (4)

Methods and problems in establishing, breeding, feeding, and management of a purebred dairy herd and farm. Visits are made to leading purebred dairy farms and to purebred cattle sales. 3 lectures, 1 laboratory. Prerequisite: DH 222, 233, 301, 323

DH 330 Artificial Insemination (2)

Techniques in the collection, evaluation, processing, storage and shipment of semen. Insemination procedures. Fertility problems. Record keeping. 1 lecture, 1 laboratory. Prerequisite: DH 121 or AH 121, VS 123 or VS 100

DH 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: Permission of department head.

DH 422 Breeding and Selection of Dairy Cattle (4)

Evaluation of inherited characteristics in dairy cattle from an economic standpoint. Proving and selecting sires and dams. 3 lectures, 1 laboratory. Prerequisite: Bio 303, DH 142

DH 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.

DH 463 Undergraduate Seminar (2)

Reports on student papers, bulletins, periodical articles, and dairy research experiments. Sources of dairy husbandry information. Practice in oral reporting. Late developments and research work in the dairy industry. 2 lectures.

DH 581 Graduate Seminar in Dairy Production (3)

Current findings and research problems in the field and their application to the industry. 3 lectures.

Dairy Manufacturing

DAIRY MANUFACTURING

DM 132 Ice Cream Making (4)

Calculating and processing ice cream mixes. Proper equipment and methods required to freeze, package, harden and distribute ice cream and related products. Practice in the college creamery as well as inspection of commercial plants. Manufacture of sherbets and ice milk. Survey of the imitation ice cream field, processing of vegetable fats, etc. 3 lectures, 1 laboratory. Prerequisite: DH 121

DM 133 Market Milk (4)

Buildings, equipment and methods used to handle, process and distribute market milk. Judging and grading market milk. Practice in the college creamery and sales room as well as in commercial plants. 3 lectures, 1 laboratory. Prerequisite: DH 121

DM 230 General Dairy Manufacturing (4)

Nontechnical presentation of the methods and problems involved in modern creamery operation. Testing, flavoring and manufacturing butter, various cheeses, ice cream, market milk, and related products. Elective course for non-dairy students. Survey course for dairy husbandry majors. 3 lectures, 1 laboratory.

DM 232 Cheese Making (4)

Equipment and methods needed to manufacture, package, cure and market various types of cheese. Practice in the college creamery. 3 lectures, 1 laboratory. Prerequisite: DH 121, Bact 221, DM 133

DM 233 Dairy Products Judging (2)

Theory and practice in the scorecard grading of butter, cheese, ice cream, cottage cheese, and market milk. 1 lecture, 1 laboratory. Prerequisite: DM 232

DM 236 Buttermaking (4)

Equipment and methods needed to handle and process manufacturing cream. Churning, packaging, storing, and marketing butter. Theory of continuous butter-making. Practice in college creamery. 3 lectures, 1 laboratory. Prerequisite: DH 121, DM 132

DM 303 Dairy Product Merchandising (2)

Product promotion, advertising, merchandising. State and national programs. Independent advertising and sales promotion programs. 2 lectures.

DM 331 Condensed and Dry Milk (4)

Processing, packaging, and marketing of evaporated and condensed milk and dry milk powders. Field trips are made to study commercial plants, methods and equipment. Mojonner analysis and other routine tests. 3 lectures, 1 laboratory. Prerequisite: DH 121, DM 132, Bact 222

DM 332 Dairy Inspection (2)

California dairy codes and score cards used for dairy plants and farms. Quality tests of dairy products. Practice in inspecting and scoring dairy farms and factories. Organizational structure of inspection services. Laws governing pricing and marketing. Role of antibiotics and pesticides in modern dairying. 1 lecture, 1 laboratory. Prerequisite: DH 121, DM 133, Bact 221

DM 333 Advanced Dairy Products Judging (2)

Judging and scoring of milk, butter, cheddar cheese, ice cream and cottage cheese. Commercial scoring with emphasis on the finer points of competitive grading and scoring. 2 laboratories. Prerequisite: DM 233

DM 431 Dairy Plant Management (4)

Basic management principles applied to the Dairy Industry. Industrial organization and control. Dairy plant location, design facilities and layout. Elements of successful salesmanship, advertising, and marketing. Survey of overhead allocation and of financing and depreciation applied to the dairy industry. Study of significant operating ratios and comparative analysis of financial statements. 3 lectures, 1 laboratory. Prerequisite: Senior standing.

DRAMA

Dr 220 Introduction to Theater (3)

Theatrical terminology, basic stagecraft and lighting, stage management, theater practice. Historical development of the theater. 2 lectures, 1 two-hour laboratory.

Dr 320 Acting (3)

Basic acting techniques, improvisation, characterization, pantomime and movement. 2 lectures, 1 two-hour laboratory.

Dr 321 Directing (3)

Script analysis, motivation and blocking of action, preparation of the prompt book. Direction of practice scenes. 2 lectures, 1 two-hour laboratory.

Dr 322 Stagecraft (2)

Scenery design, construction, painting, lighting, costumes, and make-up. 2 two-hour laboratories. Prerequisite: Sp 200 or 201

Dr 331 Applied Theater Practices (2)

Preparation of a play for public presentation, including acting, stage management, make-up, publicity and house management. Maximum of 6 units credit may be earned. 2 laboratories.

Dr 347 Children's Theater (3)

Role-playing, group dramatization, and related activities. For students preparing to teach in the elementary school. 1 lecture, 2 laboratories. Prerequisite: Sp 200 or 201

ECONOMICS

Ec 105 Consumer Economics (3)

Consumer-producer relationships, money management, buying methods; investments, insurance, and housing; agencies that help the consumer. 3 lectures.

Ec 201 Survey of Economics (3)

Selected topics in economics with focus upon the overall functioning of our economy. 3 lectures. Prerequisite: Sophomore standing. Successful completion of freshman English recommended.

Ec 211 Principles of Economics (3)

How the economic system works. Analysis of the forces which determine the levels of national income, output, employment and prices. 3 lectures. Prerequisite: Sophomore standing. Successful completion of freshman English recommended.

Ec 212 Principles of Economics (3)

Introductory analytical economics. Principles and applications in the allocation of scarce resources; the pricing and output problems of the firm; distribution of factor income; and their effects in the national economy. 3 lectures. Prerequisite: Ec 211 or consent of instructor.

Ec 213 Principles of Economics (3)

Application of economic principles in an increasingly complex world. 3 lectures. Prerequisite: Ec 212

Economics

Ec 300 Economic Problems 3

Specific current problems selected with reference to the needs of the students. 3 lectures. Prerequisite: Ec 201 or 211

Ec 301 Introduction to Managerial Economics (3)

Fundamental principles and analytical tools of economics useful in business decision making; applications to management through case study of actual business and managerial situations. 3 lectures. Prerequisite: Ec 212 or consent of instructor.

Ec 304 Comparative Economic Systems (3)

Analysis of economic principles and institutions applicable to capitalism, socialism, and communism. 3 lectures. Prerequisite: Ec 212

Ec 311, 312, 313 Intermediate Economic Analysis (4) (4) (4)

Economics of prices, markets; demand, supply, returns, and costs; employment, income; factor pricing and income distribution; welfare and economic progress. Analytical model building, analysis and policy decision making in business firms, households and government. 4 lectures. Prerequisite: Ec 213 or equivalent; Math 200, 210, Stat 211, 212 or equivalent.

Ec 317 Development of Economic Analysis (3)

Analysis of ideas related to the development of economic theory in the Western civilization from the Greeks through the classical, neoclassical, and Keynesian to the current post-Keynesian concepts. 3 lectures. Prerequisite: Junior standing and satisfactory completion of Ec 211, 212, 213, or equivalent.

Ec 324 American Economic History (3)

Topical economic analysis of major events and institutions of American economic history as viewed against their causes, origin and development. Economic development of America from an underdeveloped nation. Agriculture, transportation, monetary and banking policies, business, labor, and growth of governmental activities. 3 lectures. Prerequisite: Ec 213

Ec 325 Underdevelopment and Economic Growth (3)

Economic Development: the less developed world and the American interest. 3 lectures. Prerequisite: Ec 211 or 201

Ec 337 Money, Banking and Credit (3)

Institutions and principles of money flow and money markets as they relate to the business enterprise. 3 lectures. Prerequisite: Ec 201 or 211

Ec 401 International Trade (3)

The United States and the world economy; mechanism of exchange; balance of payments. 3 lectures. Prerequisite: Ec 201 or 211

Ec 402 Public Finance (3)

Principles of government financing and its various economic and social effects; collecting, spending and administration of public funds, particularly at state and local levels. 3 lectures. Prerequisite: Ec 212 or consent of instructor.

Ec 406 Business Fluctuations and Forecasting (3)

Causes and measurement of business fluctuations. Techniques of forecasting. 3 lectures. Prerequisite: Ec 201 or 211, Stat 212

Ec 413 Labor Economics (3)

Wage determination theory, basic economic factors that affect the labor movement, economic impact of union activities on employment, output, income, wages, prices, and national economic policy. 3 lectures. Prerequisite: Ec 212 or consent of instructor.

Ec 414 Monetary and Fiscal Policies (4)

National economic fluctuation models and related corrective monetary and fiscal policies on income, employment, output, growth and prices. 4 lectures. Prerequisite: Ec 313, 337

Ec 582 Seminar in Economic Problems (1-3)

Selected problems at an advanced level; distribution of income, private and public finance, economic mobilization, and international trade. 1 to 3 meetings. Prerequisite: 9 units of economics and graduate standing or consent of the instructor. Maximum of 6 units credit may be earned.

EDUCATION

Ed 203 Efficient Reading (2)

Development of reading efficiency required in modern business, industry, and the professions. 1 lecture, 1 activity. Prerequisite: Eng 104

Ed 304 Human Development (3)

Human development with emphasis on the years up to adolescence. The physical, mental, emotional, and social aspects of development and behavior. Controlled observation in the public schools. Required for California elementary teaching credential. Recommended for secondary teacher candidates. 2 lectures, 1 activity. Prerequisite: Junior standing, Psy 202

Ed 312 Educational Psychology (3)

How students learn in school, motivation and classroom management, nature of the learning process and adolescent development. Required public school observations at appropriate grade levels. Required for California secondary teaching credential. Recommended for elementary teacher candidates. 3 lectures. Prerequisite: Psy 202

Ed 401 Public Education in American Society (3)

Development of public education in United States and California. Purpose and structure of the school system. Observations in the public schools. Prerequisite for application to teacher education program. Required for California elementary and secondary teaching credentials. 3 lectures.

Ed 403 Teaching Procedures in the Secondary School (3)

Practical skills and techniques of teaching; instruction planning, classroom control, demonstration teaching, communication media, and public school observations. 3 activity periods. Required for California secondary teaching credential. Prerequisite: Ed 312

Ed 415 Early Childhood Education (3)

Brief history of the kindergarten and nursery school program. Study of the needs, behavior and development of young children and how they affect readiness for learning. 3 lectures.

Ed 418 Principles of Adult Education (3)

Purposes, significance, scope and methods of teaching as applied to adult education. 3 lectures.

Ed 431 Teaching Procedures in the Elementary School (3)

Introduction to procedures used in elementary school teaching, development of skills in planning units of work and lessons for all areas of the curriculum, use of audiovisual materials, preparation for student teaching. 3 activities. Prerequisite: Advanced standing and Ed 304

Ed 434 Curriculum and Methods in Elementary School Reading (3)

Teaching reading, reading readiness, psychology of learning to read, instructional materials, evaluating growth, developing independent reading skills, recreational reading. 2 lectures, 1 activity. Prerequisite: Advanced standing.

Education

Ed 440 Student Teaching (3-12)

Student teaching includes participation, teaching, and allied activities under the direction of a selected regular teacher in a public school in consultation with college supervisors. The application for student teaching must be approved prior to registration for Ed 440. A grade below C is unacceptable for recommendation for a credential.

Ed 441 Practicum (2).

Practices and problems of student teaching in the elementary grades, development of effective teaching techniques, emphasis on current classroom experiences. 1 lecture, 1 activity. Taken concurrently with student teaching.

Ed 442 Curriculum and Methods in Kindergarten-Primary Education (3)

Objectives, methods, and curriculum for the kindergarten-primary grades. Acquisition of appropriate materials, and construction of instructional aids. 2 lectures, 1 activity. Prerequisite: Advanced standing.

Ed 443 Curriculum and Methods in Elementary School Language Arts (3)

Methods and materials for teaching language usage, spelling, handwriting, listening and speaking. 2 lectures, 1 activity. Prerequisite: Advanced standing.

Ed 444 Curriculum and Methods in Elementary School Science (3)

Curriculum, methods, and teaching procedures in elementary school science. 2 lectures, 1 activity. Prerequisite: Advanced standing.

Ed 445 Curriculum and Methods in Elementary School Social Studies (3)

Curriculum, methods, and teaching procedures in elementary school social studies with emphasis on the California program. 2 lectures, 1 activity. Prerequisite: Advanced standing.

Ed 501 Philosophy of Education (3)

The function of philosophy; the meaning of education; significance of present philosophical points of view; education aims and values; democracy and education; the relationship of various philosophical outlooks to educational methods and subject matter. 3 lectures.

Ed 503 Counseling and Guidance (3)

The philosophy, techniques, and administration of individual and group guidance programs. Individual counseling. The assessment of students' interests, abilities, and achievement with respect to educational and vocational choice, and school and life orientation. 3 lectures.

Ed 504 Measurement and Evaluation in Secondary School Teaching (3)

Instructional objectives, evaluation, and testing achievement in school courses. Constructing, administering, and evaluating tests for classroom use. Grading techniques and procedures. 3 lectures.

Ed 506 Evaluation in the Elementary School (3)

Appraising the results of instruction in terms of educational objectives. Pupil growth as a product of environment, health, attitudes, and mental ability. Value of cumulative records, reports to parents, and teacher-made tests as evaluation devices. 3 lectures. Prerequisite: Student teaching experience or approval of instructor.

Ed 507 Staff-Administrator Relationships (3)

Personnel administration of schools and school systems, including conditions of employment, salary, security, and retirement benefits. Problems of staff morale evaluated in terms of selection, promotion, assignment, and opportunities for professional improvement. 3 lectures. Prerequisite: Valid teaching credential.

Ed 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.

Ed 510 School Finance and Business Management (3)

A consideration of the sources of public school support in California and the formulas by which funds are distributed to educational agencies. Budgets, audits, accounting, financial statements, insurance salaries and retirement, purchasing and managing of plants, equipment, and supplies. 3 lectures. Prerequisite: Valid teaching credential, or consent of instructor.

Ed 511 School Law (3)

The legal problems affecting schools, using as sources the California Administrative Code, Title 5, the Education Code, the Attorney General's opinions, and interpretations of the state and federal courts. 3 lectures. Prerequisite: Valid teaching credential or consent of instructor.

Ed 512 Secondary School Administration (3)

The three major phases of the work of the secondary administrator; his function as a leader of people, his duties as a director of education, and his techniques as an organizer and manager, including teacher-administrator relationships. 3 lectures. Prerequisite: Valid teaching credential or consent of instructor.

Ed 513 Federal, State, County, and City School Administration (3)

Objectives of public school administration and an overview of all levels of organization; problems in state, county, and city school organization, particularly as related to California; federal government and education; issues involved in federal support. 3 lectures. Prerequisite: Valid teaching credential or consent of instructor.

Ed 515 Secondary School Curriculum (3)

Advanced study of problems in secondary curriculum development; social and psychological backgrounds; techniques in curriculum development; communication problems in curriculum work; group processes in curriculum development; evaluation of curriculum programs. 3 lectures. Prerequisite: Valid teaching credential or consent of instructor.

Ed 516 Secondary School Supervision (3)

The administrative organization of supervision. City and county supervisory methods and procedures in secondary schools. Evaluation of present practices. In-service improvement of instruction through supervision. Group processes and communication problems in supervision work. 3 lectures. Prerequisite: Valid teaching credential or consent of instructor.

Ed 517 School-Community Relationships (3)

The school and public relations. The administrator's relationship with community groups and organizations. Effect upon the public schools of community and patrons. Public administration as it affects the community's educational program. Operation of urban and rural schools, vocational education, education for adults, special school programs and auxiliary agencies. 3 lectures. Prerequisite: Valid teaching credential or consent of instructor.

Ed 518 Problems in Teaching Reading (3)

For teachers and supervisors in elementary and secondary schools who need information on the latest methods for teaching reading. Problems of classes and schools analyzed. Formulation of plans for improved reading instruction and total school programs based on research information. 3 lectures. Prerequisite: Valid teaching credential, Ed 434 or consent of instructor.

Education

Ed 519 Teaching the Gifted Child (3)

The nature of the growth and development of gifted children, including physical, social, and achievement aspects. Methods of identifying giftedness, gifted children, and children with special abilities. Study of selected programs for teaching gifted children in California and other states. 3 lectures.

Ed 520 Remedial Techniques in Elementary School Reading (3)

Advanced study of reading problems in the elementary school including reading deficiencies, remediation, and suitable reading material. 3 lectures.

Ed 521 Teaching the Culturally Deprived Child (3)

Cultural factors that inhibit learning in the school; problems and needs of the disadvantaged child; classroom procedures and materials to facilitate learning and increase educational achievement; preparation for teaching in depressed areas. 3 lectures.

Ed 523 Remedial and Special Education (3)

Theory and practice of diagnosing educational and psychological difficulties affecting the ability of children to profit from education. Use of diagnostic tests and methods of providing for the needs of children needing remedial and special education. 3 lectures. Prerequisite: Psy 202, Ed 503, Psy 432

Ed 524 Investigative Techniques (3)

Principles and methods of planning and carrying out systematic investigations dealing with learning, teaching, curriculum, instructional planning, pupil personnel services, and other related areas. 3 lectures. Prerequisite: Math 100, Psy 202

Ed 525 The Teacher's Role in Guidance (3)

Application of procedures in teaching and in conducting guidance activities. Use of techniques to implement the role of the teacher in guidance. Case studies, case conferences, parent-teacher conferences, teacher-pupil conferences. 3 lectures.

Ed 527 The Junior College (3)

The purpose, history, organization and curriculum of the junior and community college. For persons teaching and planning to teach in the junior college. 3 lectures.

Ed 528 Advanced Counseling Theory and Procedures (3)

Advanced practice in vocational, personal, and educational counseling for students in the pupil personnel program. Counseling theory and procedures, educational and career planning. Application of theory to practical counseling situations. 3 lectures. Prerequisite: Ed 305, 503

Ed 529 Supervision of Vocational and Practical Arts Education (3)

Methods of designing and implementing programs of vocational and practical arts education (applied arts) including agriculture, business, diversified co-operative, distributive, work experience education, homemaking, industrial arts, and trade technical education. 3 lectures.

Ed 531 Elementary School Supervision (3)

Principles and techniques of educational leadership in curriculum development. Curriculum improvement, working effectively with the staff, evaluation of instruction. Group processes and communication problems in supervision work. 3 lectures. Prerequisite: Valid teaching credential.

Ed 532 Elementary School Administration (3)

Principles and practices of organizing and administering the elementary school, including teacher and pupil personnel management, leadership techniques, instructional problems, special services, school plant, local school finances. Practical applications to elementary schools. 3 lectures. Prerequisite: Valid teaching credential.

Education/Electrical Engineering

Ed 539 Educational, Occupational and Community Information (3)

Collecting occupational, educational and community information including community resources such as agencies and organizations that provide services to individuals or groups. Sources and techniques of collecting and imparting such information stressed. 3 lectures. Prerequisite: Ed 503

Ed 540 Observation and Participation in Secondary Schools (5)

Observation and reporting in all subject matter areas; assisting advisers, the principal, attendance officer; various specific duties in the cafeteria, study hall and playground; assisting extra-class advisers with their activities; weekly discussion with co-ordinator of student teaching. Ed 540 taken currently with Ed 440, the two courses constituting a full load for the quarter.

Ed 541 Administration of Pupil Personnel Services (3)

Organization of pupil personnel services programs, their administration, their evaluation. Use of community resources and a study of laws relating to children and child welfare. 3 lectures. Prerequisite: Ed 503

Ed 546 Supervised Field Experience in Counseling (3)

Practical application in the public schools or college counseling center of interviewing, counseling, test administration and interpretation, case conference techniques, use of counseling records and other principles and procedures in counseling. Besides field experience, weekly seminar sessions with college staff to be included. Prerequisite: Ed 541 and consent of instructor.

Ed 578 Elementary Curriculum Construction (3)

Advanced approach to the problems of elementary curriculum development and evaluation. Public relations; people involved in building the curriculum; implementing the purposes of education through the curriculum; child development and the curriculum. 3 lectures. Prerequisite: Ed 440

Ed 581 Graduate Seminar in Education (3)

Group study of contemporary teaching problems. Trends, developments, individual problems. 3 lectures.

Ed 588 Administration or Supervision Field Work (3)

Supervised field work in school administration or supervision at the elementary or secondary level; specific assignments made to cover important aspects of school administration or supervision. Prerequisite: Valid teaching credential, Ed 531 or 516, Ed 532 or 512, and consent of instructor.

Ed 590 Seminar in Supervision of Student Teachers (3)

Organization, responsibilities, problems, and procedures in supervising, directing, and evaluating student teachers and student teaching activities. 3 lecture-discussions.

ELECTRICAL ENGINEERING

EE 104 Electric Circuits (8)

Covers lecture material in EE 132, 133. For transfer students who have completed at least one year of calculus. 8 lectures.

EE 122 Electrical Analysis (3)

Elements of electricity. Basic electrical and electronic devices. Simple passive and active circuits. For non-EE majors. 2 lectures, 1 laboratory.

EE 132, 133 Electric Circuits (5) (5)

Definitions, units, experimental laws applied to circuits. Mathematical and laboratory techniques of analysis. 4 lectures, 1 laboratory.

Electrical Engineering

EE 146 Electrical Design Graphics (1)

Single line, three line, and schematic representation of electric and electronic circuits, solid state devices, transducer elements and machines. Graphic layout. Industrial standards. 1 laboratory.

EE 151 Orientation (1)

Familiarization with the field of electrical engineering. Development of techniques useful to the student in his academic progress. 1 laboratory.

EE 154 Electric Laboratory (2)

Covers laboratory material in EE 132, 133. For transfer students. 2 laboratories.

EE 207 Electrical Engineering Circuits (3)

Fundamental electric laws. Electric circuits and circuit theorems. Magnetism and magnetic circuits. Analysis of alternating current, single and three phase circuits using symbolic method (complex phasors). Transmission lines, coupled circuits and transients. For non-electrical engineering majors. 3 lectures. Prerequisite: Math 142, Phys 133. Concurrent: EE 251

EE 208 Electric Machines and Controls (3)

The fundamentals of electro-mechanical energy conversion. Theory of operation and operating characteristics of transformers, D.C. machines and A.C. induction and synchronous machines. Electrical control devices and systems. For non-electrical engineering majors. 3 lectures. Prerequisite: EE 207. Concurrent: EE 252

EE 209 Basic Electrical Engineering (6)

Combines content of EE 207, 208. Primarily for transfer students. 6 lectures. Concurrent: EE 254

EE 221 Engineering Electromagnetics (6)

Electric and magnetic fields. Maxwell's equations. Introduction to traveling waves and radiation. 5 lectures, 1 laboratory. Prerequisite: A basic circuit course and one year of calculus.

EE 222 Wave Propagation and Power Transmission (4)

Electromagnetic wave propagation. Power and signal transmission. Analysis of transmission lines and power systems. Symmetric loads and faults. Use of AC network analyzer. 3 lectures, 1 laboratory. Prerequisite: EE 221

EE 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 laboratories.

EE 251, 252 Electrical Engineering Laboratory (1) (1)

Use of electric meters. Experiments and exercises involving direct and alternating current circuits, machines and their controls. 1 laboratory.

EE 253 Engineering Problems Solutions (1)

Machine method of problem solutions. Digital and analog devices (excludes IBM Fortran programming). 1 laboratory.

EE 254 Electrical Engineering Laboratory (2)

Combines content of EE 251, 252. Primarily for transfer students. 2 laboratories. Concurrent: EE 209

EE 304 Electromechanics (3)

Magnetically-coupled circuits. Torque and power. Rotating machines. 3 lectures. Prerequisite: EE 222 or EL 202

Electrical Engineering

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. For non-EE majors. 3 lectures. Prerequisite: EE 122 or basic circuits course.

EE 322 Network Synthesis (4)

The pole-zero concept of networks. Network analysis and synthesis in the frequency domain. Design of filters. 3 lectures, 1 laboratory. Prerequisite: EE 133 or equivalent.

EE 323 Linear Analysis with Analog Computer (4)

Laplace transform calculus and analog techniques applied to linear systems analysis. 3 lectures, 1 laboratory. Prerequisite: Math 318, EE 322

EE 324 Electrical Systems Design (3)

Elements of electricity. Electric circuits. Direct current voltage, current, and power. Alternating currents. Effective voltage and current. Power factor. Wiring installations. Code requirements. Devices used. Layout of electrical installations. Writing specifications. Primarily for architects. 3 lectures. Prerequisite: Phys 133

EE 327 Illumination (3)

Theory and practice of illumination. Mechanical and electrical problems in installation and control of lighting sources. Measurement of light. 2 lectures, 1 laboratory. Prerequisite: Consent of instructor.

EE 331, 332 Electromagnetic Machines (4)(4)

Transformers. Direct current machines. Analysis in the steady state and transient modes. Alternating current machines. Generalized, operational and dynamic analysis. Unbalanced operations. 3 lectures, 1 laboratory. Prerequisite: EE 304

EE 344 Electromechanics Laboratory (1)

Transformers and induction machines. 1 laboratory. Concurrent: EE 304

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

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

EE 402 Control Systems Engineering (3)

An advanced course in analysis and design of control systems based on root-locus, frequency domain and computer approach. Non-linear sampled data and self-adaptive systems. 3 lectures. Prerequisite: EE 431 or consent of instructor.

EE 407 Power Systems Engineering (3)

Equivalent circuits. Sequence impedances. Symmetrical components. Faults and sudden loads. 3 lectures.

EE 414, 415 Energy Conversion (3) (3)

Energy sources, conversion, and storage, with specific consideration of resources, chemical fuels, electrochemical fuels, electrochemical systems, semiconductors, thermoelectricity, thermionic generators, solar energy, and related topics. 3 lectures. Prerequisite: ME 302, Chem 125

EE 421, 422 Electrical Engineering Design (3) (3)

Application of engineering analysis to design problems. Creative thinking emphasized. Group and individual assignments. 1 lecture, 2 laboratories. Prerequisite: Senior standing in Electrical Engineering or consent of instructor.

EE 423 Ethics in Engineering (2)

Introduction to business and legal aspects of engineering. Ethics as applied to the practice of engineering. 2 activities.

Electronic Engineering

EE 424 Analog Computation (2)

Analog techniques. Systems simulation. Design aids. 1 lecture, 1 laboratory. Prerequisite: Math 242

EE 425, 426 Plant Electrical Design (3) (3)

Principles of plant layout. Feeder design. Illumination codes. 1 lecture, 2 laboratories. Prerequisite: Consent of instructor.

EE 427 Analog and Hybrid Computation (4)

Analog computing elements. Speed and accuracy of computation. Analog and hybrid simulation. Use of relays, multipliers, and function generators. Hybrid computation, using memory and decision making. Automatic optimization by hybrid technique. 2 lectures, 2 laboratories. Prerequisite: Engr 250 and EE 323, or consent of instructor.

EE 428 Dynamic Instrumentation (3)

Electrical measurement of non-electrical phenomena. Transducers. Transmission systems. Recorders. Theory and operation. 2 lectures, 1 laboratory. Prerequisite: Consent of instructor.

EE 431 Linear Control Systems Design (4)

Automatic feedback control systems. Design of linear systems. 3 lectures, 1 laboratory. Prerequisite: EE 323

EE 432 Digital Computers (3)

Theory and design. Application to control. 2 lectures, 1 laboratory. Prerequisite: Consent of instructor.

EE 442 Control Systems Laboratory (1)

Individual study of advanced control systems. 1 laboratory. Prerequisite: Consent of instructor.

EE 444 Power Systems Analysis (1)

Solutions of unsymmetrical fault and stability problems on the A.C. analyzer. 1 laboratory. Concurrent: EE 407

EE 451 Senior Electrical Engineering Laboratory (1)

Individual project fabrications resulting from student's creativity and employing previously learned skills of analysis and synthesis. Emphasis on professional development. 1 laboratory. Prerequisite: Senior standing in Electrical Engineering.

EE 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.

EE 463 Undergraduate Seminar (2)

Reports and discussions on library study and laboratory research in approved individually selected topics in electrical engineering. 2 meetings.

ELECTRONIC ENGINEERING

EL 101, 102 Elements of Electronics (2) (2)

Fundamentals of electronic components and unit circuits. Application of unit circuits in some electronic systems. Elementary electronic instrumentation and industrial control. Introduction to both the analog and digital computers with application to engineering problems. For majors in Aero, EnvE, IE, ME, and WM. 2 lectures.

Electronic Engineering

EL 111, 112 Introductory Electronics (2) (2)

Basic principles of charge control in solids and vacuum. Fundamentals of electronic components and unit circuits. Application of unit circuits in selected electronic systems. 2 lectures.

EL 113 Electronic Instruments (2)

Analysis of selected basic electronic instruments and their application to measurement in the field of electronic engineering. Introduction to both the analog and digital computers with solution of appropriate mathematical problems. 2 lectures. Prerequisite: EL 112, Math 141 or 131, Phys 131 or 121

EL 141, 142 Electronics Laboratory (1) (1)

Directed experimental work with the motion and control of charges in solids and vacuum. Properties of components and functions of basic circuits. Electronic instrumentation and computation in engineering. 1 laboratory. Concurrent: EL 101, 102

EL 146 Graphics in Electronics (1)

Schematic drafting and delineation. Electronic and industrial symbols. Printed circuits. Technical sketching. 1 laboratory. Prerequisite: ME 151, EL 102

EL 151, 152 Experimental Electronics (1) (1)

Experimental study of the properties of components, unit circuits, and selected electronic systems. 1 laboratory. Concurrent: EL 111, 112

EL 153 Electronic Instruments Laboratory (1)

Directed projects investigating the more common electronic instruments and their use in measuring voltages, current, waveform, frequency, and phase. Introductory study of elements of the analog and digital computers. 1 laboratory. Concurrent: EL 113

EL 201, 202 Introductory Circuit Analysis (5) (3)

Electric and magnetic circuits. Power and energy relationships. Integrated transient and steady-state analysis of linear direct and alternating current circuits with use of mesh and node approach. Network theorems, determinants, duality, phasor and complex-frequency concepts, exponential Fourier analysis. 5 lectures, 3 lectures. Prerequisite: Math 143, Phys 132

EL 207 Physical Electronics (4)

Introduction to fundamental physical concepts underlying electronics, with particular reference to basic electric and magnetic field theory for application to the control of charged particles. 3 lectures, 1 two-hour laboratory. Prerequisite: Phys 132, Math 143

EL 209 Electron Devices (3)

Physical and analytical study of semiconductors, vacuum and gas devices with primary emphasis on semiconductors. Device parameters and small signal equivalent circuit analysis. Graphical circuit analysis with resistive loads. 3 lectures. Prerequisite: EL 207, Phys 211. Concurrent: EL 201, Math 242

EL 213 Introductory Circuit Analysis (3)

Development of the fundamentals of circuit analysis, beginning with the total response of circuits to general driving functions. Study of the mechanical analogs of the three electrical parameters. Primarily for Aeronautical Engineering majors. 3 lectures. Prerequisite: Phys 133. Concurrent: Math 242

EL 240 Additional Engineering Laboratory (1-2)

Total credit limited to four units, with not more than two units in any one quarter. 1 or 2 laboratories.

Electronic Engineering

EL 241, 242 Introductory Circuits Laboratory (1) (1)

Selected laboratory experiments in the subject matter of EL 201, 202. Emphasis placed on laboratory procedure in collecting, correlating, graphing, and evaluating data. 1 laboratory. Concurrent: EL 201, 202

EL 249 Electron Devices Laboratory (1)

Fundamental experiments in investigating the physical and electrical properties of semiconductor and electron tube devices. Emphasis on collecting, correlating, graphing, and evaluating laboratory data. 1 laboratory. Concurrent: EL 209

EL 253 Circuits Laboratory (1)

Experiments involving the measurement of operational characteristics of basic circuits and devices with emphasis on the methods of measurements. 1 laboratory. Concurrent: EL 213

EL 301, 302 Linear System Analysis (3) (3)

The response of linear electronic, mechanical and electromechanical systems to various excitations using principally Fourier and Laplace transform methods. Analysis and synthesis of one and two part frequency selective networks with fixed and distributed parameters. Butterworth and Chebyshev polynomials. 3 lectures. Concurrent: EL 202. Prerequisite: Math 318

EL 309 Electronic Equipment Reliability (3)

Reliability prediction and reliability design, including redundancy and the allocation problem. Computer reliability prediction and analysis of variability. 3 lectures. Prerequisite: EL 314, Engr 250

EL 311 Introductory Electromechanics (3)

Development of the unifying operational principles of electromechanical devices. Formulation of the operational differential equations and solution by transform methods. Transfer functions, block diagram and systems concepts. Primarily for Aeronautical Engineering majors. 3 lectures. Prerequisite: EL 213, Math 242

EL 313 Analog Computer Techniques (3)

Course designed for mathematics, science and engineering majors other than electronic and electrical. Fundamental principles of analog computers, field of application in science and engineering. Programming techniques. Output devices. Simulation of linear and non-linear systems. 2 lectures, 1 two-hour laboratory. Prerequisite: Math 242

EL 314 Electronic Circuits (3)

Analytical study of active electronic circuits for the amplification of voltage, current and power at audio and radio frequencies. Cascade stages. Feedback. 3 lectures. Prerequisite: EL 209, Math 242

EL 315 Electronic Circuits (3)

Analytical study of oscillator, modulator, frequency-changer and demodulator circuits for amplitude, frequency and phase modulation systems. Application to communication and instrumentation systems. 3 lectures. Prerequisite: EL 301, 314

EL 316 Electronic Circuits (3)

Analytical study of pulse, digital and timing circuits employing modern electronic devices; gating circuits, scalars, linear time bases and multivibrators. Piecewise linear analysis emphasized. 3 lectures. Prerequisite: EL 301, 314

EL 321 Electronic Engineering (3)

Elements of electronics with emphasis on the theory, operation and application of some of the more common types of electronic instruments. Course designed for engineering majors other than electrical and electronic. 3 lectures. Prerequisite: EE 207, 208, Math 242

EL 322 Applied Electronics (3)

Characteristics of electronics systems and instruments with emphasis on applications in measurement and control of industrial processes. Methods of control for sequential and continuous operations. Course designed for engineering majors other than electrical and electronic. 3 lectures. Prerequisite: EL 321, 354

EL 341, 342 Networks Laboratory (1) (1)

Experimental study of alternating current network characteristics, filters and transmission lines. Use of transmission lines as circuit elements. Impedance charts. 1 laboratory. Concurrent: EL 301, 302

EL 343 Analog Computer Laboratory (1)

Laboratory study of analog computers and auxiliary equipment. Solution of engineering problems and simulation of physical systems on the analog computer. 1 laboratory. Prerequisite: EL 315

EL 344, 345 Electronic Circuits Laboratory (1) (1)

Laboratory analysis of principally solid state circuitry comprising voltage current and power amplifiers, tuned and untuned, at audio and radio frequencies. Study of modulated waves and frequency conversion. 1 laboratory. Concurrent: EL 314, 315

EL 346 Electronic Circuits Laboratory (1)

Laboratory analysis of pulse, digital and timing circuits using principally solid state circuitry. Pulse-forming techniques. 1 laboratory. Concurrent: EL 316

EL 351 Electromechanics Laboratory (1)

Experimental study of the operational characteristics and simple system application of electromechanical transducers. 1 laboratory. Concurrent: EL 311

EL 354 Electronic Engineering Laboratory (1)

Fundamental experiments designed to familiarize the student with amplification, oscillation, detection applied to noncommunication circuits. Emphasis placed on the use of electronic instruments. 1 laboratory. Concurrent: EL 321

EL 355 Applied Electronics Laboratory (1)

Fundamental experiments designed to familiarize the student with amplification, and control systems for automatic control of sequential and continuous processes. 1 laboratory. Concurrent: EL 322

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 401 Electromagnetic Fields (3)

Static and quasi-static fields: laws of Coulomb, Gauss, Faraday, and Ampere. Boundary value problems. Development of Maxwell's equations and the wave equation with emphasis on physical concepts. Investigation of traveling waves in various media. 3 lectures. Prerequisite: EL 207, Math 318

EL 402 Microwave Engineering (3)

Application of Maxwell's equations and boundary value problems, to wave guide structures. Microwave equivalent circuit theorem. Passive microwave devices including treatment of microwave propagation in ferrites. Measurement principles and technique. 3 lectures. Prerequisite: EL 401

EL 404 Principles of Digital Computers (3)

Organization of typical digital computer. Combinational and sequential switching circuit analysis and synthesis with emphasis on modern electronic devices used in the design of electronic computers. Properties of modern high-speed memory systems. Coding systems. 3 lectures. Prerequisite: EL 316, 321, or consent of instructor.

Electronic Engineering

EL 405 Advanced Amplifier Theory (3)

Analysis and design of modern electronic amplifiers and amplifier systems with advanced techniques. Pole-zero analysis, wide-band, lowpass and high-frequency, bandpass amplifiers design using Y and S parameters. Noise analysis. 3 lectures. Prerequisite: EL 302, 316

EL 406 Communication Theory (3)

A unified treatment of various types of transmission systems with emphasis on the role of system bandwidth and noise in limiting the transmission of information. Single-side-band AM and various types of pulse modulation systems are included. 3 lectures. Prerequisite: EL 405

EL 408 Digital Computer Systems (3)

Design and interconnection of various parts of a digital computing system. Survey of various input/output and other peripheral units and problems of interfacing these with the central processing unit. Design of sequential circuits with emphasis on control circuitry required in the main frame of a modern computer. 3 lectures. Prerequisite: EL 404

EL 411 Network Synthesis (3)

Modern circuit synthesis concepts and methods as applied to typical communication and control systems. Treatment of the approximation problem and techniques of network realization. 3 lectures. Prerequisite: EL 302

EL 421 Principles of Solid-State Microelectronics (3)

Systems development and reliability considerations. The physical basis of microelectronics. Properties of surfaces and thin films. Rectification and pn junction systems. Fabrication techniques. Miniature and thin-film circuits. Solid-state circuits and multiple devices. 3 lectures. Prerequisite: Phys 412, 452

EL 422 Semiconductor Devices and Models (3)

Physical operation of modern semiconductor devices including high frequency, high power, and switching characteristics. Fundamental solid-state mechanisms that contribute to device performance. Modeling theory to relate these mechanisms to usable equivalent circuits. 3 lectures. Prerequisite: Phys 412, EL 315

EL 423 Microwave Electronics (2)

Klystron amplifiers, reflex oscillators, magnetrons, traveling wave tubes, solid state signal sources, masers, and parametric amplifiers. 2 lectures. Prerequisite: EL 401

EL 441, 442, 443 Electronic Systems Engineering (1) (1) (1)

Advanced laboratory study dealing with subject matter of the senior lecture courses. Work takes on the aspects of project engineering. 1 laboratory. Concurrent registration in a senior year lecture course.

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

Selection and completion of a project under faculty supervision. Projects 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 fields of employment. Job analysis. 2 lectures.

ENGINEERING

Engr 201 The Role and Function of Engineering in Society (3)

Development of technology and the engineering method. Evaluation of technology, problems and responsibilities of the engineering profession to society, and case studies of significant engineering successes and failures. 3 lectures.

Engr 250 Digital Computer Applications (1)

Programming techniques and procedures with applications to the solution of selected engineering problems by means of digital computers. 1 laboratory. Prerequisite: Math 141 (may be taken concurrently).

Engr 410 Engineer Examination Review (2)

Review of engineering fundamentals including mathematics, statics, dynamics, strength of materials, fluid mechanics, electricity, thermodynamics, heat transfer, chemistry, and economics, in preparation for Engineer-in-Training and Professional Engineer examinations. Not acceptable for graduate credit. 2 lectures. Prerequisite: Senior standing in Engineering, Architecture, or Agricultural Engineering.

Engr 503 Advanced Structural Analysis (3)

Deformations of aircraft structures due to static and dynamic loads. Computation of natural mode shapes and frequencies. Determination of dynamic stress fields in aircraft due to transient motions caused by external forces. 3 lectures. Prerequisite: ME 427 or senior level structural design course.

Engr 504 Vehicular Design (3)

Selected vehicular design problem involving the use of creative and analytical talents, and engineering judgment. 3 lectures. Prerequisite: Engr 503

Engr 511, 512 Electric Machines Theory (3) (3)

Advanced topics in electric machines theory and design. 3 lectures. Prerequisite: EE 332 or equivalent.

Engr 520 Analog Computation and Simulation (3)

Principles and practice of analog computation and simulation; programming and scaling techniques. Application to problems in engineering, mathematics, and physics with emphasis on non-linear techniques including function multiplication and generation, output devices. 2 lectures, 1 two-hour activity. Prerequisite: EL 343 or equivalent.

Engr 521 Digital Systems (3)

Organization of digital systems, primarily the modern general purpose, high speed digital computer; arithmetic units, control units, memories, peripheral equipment. Cost and speed trade-offs in the design of such systems. 3 lectures. Prerequisite: EL 404

Engr 522 Computation Systems (3)

Organization of modern electronic computation systems (digital and analog), their capabilities and limitations. Design of hybrid (analog and digital) computation systems. 3 lectures. Prerequisite: EL 521

Engr 532 Industrial Ventilation and Exhaust Systems (3)

Environmental contamination, dispersion mechanisms, unit operations of manufacturing and processing systems. Fans, injectors, natural drafts, control velocities. 3 lectures. Prerequisite: Graduate status.

Engr 533 Aerosol Technology (3)

Definition, theory and measurement of particle properties, particle statistics, size distribution, particle transport, gas cleaning, sampling of airborne contaminants. 3 lectures. Prerequisite: Graduate status.

Engineering Technology

Engr 534 Advanced Design of Air Pollution Control Systems (3)

Comprehensive problems in air conservation. Methods of analysis, design of unit operations and processes for environmental engineering facilities. 3 lectures. Prerequisite: Graduate status.

Engr 541 Advanced Operations Research (3)

Models for mathematical programming and operations research. Mathematical programming topics in linear programming, network analysis, and dynamic programming. Operations research models will include queuing, inventory models, simulation, and Monte Carlo. Special analysis problems in non-linear programming and integer programming. 3 lectures. Prerequisite: IE 333, Math 219, Stat 322, or consent of instructor.

Engr 542 Reliability Engineering (3)

Theory and techniques for determining the reliability of systems and system elements. Influence of failures in series, parallel, and redundant designs. Failure modes and effects. Frequency distributions of failures and failure rates. Methods of estimating, predicting, measuring, and testing for reliability and effectiveness. 2 lectures, 1 laboratory. Prerequisite: IE 336; Stat 322, 425; or consent of instructor.

Engr 543 Advanced Human Factors (3)

Theory and application of man-machine relations and system design. Concepts of mathematical models, human information input channels, decision making based on capability of human operator. 2 lectures, 1 laboratory. Prerequisite: IE 435, Psy 202, Stat 321, a course in biology, graduate status, or consent of instructor.

Engr 550 Kinematic Analysis and Design (3)

Analysis and design of mechanical linkages by means of geometric and algebraic methods. Optimization studies. 3 lectures. Prerequisite: ME 324 or equivalent.

Engr 551 Mechanical Systems Analysis (3)

Specific mechanical systems by means of mathematical models and/or physical models; pertinent variables. 3 lectures. Prerequisite: Graduate standing in engineering.

Engr 562 Mechanical Metallurgy (3)

Analysis of stress and strain in solids; elements of theory and elasticity and plasticity, and applications in metal forming. Residual stresses, theory of dislocations, theory of recrystallization, effects of temperature and rate of loading; fracture mechanics, fatigue and creep. 3 lectures. Prerequisite: WM 306 or consent of instructor.

Engr 563 Metallurgical Physical Chemistry and Thermodynamics (3)

Theory and application of principles to solid state reactions. Behavior of metals and materials. 3 lectures. Prerequisite: Chem 412, 413, ME 302 or equivalent, Engr 562 or consent of instructor.

Engr 599 Design Project (Thesis) (2) (2) (5)

Each individual or group will be assigned an industrial design project for solution under faculty supervision as a thesis requirement for the Master of Engineering degree. An appropriate experimental or analytical thesis may be accepted.

ENGINEERING TECHNOLOGY

ET 101 Air Conditioning and Refrigeration Codes (2)

Introduction to current federal, state, and local codes for equipment and human safety as applied to building plumbing, heating, ventilating, refrigeration, and air conditioning systems. 2 lectures. Concurrent: EnvE 121

ET 121, 122, 123 Environmental Graphics (2) (2) (2)

Principles and practices of mechanical and architectural graphics applied to the development of the spatial concepts essential to the design and installation of environmental systems. 1 lecture, 1 laboratory.

ET 125 Advanced Turning (3)

Theory and operational problems of manual and automatic lathe type machine tools. Evaluation of cutting tool geometry, tool performance, and material machinability. American Standard Association Charts, data and material classification. Optical and lineal instrumentation for quality control. 1 lecture, 2 laboratories. Prerequisite: MP 141, 151

ET 131 Introduction to Engineering Drafting (1)

Basic instruction in drafting techniques and equipment. Geometric constructions for drafting. Basic principles and practices of isometric, oblique, and multiview drawing systems. 1 laboratory.

ET 132 Electronic Instrument Practices (3)

Analysis of selected electronic instruments and transducers, their application to measurement in the field of technology. Practice in measuring voltage, current, waveform, frequency, and phase. Systems used in measurement of physical tolerances. For technology students in non-electronic option. 2 lectures, 1 laboratory. Prerequisite: EL 101, 141

ET 141 Applied Descriptive Geometry (2)

Graphical solutions of problems involving points, lines and planes in three-dimensional space by method of multiview projection. Intersections and development of geometric solids. Application to engineering design. 2 laboratories. Prerequisite: One year of high school drafting or ET 131

ET 142 Engineering Drawing Systems (2)

Multiview and pictorial drawing. Detail and assembly drawings. Conventional industrial drafting practices including sectioning and dimensioning techniques. Role of the engineer in current industrial drafting organizations. 2 laboratories. Prerequisite: ET 141

ET 143 Engineering Graphics (2)

Vector diagrams. Gears and cams. Graphical mathematics. Functional scales. Introduction to alignment charts and monograms. Industrial drafting systems and practices. Interpretation of specialized types of technical drawings, including architectural, structural, welding, piping, diagrammatic and electrical. 2 laboratories. Prerequisite: ET 142

ET 151 Fundamentals of Technical Drawing (2)

Basic theory and application of multiview and pictorial projection. Current industrial practices and standards. Includes sectioning, techniques of dimensioning, detail drawings, and assembly drawings. Freehand sketching and interpretation of engineering drawings. 2 laboratories. Prerequisite: High school drafting or ET 131

ET 153 Engineering Communication (1)

Basic theory of multiview and pictorial projection systems. Reading and interpretation of mechanical drawings. Current industrial drafting standards and practices. Freehand sketching. 1 laboratory.

ET 156 Electronic Shop Practices (1)

Elementary skill in assembling circuits. Use of bench equipment to align and assure proper operation. Test and repair of malfunctioning equipment. For technology students. 1 activity. Prerequisite: ET 132

Engineering Technology

ET 221 Abrasive Machining and Finishing (2)

History, manufacture, selection, and care of grinding wheels. Fundamental principles, uses, capabilities, and operational characteristics of abrasive machining and finishing. Characteristics of grinder fluids. Safety standards, fixturing, and mounting of magnetic and nonmagnetic materials. 1 lecture, 1 laboratory. Prerequisite: ET 125, MP 142, 154

ET 222 Advanced Machining Processes (3)

Theory and operation of machining exotic materials using conventional, electrical, chemical, and high energy methods. 1 lecture, 2 laboratories. Prerequisite: ET 221

ET 231 Basic Circuit Analysis (4)

Application of experimental laws to basic linear passive networks. Introduction to mechanical analogues of electrical parameters. Transformer principles. Analysis of natural and forced response in networks; application of theorems, graphical solutions, handbook data, and approximations. Laboratory observation and measurement of circuit response. 3 lectures, 1 laboratory. Prerequisite: EL 112, 152

ET 232 Electronic Circuits I (4)

Frequency response in linear networks; two port networks, practical Fourier analysis. Networks combined with solid state and vacuum devices. Comparison of linear and non-linear systems. Principles of filtering. Circuit response; measurement techniques. 3 lectures, 1 laboratory. Prerequisite: ET 231

ET 233 Electronic Circuits II (4)

Modern electronic devices and application to amplifier circuits. Use of characteristic curves. Methods of biasing transistor circuits. Square wave and pulse response. Distortion analysis. Principles of feedback. Amplifier operation; practical measurement techniques. 3 lectures, 1 laboratory. Prerequisite: ET 232

ET 235 Nondestructive Testing (5)

Application of nondestructive test systems for quality control of welded structures and castings. Includes radiography, ultrasonic, magnetic particle, penetrants, and eddy current methods. 3 lectures, 2 laboratories. Prerequisite: WM 359

ET 236 Welding Power Sources (3)

Design, selection, and application of welding power sources. Physics of the welding arc as related to power supply. 2 lectures, 1 laboratory. Prerequisite: ET 235

ET 246 Engineering Drawing (2)

Fundamental principles and practices in construction drawings, piping, welding and topographic drawing. Special projects in the area of major interest. Application to current industrial methods and systems. 2 laboratories. Prerequisite: ET 142

ET 320 Mechanisms (4)

Motion of machine parts. Graphical methods for determining displacements, velocities, and accelerations in linkages, cams, gears, and other mechanical assemblies. 2 lectures, 2 two-hour laboratories. Prerequisite: Phys 121, ET 142

ET 321 Air Distribution Systems (3)

Materials and techniques in fabrication and installation of air ducts for heating, ventilating, refrigerating, and air conditioning. Introduction to fabrication of air handling equipment and related accessories for high and low velocity systems. 1 lecture, 2 laboratories. Prerequisite: EnvE 233

ET 324, 325, 326 Advanced Welding Technology (5) (5) (5)

Problems in welding carbon and low alloy steels, loads, and stresses. Difficulties and corrective measures. Problems in welding of nonferrous metals and alloys. Selection of joining processes. Welding metallography. 3 lectures, 2 laboratories. Prerequisite: ET 236

ET 331, 332 Refrigeration Systems (3) (3)

Operation, installation, and supervision of medium and low temperature refrigeration systems for food and product processing and storage using various staging systems. Cold storage and building requirements for efficient operation. Low temperature testing and cryogenic refrigeration. Transport refrigeration systems. 2 lectures, 1 laboratory. Prerequisite: EnvE 233

ET 341 Electronic Circuits III (4)

Application of electronic devices. Oscillation, modulation, and demodulation. Junction transistors at high frequencies, cascade tuned amplifiers, saw tooth oscillators, transistor multivibrators. The transistor as a switch. Wave shaping circuits. Responses in electronic circuits; practical measurement techniques. 3 lectures, 1 laboratory. Prerequisite: ET 233

ET 342 Microwave Technique (4)

Electromagnetic field theory; microwave devices. Klystron amplifiers, reflex oscillators, magnetrons, traveling wave tubes, solid state signal sources, masers and parametric amplifiers. 3 lectures, 1 laboratory. Prerequisite: ET 341

ET 344 Advanced Engineering Drawing (2)

Layout and detail drawing for typical mechanical devices and systems currently used in industry. Theory of dimensioning systems. Production drawings. Emphasis on current industrial systems and organization. 2 laboratories. Prerequisite: ET 142

ET 421, 422 Applied Machine Design (4) (4)

Machine design emphasizing graphical techniques, feasibility models, and utilization of standard and special elements. Laboratory includes solution of realistic design projects by student teams. 2 lectures, 2 laboratories. Prerequisite: ET 344, 320; Aero 202

ET 423 Air Conditioning Systems (5)

Application of complete air conditioning consisting of heating, ventilation, humidification, dehumidification, refrigeration, air purification, water treatment, and control equipment for commercial and industrial applications. 3 lectures, 2 laboratories. Prerequisite: ET 332

ET 441 Digital Circuits (4)

Generation of pulses, their shaping, timing, and transmission. Mechanization of logic. Microminiature circuits. Digital circuit responses. 3 lectures, 1 laboratory. Prerequisite: ET 341

ET 442 Automation Technology (4)

Electronic and electromechanical systems used in industrial control and measurement; installation, operation, and maintenance. Amplification and control systems for automatic control of sequential and continuous processes. 3 lectures, 1 laboratory. Prerequisite: ET 341

ET 443 Electronic Systems (4)

Communication systems; AM, FM, SSB, digital, teletype. Installation, operation, and maintenance. 3 lectures, 1 laboratory. Prerequisite: ET 342

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

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

English

ENGLISH

Eng 100 Applied English Composition (3)

Concentrated work in English composition, letter writing, reports, and language usage. May not be substituted for Eng 104 or Eng 105. Not open for credit to students with credit in college English. 3 lectures.

Eng 104 Freshman Composition (3)

Composition based on principles, practice, and correction of theme writing. Organization, content, and editing of sentences, paragraphs, and whole essays. Forms of writing, accenting exposition. Supplementary language study. 3 lectures. Prerequisite: Satisfactory score on placement test or Eng 4

Eng 105 Freshman Composition (3)

Continuation of written composition. Use of logic and argument; forms of persuasive writing. Use of reference materials in the preparation of an original, effective library research paper. Readings for critical analysis. 3 lectures. Prerequisite: Eng 104

Eng 106 Freshman Composition (3)

Continuation of written composition with emphasis on the development of style in writing (clarity, grace, individuality). Reading of good examples of style; writing of critical analysis papers. 3 lectures. Prerequisite: Eng 105

Eng 124 Intensive English (3)

For the foreign student who needs additional work with English as a foreign language. Practice in pronunciation, sentence structure, reading and composition. Individual work in the language laboratory. 3 two-hour laboratories.

Eng 125 English Composition for Foreign Students (3)

Review of English fundamentals. Reading, letter writing, and composition. May be substituted for Eng 104. 3 lectures. Prerequisite: Satisfactory score on placement test or Eng 5

Eng 126 English Composition for Foreign Students (3)

Introduction to forms of exposition and logic. Use of reference materials and preparation of term paper. May be substituted for Eng 105. 3 lectures. Prerequisite: Eng 125

Eng 200 Advanced Composition (3)

Review of American grammar and usage. Instruction and practice in written composition. 3 lectures. Prerequisite: Eng 106

Eng 201 Introduction to Fiction (2)

Understanding of the forms of fiction through guided class discussion of short stories and novels. Frequent written assignments. 2 lectures.

Eng 202 Introduction to Drama (2)

Understanding of the forms of drama through guided class discussion of plays. Frequent written assignments. 2 lectures. Prerequisite: Eng 104

Eng 203 Introduction to Poetry (3)

Understanding of the forms of poetry through guided class discussion of poems. Frequent written assignments. 3 lectures. Prerequisite: Eng 105

Eng 204 Letter Writing (2)

Letter writing problems, letters of application, inquiries, questionnaires. The psychology of modern business letters. 2 lectures. Prerequisite: Eng 105

Eng 205 Children's Literature (3)

Survey of stories, plays, and poems which are suitable for introducing literary values in the elementary grades. 3 lectures. Prerequisite: Eng 106 or consent of instructor.

Eng 207 Introduction to Literature (3)

Introduction to major forms of literature. Study in depth of selected works with reading for appreciation. May not be elected by English majors. 3 lectures. Prerequisite: Eng 104

Eng 208 Introduction to American Literature (3)

Selected reading from representative American authors. May not be elected by majors in English. Not open for credit to students with credit in Eng 311, 312, or 313. 3 lectures. Prerequisite: Eng 104

Eng 210 Introduction to Shakespeare (3)

Selected readings in Shakespeare. Course is designed for General Education. 3 lectures. Prerequisite: Eng 105

Eng 211, 212, 213 European Literature (3) (3) (3)

Directed readings in European literature from the Greeks and Romans to the present, exclusive of the British. 3 lectures. Prerequisite: Eng 104

Eng 218 Report Writing (3)

Study of the research paper in industry and engineering. Extensive writing experience. 3 lectures. Prerequisite: Eng 105

Eng 219 Technical Writing (3)

Preparation of training materials; popular presentation of technical data and conclusions; technical communication within industries. Extensive technical writing. 3 lectures. Prerequisite: Eng 104

Eng 301 Modern English Grammar (3)

English language: phonology and morphology, dialects, language and literacy, coding practices and problems. 3 lectures. Prerequisite: Eng 105

Eng 302 Modern English Grammar (3)

English language: syntax; comparison and contrast of the syntax of spoken and written English. Methods of syntactical study: traditional, descriptive-structural, transformational-generative. 3 lectures. Prerequisite: Eng 301

Eng 303 History of the English Language (3)

A study of the development of the English language from its origins to its present forms and practices. Required of all English majors. 3 lectures. Prerequisite: Eng 106, 307, 308, 309

Eng 304 Advanced Composition—Non-Fiction (3)

Instruction and practice in writing, revising, and evaluating various forms of non-fiction. 3 lectures. Prerequisite: Eng 106

Eng 305 Advanced Composition—Imaginative Writing (3)

Instruction and practice in writing, revising, and evaluating various kinds of imaginative composition. 3 lectures. Prerequisite: Eng 106, 201

Eng 306 Advanced Composition—Literary Criticism (3)

Instruction and practice in writing, revising, and evaluating various types of critical writing. 3 lectures. Prerequisite: Eng 106, 201, 202, 203

Eng 307, 308, 309 British Literature (3) (3) (3)

Selected readings in British literature from the beginning to the mid-20th century. 3 lectures. Prerequisite: Eng 105

Eng 311, 312, 313 American Literature (3) (3) (3)

Directed readings in American writers from Colonial times to the present. 3 lectures. Prerequisite: Eng 105

English

Eng 316 Readings for Young Adults (3)

A survey of readings in literature, suitable for use in secondary schools. 3 lectures. Prerequisite: Eng 106

Eng 317 Modern Drama (3)

A survey of British and American Drama of the 20th century. 3 lectures. Prerequisite: Eng 202

Eng 319 The Bible as Literature (3)

The Old and New Testaments with historical background. Literary forms and characteristics of Hebraic writing. Appreciation of the far-reaching use of Biblical narrative and reference in literature, speeches, art, drama, and modern film. 3 lectures.

Eng 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: Permission of the department head.

Eng 414 Significant World Writers (3)

Study in depth of selected world writers, as individual writers or in groups. Each course will have a subtitle descriptive of the content. May be repeated to 12 units. 3 lectures. Prerequisite: Eng 211

Eng 415 Modern Novel (3)

Readings in representative 20th century novels with special emphasis on origins, form, style, and ideas. 3 lectures. Prerequisite: Eng 201 or 9 units of literature.

Eng 416 Modern Poetry (3)

Study of poetry as an art expression of the 20th century. 3 lectures. Prerequisite: Eng 203 or 9 units of literature.

Eng 417 Significant British Writers (3)

Study in depth of selected British writers, as individual writers or in groups. Each course will have a subtitle descriptive of the content. May be repeated to 12 units. 3 lectures. Prerequisite: Eng 307, 308, 309

Eng 418 Significant American Writers (3)

Study in depth of selected American writers, as individual writers or in groups. Each course will have a subtitle descriptive of the content. May be repeated to 12 units. 3 lectures. Prerequisite: Eng 311, 312, 313 or consent of instructor.

Eng 419 Elizabethan Drama (3)

A survey of the English drama from its beginning to 1642, excluding Shakespeare. 3 lectures. Prerequisite: Eng 202, 307

Eng 461 Senior Project (2)

Selection and completion of a project under faculty supervision. Projects typify problems which a graduate may face in his field of employment. Project results are presented in a formal written report. Minimum 60 hours total time.

Eng 463 Undergraduate Seminar (2)

Study of professional articles and materials, research methodology and bibliography, professional orientation. 2 lectures. Prerequisite: Senior standing.

Eng 501 Introduction to Graduate Study (2)

Introduction to graduate scholarship and research in literature, language and composition. Research methodology and bibliographic techniques. May not be elected where credit for Eng 463 has been earned. 2 lectures. Prerequisite: Graduate status in English.

Eng 502 Introduction to Critical Analysis (3)

Basic approaches used by critics. Multiple points of view; application to literary works; reflection of critical analysis in student compositions. Designed to aid the teacher of secondary English to enrich the courses taught in secondary schools. 3 lectures. Prerequisite: graduate standing.

Eng 503 Contemporary Language Study (3)

Correlation between current development of English language and courses in grammar and composition in public schools. Usage, vocabulary, spelling, idiom, punctuation, grammar, sentence structure. Understanding of effects of language change upon writing and speaking. Suitable for upper grade, junior and senior high school teachers. 3 lectures. Prerequisite: Eng 302, or consent of instructor.

Eng 504 Problems in Language (3)

Study of development of English; consideration of problems of grammar and uses of language. May be repeated to 9 units. 3 lectures. Prerequisite: Eng 503

Eng 505 Problems in Composition (3)

Study of special problems in composition. Direct application of new language information to composition or detailed analysis of relationship between rhetorical principles and writing. May be repeated to 9 units. 3 lectures. Prerequisite: Graduate status in English.

Eng 511 Problems in American Literature (3)

Concentrated study of American authors or periods. Written and oral reports of individual investigation. 3 lectures. Prerequisite: Graduate status in English.

Eng 512 Problems in British Literature (3)

Concentrated study of British authors or periods. Written and oral reports of individual investigation. 3 lectures. Prerequisite: Graduate standing in English.

Eng 521 Curriculum and Methods in English (3)

Instruction in composition and literature as they may be applied to secondary school teaching. 3 lectures. Prerequisite: Admission to teacher education program or graduate status.

Eng 590 Graduate Seminar in English (1-3)

Independent or group study of special problems in selected areas of language, composition, or literature. Total credit limited to 3 units. 1-3 lectures. Prerequisite: Graduate status in English.

ENTOMOLOGY**Ent 126 General Entomology (4)**

Introduction to the study of insects. Structure, major orders and families of insects, life histories, economic importance and control. Insect collection required. 3 lectures, 1 laboratory.

Ent 227 Insect Morphology (4)

Morphology of exoskeleton, appendages and internal organs; direct applications of principles are emphasized with economically important insects. 2 lectures, 2 laboratories. Prerequisite: Ent 126

Ent 332 Economic Entomology (3)

Identification, life histories and control of insects beneficial or injurious to various crops, fruits, stored products, domestic animals and man; important invertebrates such as mites, ticks and spiders. 1 lecture, 2 laboratories. Prerequisite: Zoo 132 or Bot 122; Ent 126; Chem 226 or consent of instructor.

Ent 590 Seminar in Entomology (1)

Problems and topics in advanced entomology selected according to the interest and needs of the students enrolled. Maximum of 3 units. 1 lecture. Prerequisite: Graduate status and evidence of satisfactory preparation in entomology.

Environmental Engineering

ENVIRONMENTAL ENGINEERING

EnvE 141 Manufacturing Processes (1)

Methods of identification, classification and listing of the physical properties of metals used in fabrication processes. Engineering problems in processes used to control the effects of environment on gage metal components. 1 laboratory.

EnvE 201, 202, 203 Heating and Ventilating (3)(3)(2)

Heating and ventilating equipment and its application to industrial and public buildings. 3 lectures, fall, winter; 2 laboratories, spring. Prerequisite: Phys 132. Concurrent: Chem 124, 125

EnvE 231, 232, 233 Fluid Systems (2)(2)(2)

Materials, equipment, principles, and techniques used in designing and installing environmental fluid flow systems. 1 lecture, 1 laboratory.

EnvE 237 Boilers and Steam Equipment in Agriculture (2)

The operation and maintenance of steam equipment as applied to the agricultural industry. Course designed for students in Agriculture. 2 lectures.

EnvE 238, 239 Refrigeration in Agriculture (2)(2)

Basic principles of refrigeration, compression systems, refrigerant control valves, motors, service analysis, operation and maintenance of refrigeration equipment. Course designed for students in Agriculture. 2 lectures, winter; 1 lecture, 1 laboratory, spring.

EnvE 240 Additional Engineering Laboratory (1-2)

Elective project work. Total credit limited to 4 units with not more than 2 units in any quarter. 1 or 2 laboratories.

EnvE 302 Thermodynamics of Refrigeration (3)

Thermodynamic relations, mixtures, combustion. Analysis of refrigeration. 3 lectures. Prerequisite: ME 302, Chem 125

EnvE 303 Advanced Thermodynamics of Refrigeration (3)

Refrigeration and power cycles, components and controls. 3 lectures. Prerequisite: EnvE 302

EnvE 306 Survey of Heating and Air Conditioning (3)

Basic principles concerning comfort, thermal types of equipment and systems, space requirements and energy sources. Course designed for students not majoring in Environmental Engineering. 3 lectures. Prerequisite: Phys 131

EnvE 307, 308 Noise and Vibration Control (2)(2)

Behavior of sound waves, selection of instrumentation, practical measurements, criteria for noise and vibration control in environmental systems. 2 lectures. Prerequisite: Phys 133, Math 241

EnvE 313 Heat Transfer (3)

Basic principles of heat transfer, radiation, conduction, convection in gases and liquids, boiling and condensing of fluids during forced and gravity flow conditions. 3 lectures. Prerequisite: ME 311

EnvE 316 Automatic Process Control (2)

Introduction to automatic control instrumentation. Graphical method for analysis of control systems. Analytical determination of control response. 2 lectures. Prerequisite: Math 242

Environmental Engineering

EnvE 324 Introduction to Air Pollution (3)

Causes and effects of air pollution on the individual, the community and industry. Legal and public relations aspects. 3 lectures.

EnvE 325 Air Pollution Measurements (3)

Planning and conduct of atmospheric surveys. Collection, evaluation, and interpretation of data as they pertain to the concentration of pollutants sampled. 2 lectures, 1 laboratory. Prerequisite: Chem 126, EnvE 324

EnvE 331, 332, 333 Thermal and Fluids Laboratory (2)(2)(2)

Laboratory tests in controls, thermodynamics, fluid flow, heat transfer, and vibration. Performance testing of refrigeration systems, evaporators, condensers, fans, air washers, boilers, grilles, etc. 1 lecture, 1 laboratory, fall and winter; 2 laboratories, spring. Prerequisite: EnvE 203, 233

EnvE 341, 342, 343 System Design (2)(2)(2)

Individual and team project work in designing systems for heating and refrigerating applications. 2 laboratories. Prerequisite: EnvE 203. Concurrent: EnvE 307, ME 302

EnvE 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.

EnvE 401 Advanced Mass and Energy Transfer (3)

Thermodynamic properties of moist air. Humidity measurements, direct contact transfer processes, heating and cooling by extended surfaces, solar radiation. 3 lectures. Prerequisite: EnvE 313

EnvE 402 Advanced Fluid Mechanics (3)

Fluid dynamics and fluid machinery. Centrifugal and axial fans, pumps and compressors. Turbines. Fluid flow in ducts. 3 lectures. Prerequisite: ME 311, EnvE 401

EnvE 411 Air Pollution Control (3)

Theory, principles and practices related to the control of particulate emissions. Mechanical separations. Cost and design of control systems. 2 lectures, 1 laboratory. Prerequisite: EnvE 325

EnvE 421 Advanced Air Pollution Control (3)

Theory, principles and practices related to the control of gaseous emissions. Process characteristics. Odor control. Mass transfer operations as applied to environmental control. 3 lectures. Prerequisite: EnvE 411

EnvE 422 Environmental Radiation Surveillance (2)

Sources of radioactive contaminants, biological effects, radiation protection. Environmental sampling and analysis of airborne radiation. Controls and disposal of wastes. 2 lectures. Prerequisite: EnvE 421

EnvE 423 Industrial Environments (2)

Effects of the environment in relation to health and the performance of work. Adverse and favorable temperatures and pressures, atmospheric impurities, toxicants. Control of occupational hazards and disease. 2 lectures. Prerequisite: EnvE 421

EnvE 441, 442, 443 Advanced System Design (3)(3)(3)

Individual and team project work in designing systems for air conditioning. 1 lecture, 2 laboratories. Prerequisite: EnvE 341, ME 311

Farm Management

EnvE 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.

EnvE 463 Undergraduate Seminar (2)

Special studies and technical developments in the field. Individual reports on important research in the environmental engineering field. 2 lectures.

FARM MANAGEMENT

FM 101 Introduction to Agricultural Economics (5)

Modern economic system, history of U.S. Agriculture, agriculture's role in the economy, prices of agricultural products, marketing agricultural products, agricultural credit and finance, agricultural resources and land use, the role of farm management, introduction to farm management analysis processes, agriculture and the government. May not be substituted for Ec 211, 212 or FM 305. 4 lectures, 1 2-hour laboratory. To be taken by technical students.

FM 102 Farm Records and Management (4)

Farm recordkeeping for income tax purposes and study of farm business, measures of farm profits, factors affecting farm profits, reorganization of an actual farm. May not be substituted for FM 321 or 322. 3 lectures, 1 2-hour laboratory. To be taken by technical students.

FM 103 Farm Management Problems (5)

Crop and livestock enterprise costing, equipment costing and efficiency, determination of most profitable crop combinations, most profitable application of inputs, labor management, government price programs. May not be substituted for FM 421, 424, 425, or 426. 3 lectures, 2 2-hour laboratories. Prerequisite: FM 102. To be taken by technical students.

FM 104, 105, 106 Introduction to Farm Management (1) (1) (1)

Development of American agriculture, needs for farm management in agriculture, training necessary for the farm manager, American agriculture on the world scene, use of adding machine and calculators, agriculture enterprise costing. 1 lecture.

FM 124 Agriculture (3)

Identification and use of major crops and livestock, types of farming in the United States, the place and function of the farm marketing system, broad classes of soil and their general management problems, the farm problem as it affects farmers and citizens, identification of plants for the home and their general care. 2 lectures, 1 2-hour laboratory. For nonagriculture majors only.

FM 203 Agricultural Economic Analysis (3)

Role of price in the economy, the firm as a decision-making unit, the production function, single input-output analysis, substitution relationships, products combinations, risk analysis, consumption and market demand influence, population and technological changes. 3 lectures. Prerequisite: Ec 212

FM 300 Successful California Farms (1)

Visits to successful California farms involving many types of farming. Study of farm resources and organization, techniques of operation, yields, problems. Different regions visited on different trips. Maximum credit is 3 units for three different trips.

FM 304 Agricultural Marketing (3)

Marketing principles including processes, functions, institutions, costs, transition, problems and policies in the marketing of farm products. 3 lectures. Prerequisite: Ec 201 or 211

FM 305 Agricultural Resources (3)

Survey of agricultural production areas of United States from standpoint of physical resource, markets, economic advantages, and problems. Appraisal of area problem from standpoint of land economic principles. 3 lectures. Prerequisite: Ec 201 or 211

FM 307 World Agricultural Resources (3)

World agricultural production areas with emphasis on natural and human resources, existing production, economic implications, population growth and potential food supply. 3 lectures. Prerequisite: Ec 201 or 211

FM 310 Farm Credit (3)

Principles of farm financial management, credit requirements, choosing among sources of credit, farm financial planning and cash flow budgeting. 3 lectures. Prerequisite: Actg 131 or FM 321

FM 315 Land Economics (3)

Supply of land, population pressure on land, input-output relations affecting land use, economic returns, land values, development and investment costs, locational factors, conservation, institutional factors, leasing, land use planning, taxation, public regulations. 3 lectures. Prerequisite: Ec 201 or 211

FM 321 Farm Records (3)

Fundamentals of record keeping, kinds of records, inventory, depreciation, cash and accrued basis of income tax reporting, balance sheet, operating statement, analysis of statements. 2 lectures, 1 2-hour laboratory. Prerequisite: Ec 201 or 211

FM 322 Principles of Farm Management (4)

The role of farm management, types of farming, problems of leasing and buying a farm, labor problems, measures of profits, factors affecting profits, budgeting of laboratory farms, independent analysis of farm for term report. 3 lectures, 1 2-hour laboratory. Prerequisite: FM 321 or Actg 131 and 132

FM 325 California Agriculture (3)

Agricultural regions of California considered from standpoint of physical resources, crops and livestock, size, tenure, water problems, relation to urban areas, land development. 2 lectures, 1 2-hour laboratory. Prerequisite: Ec 201 or 211

FM 326 Farm Appraisal (3)

Methods of farm appraisal, use of county records, appraisal practice on different types of farms, discussions with professional appraisers. 2 lectures, 1 2-hour laboratory. Prerequisite: Ec 211 and junior standing

FM 333 Agricultural Price Analysis (3)

Application of statistical tools for price analysis. Emphasis on price making process for specific agricultural commodities. Utilization of market reports and production estimate data in price forecasting and analysis. 2 lectures, 1 2-hour laboratory. Prerequisite: Math 212

FM 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: Permission of department head.

FM 403 Agricultural Prices and Policy (3)

Price making process, price variation and trends, governmental price control programs, price characteristics and problems of specific agricultural commodities. 3 lectures. Prerequisite: Ec 201 or 211

Farm Management

FM 405 Linear Programming in Agriculture (3)

Application of linear programming to modern commercial agriculture; assumptions and data requirements; graphic and simplex solutions; modification of basic assumptions to avoid program restrictions; price and resource mapping; preparation, coding and solutions of models simulating current problems. 2 lectures, 1 2-hour laboratory. Prerequisite: Ec 201 or 211

FM 406 Advanced Agricultural Economic Analysis (3)

Basic mathematical concepts; marginal analysis; maximization, minimization and basic differential calculus, decision and game theory as it pertains to the agricultural firm. 3 lectures. Prerequisite: FM 203, Math 212

FM 421 Crop Management Problems (3)

Crop enterprise costing procedure, analysis of rotation systems, labor problems, irrigation plans, determination of most profitable rates of fertilization and irrigation, marketing crops, land development costs, effect of shifting cropping plan. 3 lectures. Prerequisite: FM 322

FM 424 Poultry Husbandry Management Problems (3)

Poultry enterprise costing procedure, economics of plant layout, analysis of labor saving equipment and procedure, determination of most profitable feed combination, credit for poultrymen, use of outlook reports, marketing methods. 3 lectures. Prerequisite: FM 322

FM 425 Livestock Management Problems (3)

Costing procedure for animal enterprises, types of beef operations compared, feed lot management problems, determination of most profitable feed rations, livestock marketing procedure, effect of feed resource changes on organization and profits. 3 lectures. Prerequisite: FM 322

FM 426 Dairy Management Problems (3)

Dairy enterprise costing procedure, relation of cropping plan to dairy organization, analysis of feed resource costs, determination of most profitable feed rations, costs and problems of shifting from grade B to grade A dairy, most profitable culling. 3 lectures. Prerequisite: FM 322

FM 430 Orientation to California Agriculture (6)

Study of California agriculture through visitation to major production areas of the State. Problems in connection with organization, management, production practices, marketing procedures, use of equipment, soils, climate, and irrigation are considered. Offered in summer only. Open only to agricultural majors. Prerequisite: Senior standing or permission of Dean of Agriculture.

FM 431 Large Farm Accounting (3)

Application of commercial accounting process to large farm accounting problems. Special emphasis will be given to the problem of devising and executing an accounting system that will give necessary details on specific enterprises for analysis and control. 2 lectures, 1 2-hour laboratory. Prerequisite: Actg 131, 132

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

Analysis of a farm management problem selected by student with approval of adviser. Project results are presented in a formal report. Minimum 120 hours total time.

FM 463 Undergraduate Seminar (2)

Student presentation and description of developments and problems in farm management. 2 lectures.

FM 520 World Agricultural Development (3)

Special problems of agricultural development in selected emerging nations; considering the role of government policies in directing development. 3 lectures. Prerequisite: FM 307

FM 581 Graduate Seminar in Farm Management (3)

Group study of current problems; development and analysis methods in the field. Consideration given to the place of Farm Management in the teaching of vocational agriculture. 3 lectures.

FINANCE AND PROPERTY MANAGEMENT

FPM 310 Insurance Principles (3)

Basic principles of insurance from the viewpoint of the consumer. Risk and risk bearing; principles of insurance buying; major types of private insurance—life, property, liability—and the underlying economic problems each type is designed to meet. The insurance contract and its legal basis. 3 lectures.

FPM 311 Property and Casualty Insurance (3)

Analysis of insurance investments, policies, forms, endorsements, and rate making. Fidelity and surety bonding; analysis of policies and rate making. 3 lectures. Prerequisite: FPM 310

FPM 312 Life and Health Insurance (3)

Analysis of contracts from the viewpoint of the insurance consumer, interpretation of major policy provisions, integration of private policies with social insurance coverages. 3 lectures. Prerequisite: FPM 310

FPM 331 Real Estate Principles and Practices (3)

Nature and scope of the real estate business including transfers of property, financing methods, and property management. 3 lectures. Prerequisite: Ec 201 or 211 or consent of instructor.

FPM 342, 343 Financial Management (3) (3)

Problems of financing current and fixed assets from internal and external sources. Emphasis on analysis, planning and control. 3 lectures. Prerequisite: Actg 223

FPM 411 Investments (4)

Survey of risk, media and objectives related to investment policies of individuals and institutions. Techniques of analysis, valuation and selection of securities. 3 lectures, 1 two-hour laboratory. Prerequisite: FPM 343 or consent of instructor.

FPM 412 Law of Real Property (3)

Legal theory and practice of estates in land. Landlord and tenant relationships, land transactions, mortgages and trust deeds, easements, land use, ownership rights in land and public land law. 3 lectures. Prerequisite: Bus 301 or 307

FOOD PROCESSING

FI 101 Survey of Food Industry (2)

Introductory course including size, distribution, major production areas of the food processing industry. 2 lectures.

FI 122 Food Processing Machinery (3)

Processing equipment selection, use, maintenance and repair. 2 lectures, 1 laboratory.

FI 123 Elements of Food Preservation (3)

Principles of food preservation including canning, freezing, dehydration and fermentation. 2 lectures, 1 laboratory.

Food Processing

FI 210 Meats (3)

Practice in slaughtering and processing of beef cattle, sheep and hogs. A study of carcass grades, yield, and cut out value. Meat curing methods, by-products and consumption trends. 2 lectures, 1 laboratory.

FI 212 Meat Classification and Grading (2)

A comprehensive and detailed study of those factors related to carcass quality, conformation, and finish, to include meat classification, grading and judging of carcass and wholesale cuts of beef, pork, and lamb. Field trip to meat packing plants is required. 1 lecture, 1 laboratory. Prerequisite: FI 210

FI 221, 222, 223, 224 Food Processing Operations (3) (3) (3) (3)

Lecture and laboratory study of complete processing procedures for seasonal fruits and vegetables, specialties and other processed food. 2 lectures, 1 laboratory. FI 224 offered in summer only. Prerequisite: FI 123 or 230

FI 230 Elements of Food Processing (4)

Principles of unit operations in food processing covering canning, freezing, dehydration, concentration and fermentation. Food quality and spoilage. For majors other than Food Processing majors. 3 lectures, 1 laboratory.

FI 232 Sanitation and Waste Disposal (3)

The organization, management and operation of a food plant sanitation and waste disposal program. 2 lectures, 1 laboratory.

FI 233 Processed Food Inspection (3)

Fundamentals, principles and procedures for inspecting processed foods based upon federal and state grades. Laboratory work in grading various products. 2 lectures, 1 laboratory.

FI 309 Meat Procurement and Use (3)

Selection, identification and cutting of meat. Physical and chemical composition of meat and its relationship to flavor, tenderness, and nutritional value. 2 lectures, 1 laboratory. Prerequisite: HE 210 or Chem 328

FI 321 Food Plant Quality Control (3)

Methods of organizing and operating food and plant quality control systems including chemical and physical techniques. 2 lectures, 1 laboratory. Prerequisite: FI 221 or 233

FI 332 Statistical Quality Control (3)

The application of statistical methods in quality control programs and evaluation of operations. 2 lectures, 1 laboratory. Prerequisite: FI 221, 222, or 223

FI 336 Packaging (4)

Study of packaging materials, packages and packaging methods applicable to a variety of processed foods. 3 lectures, 1 laboratory.

FI 338 Sausage, Smoked and Canned Meats (3)

The manufacturing of processed meats. Product formulation, curing, smoke house operation, meat canning, sanitation and quality control. 2 lectures, 1 laboratory. Prerequisite: FI 309, 210 or 212

FI 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: Permission of department head.

FI 421, 422 Advanced Food Processing (3) (3)

Detailed study of more involved food processing operations with problems of physical and chemical actions of the processes. Includes triple effect and high vacuum concentration, freeze drying, aseptic canning and similar processes. Also latest equipment developments. 2 lectures, 1 laboratory. Prerequisite: Junior standing and permission of instructor.

FI 431 Meat Technology (3)

Characteristics of meat and meat products as related to processing and marketing with special emphasis on problems and variations encountered during these operations. 2 lectures, 1 laboratory. Prerequisite: Junior standing and permission of instructor.

FI 433 Food Production Control (4)

Plant equipment construction, plant layout and flow lines, cost estimating, work simplification, automation and control systems. 3 lectures, 1 laboratory. Prerequisite: Junior standing and instructor's permission.

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. Minimum 120 hours total time.

FI 463 Undergraduate Seminar (2)

Major developments in the chosen field of the student. Discussion of new developments, policies, practices, and procedures. Each individual is responsible for the development and presentation of a topic in his chosen field. 2 lectures.

FI 581 Graduate Seminar in Food Processing (3)

Current findings and research problems in the field and their application to the industry. 3 lectures.

FOREIGN LANGUAGE

The primary purpose of offering foreign language instruction at California State Polytechnic College is to prepare students to meet better the educational requirements of working in foreign countries, communicating with foreign nationals in this country, or preparing to teach language in the elementary schools. The subject matter and teaching methods used provide a usable, practical knowledge of the language studied.

Fr 101, 102, 103 Elementary French (4) (4) (4)

For beginners. Class practice in pronunciation, sentence structure, reading, writing, and basic conversation. Laboratory drill with recorded materials. 3 lectures, 1 two-hour laboratory.

Fr 201, 202, 203 Intermediate French (3) (3) (3)

Further practice in speaking, reading, and writing French. Introduction to French culture. 3 lectures. Prerequisite: Fr 103 or equivalent.

Fr 301, 302, 303 Third Year French (3) (3) (3)

Readings in French literature; poetry, essays, novels, plays. 3 lectures. Prerequisite: Fr 203 or equivalent.

Span 101, 102, 103 Elementary Spanish (4) (4) (4)

For beginners. Class practice in pronunciation, sentence structure, reading, writing, and basic conversation. Laboratory drill with recorded materials. 3 lectures, 1 two-hour laboratory.

Fruit Production

Span 201, 202, 203 Intermediate Spanish (3) (3) (3)

Further practice in speaking, reading, and writing Spanish. Introduction to Spanish and Latin American cultures. 3 lectures. Prerequisite: Span 103 or equivalent.

Span 301, 302, 303 Third Year Spanish (3) (3) (3)

Readings in Spanish literature; poetry, essays, novels, plays. 3 lectures. Prerequisite: Span 203 or equivalent.

Lang 101, 102, 103 Foreign Language, Independent Study (3) (3) (3)

Independent supervised study arranged for students who wish individually to acquire basic skill in a foreign language. Instruction includes use of prerecorded and programmed materials. Not open for credit by examination.

FRENCH

(See Foreign Language)

FRUIT PRODUCTION

FP 123 Beekeeping (3)

Practical studies and exercises in the handling of honey bees with special reference to pollination of commercial crops. Honey processing and marketing. Bee inspection and disease detection. 2 lectures, 1 laboratory.

FP 131 Pomology (4)

History and outlook for California fruit growing. Apple, peach, pear and prune production practices. Field laboratories in orchard management practices, tree and fruit identification, harvesting, grading and packaging of college orchard products. 3 lectures, 1 laboratory. Credit will not be allowed for both FP 131 and 230.

FP 132 Pomology (4)

Planting and planning the deciduous orchard. Apricot, cherry, fig, olive and plum production practices with special emphasis on pruning trees and grapevines. 3 lectures, 1 laboratory. Prerequisite: FP 131

FP 133 Pomology (4)

Production practices common to deciduous nut crops produced in California. Normal spring cultural problems including thinning and spraying. Small fruit culture. 3 lectures, 1 laboratory. Prerequisite: FP 132

FP 230 California Fruit Growing (4)

Production practices, areas of production, suitable varieties, harvest and processing of important deciduous and subtropical fruit crops. Methods of propagation and training. 3 lectures, 1 laboratory. Credit will not be allowed for both FP 131 and FP 230.

FP 231 Viticulture (4)

A comprehensive study of grape growing utilizing the college plantings for field practice in planting, training and maintaining the vineyard. Varietal identification and use. 3 lectures, 1 laboratory.

FP 232 Fruit Plant Propagation (4)

Propagation by seed, cuttings, layering, grafting, and budding. Rootstocks for deciduous fruits, commercial nursery practices. 3 lectures, 1 laboratory. Prerequisite: FP 133 or 230

FP 239 Home Fruit and Vegetable Production (3)

Growing, handling and evaluating fruits and vegetables common to demonstration and Estate plantings. Varietal characteristics and climatic adaptation. 2 lectures, 1 laboratory.

FP 324 Tropical Fruit and Nut Production (4)

Common practices in producing tree and fruit crops of economic importance in tropical areas—cocoa, tea, coffee, rubber, oil palm, bananas and dates. 3 lectures, 1 laboratory.

FP 331 Advanced Viticulture (4)

Commercial production practices, mechanization and processing. Management of college planting. Field labor management efficiency studies. Techniques in handling and harvesting. 3 lectures, 1 laboratory. Prerequisite: FP 231

FP 332 Citrus and Avocado Fruit Production (4)

Growing and marketing oranges, lemons, grapefruit, avocados and dates. Minor subtropical fruits also included. Orchard practice. 3 lectures, 1 laboratory.

FP 421 Advanced Pomology (3)

Storage problems, post-harvest physiology, environmental factors affecting fruit development. Maturity standards. Two-day field trip required. 2 lectures, 1 laboratory. Prerequisite: FP 232, CP 311

FP 436 Orchard Management (4)

Organization and management of labor and equipment in field and processing operations. Production problem analysis. Advanced work in production management. Job instruction training. 3 lectures, 1 laboratory. Prerequisite: FP 421

FP 581 Graduate Seminar in Fruit Production (3)

Group study of current problems of fruit production; current experimental and research findings as applied to production and marketing. 3 lectures.

GEOGRAPHY

Geog 201 Regional World Geography (3)

Regional geographical characteristics and interrelationships emphasizing the international importance, problems, and potentialities of Europe and the Soviet Union. Primarily for the elementary or the secondary school teacher. 3 lectures.

Geog 202 Regional World Geography (3)

Regional geographical characteristics and interrelationships emphasizing the international importance, problems, and potentialities of the Middle East, Africa, and the Orient. Primarily for the elementary or secondary school teacher. 3 lectures.

Geog 203 Regional World Geography (3)

Regional geographical characteristics and interrelationships emphasizing the international importance, problems, and potentialities of the Pacific World, Latin America, the United States, and Canada. Primarily for the elementary or the secondary school teacher. 3 lectures.

Geog 308 Global Geography (3)

Survey of man's utilization and occupation of the earth. Interrelations of human life and elements of natural dependence of nations, and world trade. Supporting power of geographical environment. 3 lectures.

Geog 315 Political and Economic Geography (3)

Survey of world resources, mineral and agricultural, and of the geographical factors affecting their production and distribution. An analysis of economic geographic factors in current international affairs. 3 lectures.

Geog 401 Area Geography (3)

Depth study of geographic characteristics of a selected world area. Each time the course is offered it will bear a subtitle descriptive of the particular world area studied. 3 lectures. May be repeated to a total of 12 units. Prerequisite: Geog 315

History

HISTORY

Hist 101, 102, 103 History of Civilization (3) (3) (3)

Development of civilization from earliest times to the present. Political, economic, social, intellectual, and religious contributions of the various peoples to contemporary life. 3 lectures.

Hist 112 History of California (3)

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

Hist 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. Hist 201 satisfies the general education requirement of Hist 304 for Social Science and History majors. 3 lectures. Prerequisite: Sophomore standing.

Hist 301 European Historiography (3)

Critical studies in historical sources and methods, with examples from the publications of recognized historians in several fields of European history. 3 lectures. Prerequisite: Junior standing.

Hist 302 American Historiography (3)

Critical studies in historical sources and methods, with examples from the publications of recognized historians in American history. 3 lectures. Prerequisite: Junior standing.

Hist 304 Growth of American Democracy (3)

The historic backgrounds of present-day economic, political, and social problems. Development of American institutions and ideals. Not open to students with credit in or enrolled in Hist 203. 3 lectures. Prerequisite: Pol Sc 301

Hist 305 The United States in World Affairs (3)

The origin, forms, and forces of international relations. Current problems of security since World War II. American ideals. Development of United States influence in world affairs. Finding and evaluating authoritative source material on world affairs. 3 lectures. Prerequisite: Pol Sc 301, Hist 304 or equivalent.

Hist 309 History of Latin America (3)

Significant developments in the history of Latin America since 1492. 3 lectures. Prerequisite: Junior standing.

Hist 311, 312, 313 British History (3) (3) (3)

History of Britain from pre-Roman times to the present. Emphasizes social, economic, political, and cultural history. 3 lectures.

Hist 331 Afro-American History (3)

Political and social history of Afro-Americans from the early 17th century to the present; emphasizes contributions to American cultural and political life. 3 lectures. Prerequisite: Junior standing.

Hist 351, 352, 353 Modern European History (3) (3) (3)

Growth of political institutions; development of national states; imperial rivalries; origins of World War I; peace settlements; totalitarianism; World War II; developments since 1945. 3 lectures. Prerequisite: Hist 101, 102, 103 or permission of the instructor.

History/Home Economics

Hist 381, 382 African History (3) (3)

Survey of African history from earliest times; ancient African civilizations, Moslem penetration, indigenous kingdoms, European colonialism, rise of African nationalism, development of independent Africa as illustrated by the history of selected countries. 3 lectures. Prerequisite: Junior standing.

Hist 401 Early American History to 1763 (3)

Age of exploration; European powers in eastern North America; English settlements; development of the English colonies, with emphasis on Virginia and Massachusetts; proprietary interests; growth of internal control, and colonial conflicts. 3 lectures. Prerequisite: Junior standing and Hist 201 or consent of instructor.

Hist 402 American Revolution and the New Nation (3)

Background of the Anglo-American imperial problem; the War for Independence and internal democratic upheaval of the era; establishment of the new nation, origins of the Constitution, the party system, American foreign policy, the national economy. 3 lectures. Prerequisite: Junior standing and Hist 201 or consent of instructor.

Hist 405 Rise of Industrial America (3)

Social history of industrial America. Increasing industrialization, urbanization, immigration and the impact of such changes upon established agrarian traditions of political and economic organization, education, religion, and other cultural manifestations. 3 lectures. Prerequisite: Hist 203 or 304

Hist 411, 412, 413 History of East Asia (3) (3) (3)

Social, political, economic, and intellectual developments in Japan, China, Korea, and Southeast Asia from earliest times to the present. 3 lectures. Prerequisite: Junior standing.

Hist 427. History of Russia (3)

Political, social, economic, cultural, and intellectual developments in Russia during the past century; from the emancipation of the serfs to the death of Stalin. Includes relations with the West. 3 lectures. Prerequisite: Junior standing.

Hist 460 Senior Project (2)

Selection and completion of a project under faculty supervision. Results presented in a formal report. Minimum of 60 hours time. Prerequisite: Hist 301 or 302

HOME ECONOMICS

HE 101 Orientation to Home Economics (1)

Explanation of educational requirements and programs in home economics. Adjustment to personal problems of freshmen. Required for all home economics freshmen fall quarter. 1 lecture.

HE 103 The Beginning Family (3)

Relationships and adjustments in family living with emphasis on the beginning stage of the family life cycle. For both men and women. 3 lectures.

HE 108 Child, Family, and Community (2)

Influence of family, society, and cultural forces on behavior of children. Role of parents, teachers, and professional workers on the healthy personality development of the child. Field trips and home visits required. 2 lectures.

HE 121 Introduction to Foods (5)

Formation and illustration of basic concepts of the scientific principles in food preparation. Supporting factors necessary for successful meal preparation. 3 lectures, 2 two-hour laboratories.

Home Economics

HE 131 Clothing Construction (5)

Present-day construction techniques emphasizing speed and efficiency as related to custom quality clothing procedures. 5 two-hour laboratories.

HE 203 Personal and Home Management (3)

Home management as it is affected by personal and family situations. Emphasis on role of values in management and the relationship of goals to values. For both men and women. 3 lectures. Prerequisite: Sophomore standing.

HE 210 Nutrition (3)

Nutritional needs throughout the life cycle. Chemical compositions of foods and their utilization in the body. 3 lectures. Men and women of sophomore standing or over.

HE 222 Family and Community Health (2)

Principles in individual, family, and community health related to psychology, physiology, sociology, and economics. 2 lectures. Prerequisite: Sophomore standing.

HE 225 Demonstration Techniques (2)

Instruction in the technique of demonstrations; planning and giving demonstrations for different groups; lecture-demonstrations by specialists from commercial field. 1 lecture, 1 two-hour laboratory. Prerequisite: Sophomore standing.

HE 226 Home Food Conservation (2)

Conservation techniques to obtain maximum control of food quality with most efficient use of time, energy, and economic resources. 1 lecture, 1 two-hour laboratory. Prerequisite: HE 121

HE 231 Household Equipment (3)

Efficient selection, use and maintenance of common types of household equipment. Simple repairs and adjustments. 2 lectures, 1 two-hour laboratory. Prerequisite: Sophomore standing.

HE 232 Child Development—Infancy (3)

Basic principles of development. Growth and development from conception through infancy. Characteristic behavior patterns of the young child in relation to environment. Field trips and observations required. 3 lectures. Prerequisite: Psy 202, HE 103

HE 233 Child Development—Preschool Years (3)

Development and behavior of the preschool child on the basis of current knowledge in child development. Intellectual, physical, emotional, social, and moral development of the preschool child. Controlled observations in the laboratory nursery school. 3 lectures. Prerequisite: Psy 202, HE 232

HE 241 Pattern Construction Analysis (3)

Pattern design analyzed through the basic techniques of fitting and use of flat pattern. 1 lecture, 2 laboratories.

HE 242 Interior Design (3)

Analysis of elements of interior design including consumer and socio-economic aspects. Individual creative laboratory experience in problems related to living space. 2 lectures, 1 two-hour laboratory.

HE 313 Parent Education (2)

Nature, extent, and significance of the parent education movements; home and school relationships; methods and resources; training professional lay leaders; local and state program; present trends and future developments. 2 lectures. Prerequisite: Junior standing.

HE 319 Nursery School Programming (2)

Application of principles of development to planning the nursery school program. Emphasis given to planning specific creative activities appropriate for the nursery school child. 2 lectures. Prerequisite: HE 233, junior standing.

HE 320 Nursery School Participation (3)

Experience in application of principles of development, maturation, and guidance of young children in a group situation. 1 lecture, 2 laboratories. Prerequisite: HE 233, 319, junior standing or above.

HE 321 Meal Management (3)

Planning, preparing, and serving family meals. Emphasis on nutritional, aesthetic, and economic aspects. 1 lecture, 2 two-hour laboratories. Prerequisite: HE 121, 210

HE 322 Textiles (3)

Physical and chemical characteristics of natural and synthetic fibers. Yarns, fabrics, and textile finishes. Application of theory to textile fabrics. Selection, use, and care. 2 lectures, 1 three-hour laboratory. Prerequisite: Chem 226

HE 323 Housing for Contemporaries (3)

Basic principles and functions of house selection, planning, and decoration as they relate to: expressions of personality, architectural design and setting, and socio-economic levels. 3 lectures. Prerequisite: HE 242, junior standing.

HE 326 Demonstration Techniques (2)

Development of effective means of communication by use of the demonstration technique, through presentations with evaluations. 1 lecture, 1 two-hour laboratory. Prerequisite: Sp 201, junior standing.

HE 328 Advanced Nutrition (3)

Nutrient requirements of man; factors affecting requirements. Evaluation of nutritional status. Topics in nutrition research. 2 lectures, 1 two-hour laboratory. Prerequisite: HE 210, Chem 226, Zoo 122

HE 332 Advanced Interior Design (2)

Individual creative experiences in problems of interior design. 2 laboratories. Prerequisite: HE 242

HE 333 Costume Design and Construction (3)

Fundamentals of designing by flat pattern and French draping. Designing for the individual and the fabric. Advanced construction and fitting techniques. 1 lecture, 2 laboratories. Prerequisite: HE 131, 322

HE 341 Dynamics of Clothing (3)

A critical evaluation of the various social-psychological aspects of clothing as they relate to the individual as a consumer, and as they relate to age of the individual. 3 lectures. Prerequisite: Junior standing.

HE 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.

HE 403 Supervised Nursery School and Community Experience (6)

Participation, teaching, and allied activities in a day care center, private nursery school, or cooperative nursery school under the supervision of a selected nursery school teacher or community action director. Consultation with college supervisors. Prerequisite: HE 313, consent of instructor.

Home Economics

HE 404 Administration of Child Development Programs (2)

Preparation for administering nursery school and day care centers. Minimum and recommended standards for housing, equipment, outdoor play space, teacher-child ratio, health supervision, meal planning, selection of personnel. Program planning and supervision. 2 lectures. Prerequisite: HE 319, 320

HE 405 Family Development (3)

Dynamics of family interaction at each stage of the life cycle. Emphasis on developmental tasks, socio-economic and cultural influences, and family differences. 3 lectures. Prerequisite: Senior standing.

HE 411 Methods and Materials for Homemaking Instruction (4)

Development of a timely philosophy in homemaking education. Classroom management, procedures, curriculum development, teaching aids and evaluating techniques for teaching homemaking in junior and senior high schools, including federally reimbursed programs. Field trips required. 4 lectures. Prerequisite: Ed 312, 401, 403

HE 412 Home Economics Student Teaching Seminar (3)

Practices and problems of student teaching in Home Economics, synthesizes professional study and experience to develop teaching competence. Taken concurrently with student teaching. 3 lectures.

HE 413 Adult Homemaking Education (2)

Curriculum materials, procedures, teaching aids and evaluative techniques for teaching adult homemaking. 2 lectures. Prerequisite: HE 411

HE 421 Meals for Special Occasions (2)

Cultural and aesthetic aspects of food. Distinctive foods as related to the cultural and economic studies of worldwide cuisine. 2 three-hour laboratories. Prerequisite: HE 121, 210, 321

HE 422 Advanced Textiles (3)

Advanced study of fiber structure and fabric properties as related to fabric performance. Laboratory testing of fibers and fabrics. 2 lectures, 1 three-hour laboratory. Prerequisite: HE 322

HE 423 Home Management Residence (3)

Application of managerial principles to specific situations while living in a family-type home. Individual and group conferences with instructor. Required for senior students working toward Standard Teaching Credential in Secondary Schools with emphasis in Home Economics. Prerequisite: Senior standing in Home Economics, consent of instructor.

HE 424 Home Management (3)

Philosophy of home management and factors involved in management of human and natural resources in the home; emphasis on the family as a unique economic unit in the changing American economy. 3 lectures. Prerequisite: HE 203, senior standing.

HE 425 Quantity Cookery (3)

Economic principles and problems involved in planning and preparing food using institutional equipment to meet specific product standards for large groups. 1 lecture, 2 laboratories. Prerequisite: HE 328 or consent of instructor.

HE 426 Food Production Management (3)

Principles of successful organization and management with their application to the effective operation of food service. Administrative responsibilities of the food service manager. Advance reservation with instructor required. 3 lectures. Prerequisite: HE 425 or consent of instructor.

Home Economics

HE 427 Equipment and Layout (3)

Selection, maintenance and arrangement of equipment and furnishings for food service departments with emphasis on materials, construction and specifications. Designated field trips required. 2 lectures, 1 laboratory. Prerequisite: HE 426 or consent of instructor.

HE 429 Diet Therapy (3)

Modification of normal food intake and dietary patterns, with emphasis on dietary adjustments necessitated by certain disease processes and conditions. 3 lectures. Prerequisite: HE 328

HE 433 Historic Costume (3)

Costumes of the past as related to contemporary fashions. Illustration and creation of original designs. 1 lecture, 2 two-hour laboratories. Prerequisite: HE 333

HE 442 Tailoring (2)

Selection and construction of garments requiring tailoring techniques. 2 laboratories. Prerequisite: HE 333 or consent of instructor.

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

Selection and completion of a project under faculty supervision, the project to be related to a probable field of employment. Results of the study are presented in a formal report. Minimum of 120 hours to be used in making the study. Prerequisite: All freshman, sophomore, and junior home economics courses must be completed.

HE 463 Undergraduate Seminar (2)

Study and discussion of current developments in the field of home economics. 2 lectures. Prerequisite: Senior standing.

HE 501 Management of Family Resources (3)

Principles, major problems and trends in the economics of the family. 3 lectures. Prerequisite: Graduate standing.

HE 523 Time Studies in Home Management (3)

Developing and selecting labor-saving methods and devices for the able-bodied and handicapped. Individual and group investigation. Survey of literature. Current trends and methods of research. 2 lectures, 1 two-hour laboratory. Prerequisite: Graduate standing.

HE 525 Experimental Studies in Textiles (4)

Review and reporting of pertinent studies in textile research. Testing of fabrics using equipment available. 3 lectures, 1 laboratory. Prerequisite: Graduate standing.

HE 528 Experimental Studies in Foods (4)

Experimental approach to the study of chemical and physical properties of interaction components of selected foods; correlated emphasis on selection, application, and evaluation of pertinent literature. 3 lectures, 1 laboratory. Prerequisite: Graduate standing.

HE 532 Problems and Trends in Home Decoration (3)

Individual problems in decoration, relating trends in textiles and architecture to economic and sociological needs of the family. 2 lectures, 1 two-hour laboratory. Prerequisite: Graduate standing or consent of instructor.

HE 533 The Child in Contemporary Culture (4)

Development of children in the home and family in relation to contemporary society. Emphasis upon research findings. Responsibility in the Child Care Laboratory and selected field experiences. 2 lectures, 2 laboratories. Prerequisite: HE 233 or consent of instructor.

Industrial Engineering

HE 580 Graduate Seminar (3)

General trends in enrollment, curriculum and guidance supervision, administration. Special study of role of home economist in occupational training. 3 lectures. Prerequisite: Graduate standing or consent of instructor.

HE 599 Thesis (3) (3) (3)

Individual research under the general supervision of the staff, leading to a graduate thesis of suitable quality. Prerequisite: Graduate standing.

HE 621 (A-Z) Workshop (Various titles as required) (1½)

Special workshops organized either on the initiative of the college or at the request of special groups. Normally offered during the summer. Credit granted at the rate of 1½ units per week.

INDUSTRIAL ENGINEERING

IE 101 Introduction to Industrial Engineering (2)

Historical development of the industrial economy and the profession of industrial engineering. Basic concepts and principles of industrial organization and management. The dynamics of the industrial enterprise and the functional activities associated with industrial engineering. 2 lectures.

IE 122 Engineering Analysis (2)

Introduction and application of the basic concepts of the experimentalist in structuring engineering studies. Solutions to engineering systems problems utilizing data collection, analysis, evaluation, and reporting. 1 lecture, 1 laboratory.

IE 123 Systems Analysis (3)

Introduction to systems-design. Fact gathering and analytical tools in formulating optimum work systems. 2 lectures, 1 laboratory. Prerequisite: IE 101

IE 141 Manufacturing Processes (1)

Principles, practices and theory of metal casting, sand and shell molding; precision investment casting; die casting; plastic forming and molding. Basic fundamentals and theory of pattern making and hot forming by forging methods. 1 laboratory.

IE 202 Motion and Time Study (3)

Principles, tools, and techniques for methods improvement and the setting of time standards. Motion and time study as used by management for planning and control. A study of methods for systems analysis. 3 lectures. For Non-IE Students. Prerequisite: Junior Standing.

IE 204 Industrial Safety (2)

History of industrial safety; fire prevention; personal protective equipment; health hazards; machinery safeguards; electrical hazards; plant inspection; accident insurance. 2 lectures.

IE 232 Metrology (2)

Fundamental theory of dimensional metrology including inspection tools, standards, techniques, and application for physical measurements in industry. Design and application of direct-measuring tools, optical, pneumatic and electronic comparators, gages, and optical flats. 1 lecture, 1 laboratory. Prerequisite: Sophomore standing, or consent of instructor.

IE 233 Elements of Numerical Control Machining (2)

Theory, principles, and concepts of numerical control of machine tools. Principles and application techniques of various control media. Orientation in concepts of continuous path and point-to-point systems. Part programming including control tape preparation for numerical control drilling. 1 lecture, 1 laboratory. Prerequisite: ET 153, MP 142

IE 236 Work Methods and Measurement (2)

Motion and time study as a management tool. Principles of motion economy; work simplification; micromotion analysis; theory and practice of time study, performance rating, and allowances; standard data. 1 lecture, 1 laboratory. Prerequisite: IE 252

IE 239 Industrial Costs and Controls (3)

Estimation and use of production costs, budgetary procedures and controls. Concepts and techniques employed in product costing. Application to practical manufacturing situations. 2 lectures, 1 laboratory. Prerequisite: Actg 132. Concurrent: IE 236

IE 240 Additional Engineering Laboratory (1-2)

Total credit limited to 4 units, with not more than 2 units in any one quarter. 1 or 2 laboratories.

IE 251, 252 Manufacturing Engineering Laboratory (3) (3)

Engineering studies encompassing theory, principles and application concepts of manufacturing engineering in industrial enterprises. Projects in manufacturing process areas include experimental and design studies in metal casting, metal forming and cutting, metrology, and finishing processes. 1 lecture, 2 laboratories. Prerequisite: MP 142, IE 141, ET 153

IE 304 Control Analysis (2)

Qualitative aspects and preliminary study of the quantitative features of the control of production operations. Forecasting, simple inventory, and economic lot size determinations. Adapting the production plans to manufacturing schedules. Use of linear programming in scheduling and distribution operations. 2 lectures. Prerequisite: IE 252.

IE 305 Operations Research (2)

Quantitative approaches to basic production operations. Distribution, queuing, sequencing, scheduling, complex inventories, and scheduling problems. Practical applications of quantitative techniques. 2 lectures. Prerequisite: IE 304

IE 314 Production Control (2)

Production control in the industrial complex. Basic functions of routing, scheduling, dispatching, and expediting. Studies in forecasting, estimating, and inventory control using linear programming and critical path method techniques. For non-IE students. 2 lectures. Prerequisite: Junior standing or consent of instructor.

IE 333 Computer Analysis (2)

Application of digital computer in solution of production problems. Formulation, programming, and solution of quantitative problems in inventory, waiting lines, scheduling, dispatching, and sequencing. Use of Fortran and/or Intercom 1000. 1 lecture, 1 laboratory. Prerequisite: Engr 250, IE 305

IE 336 Statistical Quality Control (3)

Theory and practice of statistical quality control as applied to industrial situations; control charts, acceptance sampling. 2 lectures, 1 laboratory. Prerequisite: Stat 321

IE 341, 342 Manufacturing Design (2)(2)

Development of manufacturing data for process design and plant layout. Theory, principles, and techniques for research and product development involving detail design, prototype production, production drawings, process charts. Planning for the product, equipment, and facilities. 2 laboratories. Prerequisite: IE 236

IE 351 Production and Process Planning (2)

Analysis and planning of the layout of industrial plants. Simplification and standardization in product design and cost analysis. Process and systems analysis including flow process layout, materials handling, and automation. Continuous (process) or intermittent (job lot) production laboratory projects. For non-IE students. 2 laboratories. Prerequisite: Junior standing or consent of instructor.

Industrial Engineering

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 401 Sales Engineering (2)

Concepts and principles of engineering in sales. Role of the professional engineer in the analysis, design, development, production, and final application of a product or system required by the buyer. 2 lectures. Prerequisite: Senior standing in Engineering.

IE 411, 412 Organization for Manufacturing (2) (2)

Principles and techniques of administration and organization of the activities of an industrial enterprise. Planning, organization, staffing, direction and control functions in activities of: facilities, manufacturing processes, plant location, job evaluation and wage incentives, inventory control, production control, procurement, and sales. 2 lectures. Prerequisite: For non-IE students of Senior or advanced Junior standing or consent of instructor.

IE 413 Management for Engineers (2)

Principles of management involved in the administration of the organizational functions of an industrial enterprise. The principles will be concerned with the basic fundamentals of management, including development of management concepts and techniques involved in the various aspects of administrative action. For non-IE students. 2 lectures. Prerequisite: Senior standing in Engineering.

IE 414 Engineering Economy (3)

Categories of engineering decisions. Interest rates in the industrial complex. Basic principles and tools of analysis. Application to industrial engineering through the use of case studies. 3 lectures. Prerequisite: Senior standing in Industrial Engineering.

IE 415 Project Economy (3)

Use of analytic methods such as replacement models and program evaluation review techniques (PERT) to achieve optimum utilization of resources in engineering projects. For non-IE students. 3 lectures. Prerequisite: Senior standing.

IE 416 Value Engineering (3)

Analysis of design, material, and process to obtain desirable functional performance at minimum cost. Application to manufacturing products, systems, and services. 2 lectures, 1 activity. Prerequisite: IE 342 or consent of instructor.

IE 421 Manufacturing Management (3)

Sub-systems in the manufacturing enterprise designed, organized, and administered by the industrial engineer. Analysis of compensation systems and job evaluation as a means of establishing fair and equitable wage structures. 2 lectures, 1 laboratory. Prerequisite: IE 342

IE 422 Manufacturing Management (3)

Integration of concepts of organization and management with sub-systems utilized in each segment of the manufacturing enterprise. 3 lectures. Prerequisite: Senior standing.

IR 425 Industrial Procurement (2)

Concepts and principles of engineering in procurement. Role of the professional engineer in screening, evaluation, and selection of products or systems in industry. 2 lectures. Prerequisite: Senior standing.

Industrial Relations

IE 428 Predetermined Time Standards (2)

Study of common techniques which have various levels of precision. Concentration on methods-time measurement. Includes application in laboratory to assembly operations. Orientation in work factor system. 1 lecture, 1 laboratory. Prerequisite: IE 236

IE 429 Materials Handling (2)

Conceptual studies in effective movement of materials, including economic aspects of design of plant facilities. Transportation in-plant and to the consumer. 1 lecture, 1 laboratory. Prerequisite: Senior standing.

IE 435 Human Factors Engineering (2)

Psychological and biological factors and physical analogies. Human reactions and capabilities related to specific tasks and systems. 1 lecture, 1 laboratory. Prerequisite: Stat 321, senior standing, or consent of instructor.

IE 436 Advanced Operations Research (2)

A continuation of IE 305 including more advanced methods. Application studies utilizing computer laboratory. 1 lecture, 1 laboratory. Prerequisite: IE 305, 333

IE 441, 442 Fundamentals of Supervision (2) (1)

Theory and principles of supervision. Application of fundamental concepts and techniques of supervision provided by assignment in manufacturing laboratories. 2 laboratories, 1 laboratory. Prerequisite: IE 236

IE 451 Advanced Industrial Engineering Laboratory (2)

Theory, concepts, and applications in manufacturing planning and research. Verification and/or validation of manufacturing processes theories. 2 laboratories. Prerequisite: IE 252

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 of total time.

IE 463 Undergraduate Seminar (2)

Preparation, oral presentation, and discussion by students of technical papers on recent engineering developments and/or subject matter pertinent to industrial engineering. 2 lectures. Prerequisite: Senior standing in IE

INDUSTRIAL RELATIONS

IR 118 Human Relations (3)

Selected concepts in human relations, their integration and application to managerial environment and functional fields of business administration. 3 lectures.

IR 211 The Labor Movement in the United States (3)

Labor movement theories, American trade-union development, union management, labor and economic political power, variations in labor movements. 3 lectures.

IR 214 Industrial Relations (3)

The industrial relations function and its relationships within the business and industrial environment. Employment, training, wage and salary, and labor relations. 3 lectures.

IR 315 Personnel Administration (3)

Organization and manpower planning, recruitment, selection and placement of employees. Employee education and development. Interviewing, testing, reference checking, performance appraisal, and development techniques. 3 lectures. Prerequisite: IR 214

Industrial Technology

IR 316 Labor Contract Administration (3)

Designed to equip representatives of labor, management, and government agencies to cope with problems involving contracts between unions and companies. 3 lectures.

IR 319 Wage and Salary Administration (3)

Functions of management that involve planning, developing, directing, and controlling all phases of employee compensation. Areas included are: job evaluation, employee evaluation, job standardization and work measurement, incentive wages and managerial compensation. 3 lectures.

IR 410 Supplemental Employee Benefits (3)

Supplemental benefit programs for employees. Effect on payroll and other costs, contract negotiations, employee relations. Pensions, hospitalization, insurance, supplemental unemployment benefits, job security, vesting rights, bonuses, severance pay, profit sharing plans. 3 lectures. Prerequisite: IR 214

IR 412 Collective Bargaining (3)

Collective bargaining and the relationship between management and labor. The bargaining unit, recognition, the labor agreement, strikes, picketing, boycotts, unfair labor practices, and mediation and arbitration. 3 lectures.

IR 413 Labor Law (3)

Federal and state labor laws and their effects upon labor and management. 3 lectures. Prerequisite: Bus 301 or 307

IR 415 Business and Human Relations (3)

Individual and group practice emphasizing the aims of management training in the behavioral sciences to achieve greater individual job effectiveness, improve interpersonal relationships in the organization, and enhance individual adjustment to the context of his total environment. 3 lectures. Prerequisite: IR 118 and senior standing or consent of instructor.

INDUSTRIAL TECHNOLOGY

IT 101 Technical Computation (2)

A study of the techniques used in the analysis and solution of typical technical problems. Emphasis on the need for orderly work, checking procedures, handling and presenting scientific data; purpose and presentation of technical reports. 2 lectures.

IT 111 Introduction to Industrial Technology (2)

Orientation to the objectives of the Industrial Technology Department. Investigation of employment opportunities. Development of techniques useful to the student in his study. 2 lectures.

IT 122 Power Technology: Sources (2)

Analysis of power sources: natural, steam, internal combustion, continuous combustion, nuclear energy, fuels and lubricants. 1 lecture, 1 laboratory. Prerequisite: Phys 123

IT 123 Power Technology: Transmission (2)

Transmission of power: clutches, gear trains, wrapped connectors, hydraulics, universal joints, bearings, lubricants. 1 lecture, 1 laboratory. Prerequisite: Phys 123

IT 125 Industrial Wood Processes (2)

Analysis of basic woodworking equipment, processes and materials currently used in lumbering, mill-cabinet, general construction and related industries. Theory and practice in the use of woodworking equipment. 1 lecture, 1 laboratory.

Industrial Technology

IT 131 Electronics, D.C. (3)

Theory and application of basic A-C and D-C circuits. Magnetic circuits. Principles of motors and generators; lighting; instruments. 2 lectures, 1 laboratory.

IT 132 Electronics, A.C. (3)

Controls and control circuits, A-C circuits. Advanced instrument application. Transformers. Lighting and signal systems. 2 lectures, 1 laboratory. Prerequisite: IT 131

IT 133 Industrial Electronic Circuits (3)

Electronic components and circuitry. Vacuum tubes and transistors. Amplifiers. Radio and television. Oscilloscopes. 2 lectures, 1 laboratory. Prerequisite: IT 101, 132

IT 233 Metal Technology (3)

Theory and practice in care and use of hand and machine tools. Applications of welding, forging, foundry, sheet metal, ornamental metal, machine shop and bench metal processes to the fabrication of industrial products. 3 activities. Prerequisite: MP 141, 142; WM 141, 142; EnvE 141; IE 141

IT 236 Wood Technology (3)

Advanced theory and practice in the use of hand and machine tools. Production processes, wood sources, classification and finishes. 3 activities. Prerequisite: IT 125

IT 241 Introduction to Manufacturing Technology (2)

Current and new basic industrial materials, processes and applications. Manufacturing in electronics, metals and machine tools, mass production processes, graphic arts, power technology, plastics, wood technology, innovations in drafting. Primarily for non-Industrial Technology majors. 2 activities.

IT 245 Technical Sketching (2)

Freehand sketching of industrial products using perspective, isometric oblique and orthographic projection. Shading. Basic design. 2 activities. Prerequisite: ET 151

IT 321 Mechanical Systems (3)

Case study of engineering fundamentals from an application point of view. Strength of materials, thermodynamics, fluid mechanics, heat transfer and kinematics. 2 lectures, 1 laboratory. Prerequisite: Math 131, Phys 122, IT 123

IT 322 Mechanical Systems (3)

Case study of various component systems from an application point of view. Steam systems, air conditioning and refrigeration systems, pneumatic and hydraulic systems, servomechanisms, piping systems. 2 lectures, 1 laboratory. Prerequisite: IT 321

IT 323 Mechanical Systems (3)

Case study of industrial manufacturing processes from an operational and service engineering viewpoint. Materials handling techniques. Production equipment and systems. 2 lectures, 1 laboratory. Prerequisite: Junior standing.

IT 324 Modern Industrial Finishes (2)

Characteristics and applications of finishes to modern industrial products. Brushing, dipping, spraying, baking, plating, etching. 2 laboratories.

IT 325 Home Mechanics (2)

Selection, care and application of common tools and processes to repair and maintain household appliances and furnishings. 1 lecture, 1 laboratory. Designed for home economics students, open to others as an elective.

Industrial Technology

IT 326 Product Evaluation (2)

Procedures in the gathering, preliminary analysis and practical application of quality and reliability field data by industrial sales and service personnel. Principles of value engineering and production quality control techniques in relation to customer needs. 2 activities. Prerequisite: Junior standing.

IT 327 Plastics Technology (2)

Technical processes, materials, tools and equipment used in plastics manufacturing. Foam, expandable bead and liquid casting, injection molding, thermo-forming, dip-coating, laminating and plastic welding processes. Basic operations in plastic pattern-making, cutting, fabricating, and finishing. 1 lecture, 1 laboratory. Prerequisite: IT 125, MP 141, 142, Chem 122

IT 330 Principles and Practices of Industrial Arts (5)

Techniques and procedures for teaching industrial arts; observations in neighboring schools; survey of methods applicable to teaching drafting, crafts, wood, metal, electricity-electronics, graphic arts, power mechanics and general shop; shop organization; evaluation; preparation for practice teaching. 5 activities. Prerequisite: Junior standing.

IT 331 Electronic Power Systems (3)

Advanced study of electrical applications. Power generation and distribution. Applications of motors, motive power, electrical installations. 2 lectures, 1 laboratory. Prerequisite: IT 132, Math 131

IT 332 Electronic Control Systems (3)

Automated control devices from an operational and service engineering viewpoint. 2 lectures, 1 laboratory. Prerequisite: Phys 123, IT 133, 331

IT 333 Electronic Computer Applications (3)

Fundamentals of analog computers, electronic data processing machines, and numerical control of machine tools. Applications in production supervision, sales, and industrial education. 2 lectures, 1 laboratory. Prerequisite: IT 133, or consent of instructor.

IT 336 Automotive Technology, Engines (3)

Engine overhaul and maintenance, theory and construction. Practical activities with various types of engines, including automotive, marine, and low horsepower power plants. 1 lecture, 2 laboratories. Prerequisite: IT 122

IT 339 Automotive Technology, Fuel Systems (2)

Fuel systems and fuels used in internal combustion engines. Carburetors, injectors, superchargers, manifolds, pumps, and storage tanks. Types of fuels and their compounding. 1 lecture, 1 laboratory. Prerequisite: IT 122

IT 343 General Metals (2)

Applications of the various metal fabrication processes to typical construction problems. Design and construction of instructional aids suitable for the secondary school industrial arts program. 2 laboratories. Prerequisite: IT 233

IT 344 Technical Drawing (2)

Application of current drafting procedures in preparing complete graphic descriptions of industrial components. Sketching, lettering, instrument drawing, reproduction processes. Preparation of work drawings and specifications. Analysis of drafting materials, equipment and processes. 2 activities. Prerequisite: IT 245

IT 346 Industrial Design (2)

Applications of design principles to the various materials and processes of industry; development of a creative, problem-solving approach to design as it applies to industry. 2 laboratories. Prerequisite: IT 245

IT 352 Additional Laboratory Problems (1-2)

Advanced instruction in the construction, repair, maintenance and use of laboratory equipment. Primarily for students intending to become industrial education teachers. Total credit limited to 4 units with not more than 2 units any one quarter. 1 or 2 laboratories. Prerequisite: Consent of instructor.

IT 354 Machine Wood Technology (3)

Advanced applications of the principles of safe and efficient use and maintenance of power wood working machinery. 3 laboratories. Prerequisite: IT 123, 236

IT 355 Furniture Design and Construction (3)

Application of design principles; selection of suitable wood and finish; application of modern production processes. 3 laboratories. Prerequisite: IT 236

IT 356 Building Construction Techniques (3)

Examination of modern materials and construction methods as applied to home building; mass-production, custom-building and prefabrication. Field study of representative projects; laboratory experience in framing and basic processes. 3 laboratories. Prerequisite: IT 236

IT 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.

IT 404 Customer Relations (2)

Customer contacts; personal relationships, ethics, legal relationships, service contracts, communication channels. 2 lectures. Prerequisite: Mktg 204. Senior standing or consent of instructor.

IT 405 Industrial Marketing (2)

Investigation of the institutions and channels involved in industrial marketing. Analysis of industrial products, competitors, and consumers. Problems in marketing research, personnel, and management. Individual reports on industrial products, companies or training programs. 2 lectures. Prerequisite: Mktg 204. Senior standing or consent of instructor.

IT 415 Industrial Equipment Selection (3)

Systems approach to electrical and mechanical equipment used in modern industrial plants, including costs and sources. 3 lectures. Prerequisite: IT 322, 332

IT 422, 423 Construction Equipment (2) (2)

Analysis of major types of construction equipment from a practical marketing viewpoint. Contract specifications, estimating, basic processes utilizing construction equipment, selection of appropriate equipment and equipment operation and maintenance. 1 lecture, 1 laboratory. Prerequisite: IT 122, 123, 131

IT 426 Automotive Technology, Chassis (3)

Fundamental, technical, and teaching aspects of automotive suspension systems, steering, braking, and other control systems. Tires and lubrication. 3 activities. Prerequisite: IT 123

IT 427 Automotive Technology, Electronics (3)

Applications of electronic and electrical systems in automotive type equipment including ignition, lighting, starting, charging, auxiliary systems, and control systems. 2 lectures, 1 laboratory. Prerequisite: IT 122, 133

IT 428 Automotive Technology, Power Trains (3)

Advanced applications of clutches, gears, hydraulics, pneumatics, and wrapped connectors. Universal joints, bearings, and lubricants in automotive type equipment. 1 lecture, 2 laboratories. Prerequisite: IT 123

Journalism

IT 429 Modern Industrial Materials (2)

An investigation of the characteristics, applications and limitations of materials of industry including: plastics, glass, ceramics, rubber, leather, textiles, abrasives and adhesives. 1 lecture, 1 laboratory. Prerequisite: Senior standing.

IT 441 Metal Production Processes (2)

Study of mass-production techniques; design, production planning, tolerances, jigs and fixtures, interchangeable parts, assembly line. Design and construction of projects suitable for industrial arts metal courses. 2 laboratories. Prerequisite: IT 323, 343, Phys 123

IT 446 Wood Production Processes (2)

Study of mass-production techniques; design, production planning, jigs and fixtures, interchangeable parts, assembly line. Design and construction of projects suitable for industrial arts wood courses. 2 laboratories. Prerequisite: IT 236, 323

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

Selection and completion of a project under faculty supervision. Projects results are presented in a formal report. Minimum 120 hours total time.

IT 463 Undergraduate Seminar (2)

Preparation, oral presentation and discussion by students of papers on related professional topics. 2 lectures.

IT 521 Curriculum in Industrial Education (3)

Basic principles and practices in the preparation of course guides, courses of instruction and related materials for industrial instruction. 3 lectures. Prerequisite: Student teaching or teaching experience in public schools or industry.

IT 522 Facility Planning in Industrial Education (2)

Analysis of major factors in planning and designing industrial education laboratories and related areas. Includes State standards, equipment specifications, and presentation displays. 2 activities. Prerequisite: Student teaching or instructor approval.

JOURNALISM

Jour 118 Introduction to Journalism (2)

Explores career opportunities in journalism, examines specialized communications problems, introduces organizations and methods of campus communication media offering opportunities for applied training, familiarizes student with campus community. 2 lectures.

Jour 201 Journalism History (3)

Survey of historical and current influences in the development of today's journalism media. 3 lectures.

Jour 202 News Writing (3)

Study of principles used in the reporting of news events for the press. Study and practice in writing various types of news stories, including interviews and speeches. Ethical and legal problems in gathering and reporting news. Some attention to news features. 3 lectures. Prerequisite: Typing proficiency and Eng 106

Jour 203 Reporting I (3)

Daily coverage of actual news events related to the campus community with emphasis on in-depth and investigative reporting. Special techniques and problems of reporting further explored with some off-campus assignments. 1 lecture, 2 two-hour laboratories. Prerequisite: Typing proficiency and Jour 202

Jour 221 Basic Photography (3)

For those who have had limited experience in photography. Picture-taking techniques and darkroom practices. 2 lectures, 1 laboratory.

Jour 222 Advanced Photography (3)

Print and negative control, lighting, color photography, slide making, photo sequence, and picture story. Fundamentals in movie camera technique. 2 lectures, 1 laboratory. Prerequisite: Jour 221 or consent of instructor.

Jour 223 Photojournalism (3)

Advanced techniques in developing photographic story and essay for newspapers and magazines; fundamentals in advertising, fashion, industrial photography; further study into color and movie photography. 2 lectures. 1 laboratory. Prerequisite: Jour 222

Jour 233 Editing and Copy Desk (3)

Copy desk work, head writing, page makeup, special rewrite and editing problems, handling of correspondents, etc. 1 lecture, 2 two-hour laboratories. Prerequisite: Jour 202

Jour 251 Journalism Practice—Reporting and Editing (2)

Credit arranged for students holding editorial or other positions on college publications or securing other similar supervised experience. 2 laboratories. Prerequisite: Journalism major or instructor's permission. Total credit limited to 8 units.

Jour 254 Journalism Practice—Photography (2)

Credit arranged for students holding editorial or other positions on college publications or securing other similar supervised experience. 2 laboratories. Prerequisite: Jour 222 or equivalent experience. Total credit limited to 6 units.

Jour 302 Feature Writing (3)

Feature writing techniques. Study of markets for nonfiction articles; practice in gathering material and preparation of articles for technical and trade journals, and other media. 3 lectures. Prerequisite: Consent of instructor.

Jour 303 Illustrated Features (3)

Emphasis on market research and preparation of illustrated articles for publication. Close attention to techniques of combining photographs and text in article preparation and marketing. 3 lectures. Prerequisite: Jour 302

Jour 304 Reporting II (3)

Additional experience on advanced level in campus community news coverage with special attention to public affairs reporting. Special assignment for off-campus news media. 1 lecture, 2 two-hour laboratories. Prerequisite: Jour 203

Jour 333 Broadcast Media News I (3)

Radio and television news programming, fundamentals of writing and editing for radio and television. Community interviews. Copy preparation. Commercial tie-ins. 1 lecture, 1 laboratory, and assigned field work. Prerequisite: Sp 201

Jour 334 Advanced Copy Editing (3)

Daily experience and responsibilities in editing and rewriting news and feature stories, and editorial writing for campus news media. Practical application of headline writing and page makeup principles. 1 lecture, 2 two-hour laboratories. Prerequisite: Jour 202, 233

Journalism

Jour 351 Journalism Practice—Advertising (2)

Credit arranged for students holding advertising or other positions on college publications or securing other similar supervised experience. 2 laboratories. Total credit limited to 6 units.

Jour 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: Permission of department head.

Jour 401 International Press (3)

Global communications facilities and operations; world transmission of information; survey of world wire services and international print and broadcast news media. Analysis of press operations under varying government ideologies. 3 lectures. Prerequisite: Pol Sc 301, Hist 304, Hist 305, Geog 308, or consent of instructor.

Jour 402 Press Laws (3)

State and federal laws affecting all communications media, hazards of libel and what defenses are recognized; contempt of court, right of privacy; study of postal regulations, regulations in advertising, broadcasting, photography, and business regulatory statutes; ethics and responsibility of the press and broadcast media. 3 lectures.

Jour 403 Newspaper and Magazine Management (3)

Management problems and procedures of newspapers and magazines including case studies in advertising, business, circulation, editorial, and production operations. 3 lectures. Prerequisite: Jour 421, 425

Jour 405 Publicity Methods (3)

Study and application of publicity planning and methods used by business firms, associations and similar groups. 2 lectures, 1 two-hour laboratory. Prerequisite: Jour 302

Jour 412 Public Relations (3)

Methods employed in dissemination of public information by business, agricultural, industrial, educational, and government organizations. Survey of media used, techniques commonly employed, formation and measurement of public opinion. 3 lectures.

Jour 413 Media and Public Opinion (3)

The role of public opinion and propaganda in mass media communication; evaluation of newspapers, periodicals and broadcast media as factors in formation of public opinion and propaganda; media responsibilities in contemporary society. 3 lectures. Prerequisite: Jour 412

Jour 421 Newspaper and Magazine Advertising (3)

Advertising psychology, advertising salesmanship, copy, layout, and production. Required for majors; recommended for students from other departments needing to know how to advertise and merchandise their own or others' products or services. 2 lectures, 1 laboratory. Prerequisite: Jour 233 or consent of instructor.

Jour 425 Advertising Layout and Copywriting (2)

Study of advertising typography and illustration, application of production processes in making of layouts and writing of copy. Emphasis on local newspaper and trade magazine advertising. 1 lecture, 1 two-hour laboratory. Prerequisite: Jour 421

Jour 427 Magazine Production (3)

Organization, editing and production of magazines, with special emphasis on trade, association and company publications. 2 lectures, 1 two-hour laboratory. Prerequisite: Jour 302

Jour 432 Broadcast Media News II (3)

Survey of radio and television research methods, listenership studies, national networks, local chains, independents, production and transcription services, contracts, writing of commercials, spot announcements. 2 lectures, 1 two-hour laboratory. Prerequisite: Jour 421

Jour 451, 452, 453 Applied Journalism Techniques (2) (2) (2)

Application of advanced journalism techniques in reporting, editing, public relations, photojournalism, advertising, combined with supervisory responsibilities for campus news media. 2 laboratories. Prerequisite: Senior status in Journalism.

Jour 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.

Jour 463 Undergraduate Seminar (2)

Discussion of major political, economic, and social developments that have public interest and significance to the journalist. Ethics of the press, its importance and responsibilities. Correlation of the various phases of journalism and relation of these to other fields. 2 lectures.

Jour 502 Supervision of School Publications (3)

Study of types of school publications with emphasis on student publications including the newspaper and yearbook; methods for organizing and supervising staff; production; integrating publication into the public relations picture; financing. 1 lecture, 2 laboratories. Prerequisite: Consent of instructor.

MANAGEMENT

Mgt 201 Principles of Management (3)

The management process involving organization, decision-making, and managerial activities fundamental to all management levels and functional areas. Application to business firms, governmental agencies, hospitals, benevolent groups, and colleges. 3 lectures.

Mgt 311 Industrial Management (3)

Organization and functioning of management in industry. Planning, direction, and control of the business enterprise in terms of policy formation, organizational structure, finance, sales, procurement, plant location, facilities and production processes. 3 lectures. Prerequisite: Junior standing.

Mgt 413 Business Policies (3)

Internal and external problems of management at lower, middle, and upper levels. Analysis and decisions in setting policies for organization and operations to reach business objectives. Uses of capital, sources of capital, protection of capital and distribution of earnings. 3 lectures. Prerequisite: FPM 343

Mgt 414 Business Organization (3)

Fundamentals of management and the application of policies to organization and business operation. Emphasis on management's responsibility and methods in analyzing, coordinating, motivating, and controlling all activities of the business organization to attain objectives. 3 lectures. Prerequisite: Bus 413

Mgt 417 Management Coordination (3)

An overview of the operations of an industrial organization; the inter-relationship of functions, and the fundamental principles of management that lead toward effective coordination and control. 3 lectures. Prerequisite: Senior standing or consent of instructor.

Manufacturing

Mgt 418 Quantitative Methods and Controls in Business (3)

Basic principles of quantitative controls as applied to the fundamental operations of business. For the senior student who needs descriptive and operational knowledge as a background for application in business analysis and decision. 3 lectures. Prerequisite: Senior standing or consent of instructor.

Mgt 419 Management, Unions, and the Public (3)

Relationships among the areas of management, labor and unions, and the public. For the senior student who desires an intensive course in the management-labor area of industrial and business activity. 3 lectures. Prerequisite: Senior standing or consent of instructor.

MANUFACTURING PROCESSES

MP 127 Manufacturing Processes Fundamentals (2)

Survey of materials and manufacturing processes. Possibilities and limitations of these processes. Application to fabrication of industrial products. Limited experience in conventional machine tool operation and use of semiprecision measuring tools. For non-engineering majors. 1 lecture, 1 laboratory.

MP 137 Introduction to Skills (2)

Technical vocabulary, English measuring system, blueprint reading, American industrial practice, classification of industrial skills. Introduction to modern American industrial processes including machining, welding, casting, and sheet metal working. Designed for international students. 1 lecture, 1 laboratory.

MP 141 Manufacturing Processes: Turning I (1)

Uses, capabilities, and operational characteristics of lathe type machine tools. Properties and classifications of tool and work materials. Tool geometry and its relationship to the mechanics of chip formation. External and internal turning problems. Linear measurements in quality control. 1 laboratory.

MP 142 Manufacturing Processes: Milling I (1)

Uses, capabilities, and operational characteristics of milling type machine tools. Plane surfacing problems, measurement of relative angular attitudes. Standard classification of tool types. Tool geometry of the rotational tool and its effect on the physics of metal cutting. Surface measurements in quality control. 1 laboratory.

MP 151 Drilling Technology (1)

Fundamentals of drilling machine operation, tool classification, selection and sharpening, use of hand tools, basic layout procedures. Physical properties of metals. For non-Engineering majors. 1 laboratory.

MP 152 Manufacturing Processes: Drilling (1)

Programming of numerically controlled two-axis drilling type machine tools. Fundamentals of tape controlled machine tools. EIA tape standard codes. Standard classification of drilling type cutting tools. Related drilling problems bearing on tool and work material characteristics. 1 laboratory.

MP 153 Manufacturing Processes: Turning II (1)

Advanced problems of lathe type machine tools, both manually and automatically controlled. Evaluation of cutting tool performance and material machinability by use of the strain gage tool dynamometer. American Standard Association charts, data, and material classifications. Optical instrumentation for quality control. 1 laboratory. Prerequisite: MP 141

MP 154 Manufacturing Processes: Milling II (1)

Advanced problems of milling type machine tools, both manually and automatically controlled. Production fixturing and tool standards. Thermal characteristics of cutting fluids. Measuring and controlling stresses induced in the work material. Power/load calculations, prediction of results. Measurement of linear and angular dimensions to precise standards. 1 laboratory. Prerequisite: MP 142

MP 155 Manufacturing Processes: Grinding (1)

Survey of abrasive machining and finishing. Selection and care of grinding wheels. Fundamental principles, use, capabilities, operational characteristics and safety standards employed in abrasive machining and finishing. 1 laboratory. Prerequisite: MP 153, 154

MP 240 Additional Engineering Laboratory (1-2)

Advanced production and toolroom problems. Design and construction of laboratory tooling and instrumentation. Individual and group investigation of selected problems. Total credit limited to 4 units. 1 or 2 laboratories. Prerequisite: MP 153, 154. Concurrent MP 155

MP 331, 332, 333 Tool Engineering (3) (3) (3)

Advanced tooling and production problems. Correlation of product design with production tooling. Supervision of special tool and fixture construction. Field trips to manufacturing centers. 1 lecture, 2 laboratories. Prerequisite: MP 155

MP 421, 422, 423 Tool Design (3) (3) (3)

Design of manufacturing tools such as jigs, fixtures, and dies. Material selection, tolerance balancing, and quality control requirements as design factors. Field trips to manufacturing centers. 2 lectures, 1 laboratory. Prerequisite: IE 141, EnvE 141, WM 155, ET 344, 221

MP 427 Tool Design (3)

Design of such special tools as jigs, fixtures, and punch press tools. Material selection. Field trip to manufacturing center. 2 lectures, 1 laboratory. Prerequisite: MP 155

MP 435, 436 Tool and Manufacturing Engineering (4) (4)

Design, construction, and testing of jigs, fixtures, dies, and special tools for production. Field trips to manufacturing centers. 1 lecture, 3 laboratories. Prerequisite: MP 331 or 427

MARKETING

Mktg 204 Marketing Principles (4)

Survey of basic marketing institutions and functions they perform in the marketing process. Includes marketing in the business firm and in the political-economic society. Defines industrial and consumer markets, marketing research, physical distribution, promotion and advertising, buying and selling. 4 lectures. Prerequisite: Ec 201 or 211 and sophomore standing.

Mktg 301 Market-Sales Development (3)

Definition and determination of markets. Matching products and services with market demand. Analysis of products, markets, and pricing. 3 lectures. Prerequisite: Mktg 204

Mktg 304 Physical Distribution (3)

Physical movement of goods from producers to ultimate consumers. Channels of distribution to industrial and consumer markets, packaging and packing, warehousing and storage, material handling, transportation, wholesaling and retailing. 3 lectures. Prerequisite: Mktg 301 or consent of instructor.

Mktg 305 Promotion and Advertising (3)

The functional methods of reaching and communicating with industrial and consumer markets. Includes the oral, printed, and electronic media available to business; their characteristics, costs, and limitations. 3 lectures. Prerequisite: Mktg 301 or consent of instructor.

Mathematics

Mktg 405 Sales Management (3)

Headquarters, staff and field management of sales personnel. Includes recruiting, training, organization, control, planning, sales policies and operations to marketing objectives of the firm. 3 lectures. Prerequisite: Mktg 301 or consent of instructor.

Mktg 406 Marketing Management (3)

Planning, organizing, operating, and controlling individual brands and the total marketing activities of the business in coordination with all activities of the firm. 3 lectures. Prerequisite: Mktg 204 and consent of instructor.

Mktg 466 Marketing Problems Seminar (3)

Seminar in marketing problems emphasizing simulation of the marketing process with computerized games and case studies. 3 meetings. Prerequisite: Senior standing, Mktg 301 or consent of instructor.

MATHEMATICS

*** Math 100 Mathematics for General Education (3)**

The number systems of mathematics through the real numbers; sets, relations, and functions; the properties of equality and inequality; absolute value; geometry of mathematics, including basic triangle relationships; coordinate systems; distance in a plane; trigonometric functions and identities. 3 lectures.

Math 102 Agricultural Mathematics (3)

Percentage problems in soils, dairy, horticulture, poultry, feeds; discount and interest, Pearson's square, equations, formulas, linear measurements, areas, volumes, concrete, lumber and proportions. 3 lectures.

*** Math 103 Agricultural Mathematics (3)**

Use of exponents, logarithms and elementary slide rule, trigonometric functions; basic land descriptions; work, horsepower and efficiency, pressure; standard deviation. Not open to students with credit in Math 117. 3 lectures. Prerequisite: Math 102

Math 104 Slide Rule (1)

Operation of the slide rule and methods of computation used in engineering. 1 lecture. Prerequisite: Math 115 or 117 or consent of instructor.

*** Math 113 Agricultural Mathematics (3)**

Applications of algebra and trigonometry, including computation with logarithms and slide rule, to selected topics in agriculture; elementary statistics for agriculture; basic land descriptions and measurements; horsepower, efficiency and pressure. Not open to students with credit in Math 102 and/or Math 103. 3 lectures. Prerequisite: Appropriate score on entrance examination.

*** Math 114 College Algebra for Agriculture (3)**

Factoring and fractions; functions and graphs; linear and quadratic equations; logarithmic functions; proportion and variation; simple inequalities, progressions, determinants, and probability. Not open to students with credit in Math 117. 3 lectures. Prerequisite: Math 103, 113, or appropriate score on placement test.

*** Math 115 Trigonometry for Agriculture (3)**

Trigonometric functions of acute angles and related angles; graphs, radian measure, fundamental identities, functions of two angles, applications of right and oblique triangles, and logarithmic applications. Not open to students with credit in Math 117. 3 lectures. Prerequisite: Math 114

* Not open to students having credit in Math 141 or equivalent.

*** Math 117 Mathematics for Engineers (5)**

An integrated course in college algebra and trigonometry covering function concept and symbols, rectangular co-ordinates, trigonometric functions, linear and quadratic functions, inequalities, analysis of trigonometric functions, inverse trigonometric functions, exponential and logarithmic functions, systems of equations, binomial formula, and complex numbers. 5 lectures.

Math 131, * 132, 133 Technical Calculus (4) (4) (4)

Functions, their graphs and limits; techniques and applications of differential and integral calculus; introduction to applied differential equations. Designed principally for technology students and others interested in an applied three-quarter calculus sequence. 4 lectures. Prerequisite: Math 117, 115, or appropriate score on the entrance examination.

Math 141 Analytic Geometry and Calculus (4)

Introduction to analytic geometry and calculus. 4 lectures. Prerequisite: Math 117, Math 115, or appropriate score on the entrance examination.

Math 142 Analytic Geometry and Calculus (4)

Continuation of analytic geometry and calculus. 4 lectures. Prerequisite: Math 141

Math 143 Analytic Geometry and Calculus (4)

Continuation of analytic geometry and calculus. 4 lectures. Prerequisite: Math 142

Math 200 Mathematics for General Education (3)

Symbolic logic; sets and subsets, including set operations; partitions of universal sets; permutations and combinations; elementary probability using Venn diagrams of truth sets. 3 lectures. Prerequisite: Math 100 or a satisfactory score on the placement examination.

Math 204 Mathematics of Matrices (3)

Matrices, determinants, inverses, characteristic values, applications. 3 lectures. Prerequisite: 3 units of college mathematics.

Math 210 Finite Mathematics for Business (3)

Vectors and matrices, including application of matrix theory to Markov chains; probability theory; linear programming; theory of games; absorbing Markov chains and genetics. 3 lectures. Prerequisite: Math 200

Math 215 Mathematics of Business (4)

Simple and compound interest principles, methods and applications; annuities; amortization of debts and sinking funds; perpetuities and capitalized costs. 4 lectures. Prerequisite: Math 210 or consent of instructor.

Math 241 Analytic Geometry and Calculus (4)

Continuation of analytic geometry and calculus. 4 lectures. Prerequisite: Math 143

Math 242 Differential Equations (4)

Introduction to differential equations. Differential operators. 4 lectures. Prerequisite: Math 241

Math 307 Theory of Equations (3)

Binomial equations, algebraic polynomial functions and equations. Theorems and techniques for rational and irrational solutions of polynomial equations. Solutions of systems of linear equations. 3 lectures. Prerequisite: Math 142

Math 312, 313 Linear Algebra (3) (3)

Vector spaces, linear independence, subspaces, determinants, linear transformations, eigenvalues and eigenvectors, applications. 3 lectures. Prerequisite: Math 241

* Not open to students having credit in Math 141 or equivalent.

Mathematics

Math 318 Advanced Engineering Mathematics (4)

Theory and application of Fourier Series, Laplace transforms, Bessel functions, and power series solutions of ordinary differential equations. 4 lectures. Prerequisite: Math 242

Math 319 Advanced Engineering Mathematics (3)

Elliptic integrals, differentiation under the integral sign, harmonic analysis and solution of partial differential equations. 3 lectures. Prerequisite: Math 242

Math 327, 328 Basic Structure and Concepts of Mathematics (3) (3)

Basic concepts, structure, and algorithms of elementary mathematics. An heuristic approach to topics in geometry, number theory, and measurement. Equations and inequalities in problem solving. Use of mathematical models to extend powers of induction and to introduce deductive processes. 2 lectures, 1 activity. Prerequisite: Junior standing.

Math 381, 382 Modern Algebra (3) (3)

Concepts of modern algebra including operations and relations defined on sets; systems, including groups, rings, integral domains and fields; investigations through isomorphisms of ordered pairs; congruences of numbers; integral domains of polynomials and the congruences of polynomials. 3 lectures. Prerequisite: 9 units of college mathematics.

Math 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: Permission of the department head.

Math 402 Secondary School Mathematics (3)

A study of the mathematical content of junior high school courses with particular emphasis on the new curricular materials that are being developed and introduced into the schools. Suitable for both upper grade and junior high school teachers. 3 lectures. Prerequisite: At least junior standing.

Math 403 Secondary School Mathematics (3)

A study of the mathematical content of the senior high school courses, with particular emphasis on the new curricular materials that are being developed and introduced into the senior high school courses. 3 lectures. Prerequisite: At least junior standing.

Math 404 Vector Analysis (3)

Algebra of free vectors with applications. Differential and integral calculus of vectors. Development of theory and application of vector operators. 3 lectures. Prerequisite: Math 242

Math 405 Vector Analysis (3)

Additional topics including surface integrals, volume integrals, the divergence theorem, Stokes' theorem, applications to electrostatic fields, general coordinates, and introduction to tensor analysis. 3 lectures. Prerequisite: Math 404

Math 408 Functions of a Complex Variable (3)

Fundamental properties of a complex variable; elementary analytic functions; mapping, and applications of mapping, by elementary functions; complex integration and applications. 3 lectures. Prerequisite: Math 242

Math 409 Functions of a Complex Variable (3)

Continuation of elementary mapping and its applications; Taylor and Laurent series expansions of analytic functions; theory and applications of residues and poles, and contour integration; analytic continuation and Riemann surfaces. 3 lectures. Prerequisite: Math 408

Math 411 Foundation of Geometry (3)

Logical foundations of geometry, coordinate systems, synthetic and analytic projective geometry, fundamental concepts of Euclidean geometry, Non-Euclidean geometries. This course is designed to broaden the student's perspective in the field of geometry. 3 lectures. Prerequisite: 9 units of college mathematics.

Math 412 Advanced Calculus (3)

Real numbers system, Dedekind cuts, sequences, limits, continuity, derivatives and differentials, Riemann integration. 3 lectures. Prerequisite: Math 241

Math 413 Advanced Calculus (3)

Functions of several variables and partial differentiation, uniform continuity, theory of integration. Stieltjes integrals, infinite series, sequences of functions and uniform convergence. 3 lectures. Prerequisite: Math 412

Math 420 Topics in Applied Mathematics (1-2)

Group investigations of specialized areas of mathematics. Total credit limited to 4 units, with not more than 2 units in any one quarter. Prerequisite: Permission of the department head.

Math 435 Teaching Mathematics in the Elementary School (3)

Development of mathematical concepts; the discovery or laboratory approach to learning and the role of manipulative or visual materials; teaching the mathematical rationale of the fundamental operations with the rational numbers; necessity for a sequential and organized program; the newer curricular materials and their place in the total program; problem solving; evaluation. 3 lectures. Prerequisite: Ed 304 and Math 122 or permission of the instructor.

Math 441 Theory of Numbers (3)

Properties of numbers. Euclid's Algorithm, greatest common divisor, least common multiple, indeterminate equations, prime numbers, congruences; emphasis toward the teaching of secondary mathematics. 3 lectures. Prerequisite: At least junior standing and Math 141

Math 442 College Geometry (3)

Modern development of the basic concepts of plane and solid Euclidean geometry including a coordinate treatment; selected topics in advanced Euclidean geometry. 3 lectures. Prerequisite: Junior standing.

Math 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.

Math 463 Undergraduate Seminar (2)

Reports and discussions by students through seminar methods, based on their senior projects and on other topics in mathematics which are of interest to them. Two activity periods.

Math 505 Sets, Functions and Relations (3)

Introduction to the basic concepts of sets with applications to functions, relations and graphs. Appropriate for the prospective or in-service teacher. 3 lectures. Prerequisite: Graduate status or the consent of instructor.

Math 506 Structure of Algebra (3)

Development of properties and operations of number systems by the axiomatic method culminating in a formal appreciation of algebraic structure. Appropriate for the prospective or in-service teacher. 3 lectures. Prerequisite: Graduate status or the consent of instructor.

Mathematics

Math 507 Structure of Geometry (3)

Axiomatic systems; model of a finite geometry; incidence, measure, and order relations; congruence, similarity; four-dimensional geometry; hyperbolic geometry; lines and planes in space; analytic treatment of a Euclidean model. Appropriate for the prospective or the in-service teacher. Prerequisite: Math 442 and graduate status.

Math 508 Introduction to Topology (3)

Introduction to the basic concepts of graphs, algebraic topology, and set theoretic topology. An intuitive approach will be observed in the study of these topics. 3 lectures. Prerequisite: Graduate status.

Math 509 Development of Mathematics (3)

Correlation between the development of our society and the development of mathematics. Designed to aid the teacher of secondary mathematics to enrich the courses taught in secondary schools. 3 lectures. Prerequisite: Graduate status.

Math 510 Survey of Modern Mathematics (3)

Selected topics from the field of modern mathematics: projective, and synthetic geometry, topology, logic, matrices, theory of games, probability, linear and modern algebra and convex sets. 3 lectures. Prerequisite: Graduate status or instructor's approval.

Math 512 Partial Differential Equations of Physical Systems (3)

Partial differential equations of first and second order. Laplace's equation, wave equation, diffusion equation, and others. 3 lectures. Prerequisite: Math 318, 319

Math 516 Linear Operators (3)

Linear spaces, operator theory, and operational calculus. Applications to differential equations, integral equations, transforms, and Fourier analysis. 3 lectures. Prerequisite: Math 313, 319, 412

Math 521 Curriculum and Methods in Mathematics (3)

General aims, objectives and methods of effective teaching of mathematics in the secondary schools. The traditional secondary curriculum will be compared with new trends and developments. 3 lectures. Prerequisite: Graduate status.

Math 580 Seminar (1-2-3)

Built around topics in advanced mathematics chosen according to the common interests and needs of the students enrolled. Each seminar will have a subtitle according to the nature of the content. 1, 2, or 3 lectures. Prerequisite: Consent of instructor.

Math 593 Seminar in Applied Mathematics (3)

Topics based on the interests and backgrounds of the students. Applications of mathematics to problems in engineering and science. 3 meetings. Prerequisite: Graduate status and consent of instructor.

Math 596 Thesis (3) (3)

Serious research endeavor devoted to the development, pedagogy or learning of mathematics. Prerequisite: Graduate status and consent of instructor.

MECHANICAL ENGINEERING

ME 131, 132 Mechanical Systems (3) (3)

Analysis and synthesis of mechanical systems and their components. Power, thermal, kinematic and process systems. 2 lectures, 1 two-hour laboratory.

Mechanical Engineering

ME 144, 145, 146 Mechanical Engineering Laboratory (1) (1) (1)

Basic experimentation and testing of mechanical equipment for the purpose of illustrating equipment function and instrumentation problems and limitations. This lab also provides the student descriptive information as background for his advanced mechanical engineering courses. 1 laboratory.

ME 205 Engineering Statics (3)

Statics by scalar methods. Includes forces, couples, resultants, equilibrium, trusses, cables, friction, centroids, and moments of inertia. 3 lectures. Prerequisite: Phys 121, Math 132, or Phys 131, Math 142

ME 206 Engineering Dynamics (4)

Dynamics by scalar methods. Includes kinematics (both absolute and relative motion of particle and bodies) and kinetics, force, mass, acceleration, work and energy, and impulse and momentum. 4 lectures. Prerequisite: ME 205 or ME 211

ME 211, 212 Engineering Mechanics (3) (4)

General and specific consideration of moments, couples, centroid, multidimensional systems. Field concepts as applied to rigid bodies. Motion, momentum, and energy. Application of vector methods. 3 lectures, 4 lectures. Prerequisite: Phys 131, Math 142

ME 213 Dynamics Laboratory (1)

Experimental studies of the dynamic behavior of structures and machines. Instrumentation methods utilized in field and laboratory. Analog techniques. 1 laboratory. Concurrent: ME 212

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 laboratories.

ME 249 Strength of Materials Laboratory (1)

Commercial tests of materials. Familiarity with physical properties of industrially useful materials. Electric resistance strain gages. 1 laboratory. Concurrent: Aero 207

ME 301 Thermodynamics (4)

Fundamental concepts of work, heat, and energy. First and second laws of thermodynamics. Ideal gas law as introduction to incompressible flow. Power and refrigeration cycles. Combustion and gas mixtures. 4 lectures. Prerequisite: Math 133, Phys 123, ME 341

ME 302, 303 Thermodynamics (3) (3)

First and second laws of thermodynamics, processes, properties, and general relationships. Gases, vapors, mixtures. 3 lectures. Prerequisite: ME 212, Chem 124, Phys 132

ME 311 Fluid Flow (3)

Study of the principles that underlie the flow of various fluids. Fluid statics, viscosity, dynamic similarity, and fluid friction. Dimensional analysis, Reynolds number, steady flow energy transformation of compressible and incompressible fluids. Fluid resistance, dynamic lift and propeller action, propulsion theory. Pumps, turbine, fluid power transmission systems, and fluid film lubrication. 3 lectures. Prerequisite: ME 206 or 212

ME 316 Mechanical Vibrations (4)

Free vibrations, damping, forced vibrations. Critical speeds of shafts. Energy methods. Numerical analysis of complex systems. Transient vibrations. 3 lectures, 1 laboratory. Prerequisite: Math 242, ME 212, 324

Mechanical Engineering

ME 324 Kinematics (4)

The study of motion in machine parts. Displacements, velocities, and accelerations in linkage, cams, gears, and other mechanisms. 2 lectures, 2 two-hour laboratories. Prerequisite: Phys 131, ET 142

ME 331 Mechanical Equipment of Buildings (3)

Application of engineering analysis and building code requirements in the design of building systems for handling water supplies, liquid wastes, fuel, gas and ventilation. Related systems connecting groups of buildings and health and accident hazards involved. 2 lectures, 1 laboratory. Prerequisite: Phys 132

ME 333 Plumbing and Building Sanitation (3)

For architectural engineering students. Calculation of water supply and consumption. Fire protection and sprinkler systems. Plumbing and drainage. Gas services. Application of principles to specific elements of engineering structures. 3 lectures.

ME 341, 342 Fluid Mechanics (3) (4)

Fluid statics and dynamics. Flow measurement, networks, open channels, compressible flow, fluid machinery and control systems. 3 lectures; 3 lectures, 1 laboratory. Prerequisite: ME 206 or 212

ME 343 Thermodynamics Laboratory (1)

Testing thermodynamic equipment and machinery. An advanced laboratory course requiring the student to determine the test procedure and instrumentation and to evaluate the degree of exactness or uncertainty of the test setup. 1 laboratory. Prerequisite: ME 303

ME 349 Advanced Materials Testing Laboratory (1)

Advanced laboratory work in testing of materials and structures. Column and beam tests, fatigue tests, static and dynamic experimental stress analysis techniques with electric resistance strain gages and brittle lacquer coatings. 1 laboratory. Prerequisite: ME 249

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 401, 402 Stress Analysis (4) (4)

Thick-walled cylinders, force and shrink fits. Stresses in high speed rotors. Stress and stability of thin plates and shells. Curved beams. Triaxial stress, strain energy, and ultimate load. 3 lectures, 1 laboratory. Prerequisite: Math 242, ME 427

ME 412 Nuclear Power Plants (3)

Engineering applications of nuclear energy, nuclear reactor design and operation, instrumentation and control. Nuclear power plants; materials, equipment and economics. 3 lectures. Prerequisite: Chem 125

ME 417 Advanced Vibrations (4)

Vibration of continuous systems and wave motion, orthogonality of normal modes, Lagrangian mechanics, matrix methods of lumped mass systems, mode coupling and iteration methods. 3 lectures, 1 laboratory. Prerequisite: ME 316

ME 422 Instruments and Controls (4)

Fundamentals of control system design and a study of basic electro-mechanical sensing elements used in control systems. Computation and study of various basic instruments used in control work. 3 lectures, 1 laboratory. Prerequisite: EE 208, Math 242

ME 423 Elements of Machine Design (4)

Fundamentals of machine design for engineering students other than mechanical. Stresses and deflections in machine parts. Engineering materials. Design of springs, bearings, gears, chains, belts, clutches and brakes. Course is oriented to stress philosophy of design, application and comparative advantage rather than basic design. 3 lectures, 1 laboratory. Prerequisite: Aero 207, or equivalent, Math 241, ME 212

ME 424, 425 Design of Piping Systems (4) (4)

Functions, requirements, and design of piping systems, including safety and economic considerations for power, chemical, and process plants. Welding and other forms of joint construction, materials specifications, sizing, layout, flexibility, support, insulation, and cost estimation of water, steam, air, gas, and corrosive and viscous fluid systems. Philosophy, background, and requirements of principal governing National Codes. 3 lectures, 1 laboratory. Prerequisite: Aero 207, ME 341

ME 427 Introduction to Design (4)

Design of machine parts by stress and deflection. Effects of fluctuating stresses and stress concentration. Design of gears, clutches, brakes, bearings, shaft and other machine parts. Modern industrial design practice using standard components and design layout drawings. 3 lectures, 1 laboratory. Prerequisite: Aero 207, ME 324, WM 306

ME 428 Design (4)

Basic design techniques such as brainstorming, feasibility studies, models, case studies, design decisions and compromises. Industrial participation design program. 2 lectures, 2 laboratories. Prerequisite: ME 427

ME 431 Mechanical Design Technique (3)

Comprehensive study of design methods. Design factors, including market value, producibility, servicability, utility, style. Analysis of useful ideas and their integration into a practical design in the form of an engineering layout drawing. 1 lecture, 2 laboratories. Prerequisite: ME 428

ME 434 Fundamentals of Petroleum Production (2)

Survey of the production of crude petroleum covering exploration, drilling, pumping, transportation, and storage. Observation of actual field operations and installations of major oil companies and oil equipment companies. Nomenclature, methods, and mechanical equipment. 2 lectures. Prerequisite: ME 146, 302

ME 435 Petroleum Production Development (3)

Mechanical engineering aspects of rotary drilling. Problems attendant to the rotary rig and its auxiliary equipment. Practical problems dealing with drilling mud, casing, cementing, directional drilling, and well completion operations. 2 lectures, 1 laboratory. Prerequisite: Aero 207

ME 436 Petroleum Reservoir Engineering (3)

Methods of applied engineering in the operation of oil and gas reservoirs. Flow of fluids through porous media under primary and secondary recovery. Modern stimulation techniques of nuclear detonation, steam injection, and hydraulic fracturing. 3 lectures. Prerequisite: ME 341

ME 441 Advanced Thermodynamics (3)

Maxwell relations, clapeyron equation, activity, activity coefficient, and fugacity. Phase and chemical equilibrium. Selected modern applications of thermodynamics. 3 lectures. Prerequisite: ME 303

Meteorology/Military Science

ME 442 Dynamics and Thermodynamics of Compressible Flow (3)

Control volume analysis of fluid-thermo equations for one dimensional, compressible flow involving area change, normal shocks, friction, and heat transfer. Two-dimensional supersonic flow including linearization, method of characteristics, and oblique shocks. One-dimensional constant area, unsteady flow. 3 lectures. Prerequisite: EnvE 313, Math 242

ME 443 Turbomachinery (3)

Mechanical aspects of turbine design. Steam turbine control and performance. Centrifugal compressor. Axial flow compressor. Combustion. Regenerators, gas turbine power plants. 3 lectures. Concurrent: ME 303

ME 444 Combustion Engine Design (3)

Application of design parameters to the various engine cycles. Aspects of the combustion processes. Energy conversion including losses and cooling. Static and dynamic loading. 3 lectures. Prerequisite: ME 303

ME 452 Nuclear Engineering Laboratory (1)

Radioisotope engineering experiments, analog computer simulation of reactor operation and control variables, and mechanical design problems. 1 laboratory. Prerequisite: Phys 421. Concurrent: ME 412

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

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

ME 463 Undergraduate Seminar (2)

New developments, policies, practices, and procedures are discussed through regular seminar. Each individual is responsible for the development and presentation of a topic in his chosen field. 2 meetings. Prerequisite: Senior standing.

METEOROLOGY

Met 424 Meteorology (3)

Weather instruments; insolation, convection and advection; land and sea breezes; fog, smogs, clouds, and showers; thunderstorms; lapse rate and temperature inversions; cyclones; anti-cyclones; tornadoes and waterspouts; stacks and plumes; meteorological conditions under which air pollution accumulates. 2 lectures, 1 laboratory.

MILITARY SCIENCE

MSc 101-102-103 (MS I) Basic Course (1) (1) (1)

Organization of the Army and ROTC; individual weapons and marksmanship; United States Army and national security; leadership and command (drill). Academic subject in related fields. May be substituted for PE 141. 1 lecture. One hour and 20 minutes field instruction.

MSc 201-202-203 (MS II) Basic Course (2) (2) (2)

American Military History; introduction to basic tactics and techniques; leadership and command (drill). Academic subjects in related fields. May be substituted for PE 241. 2 lectures. One hour and 20 minutes drill instruction. Prerequisite: MS I or equivalent.

MSc 301, 303 (MS III) Advanced Course (3) (3)

Leadership; military teaching principles; branches of the Army; small unit tactics; communication; internal defense management; leadership and command (drill). Academic subjects in related fields. 4 lectures. One hour and 20 minutes field instruction required during fall, winter, and spring quarters. Prerequisite: MS II or equivalent.

MSc 400 ROTC Summer Camp (5)

A concentrated laboratory course in military science and tactics. An application of the military theory learned in the classroom. Technical operation, maintenance, and tactical employment of the latest weapons and equipment. Required for a six-week period during the period normally following completion of MSc 303.

MSc 401, 403 (MS IV) Advanced Course (3) (3)

Internal defense development; command and staff; organization for operations; military intelligence; the military team; logistics; army readiness; administrative management; role of the U.S. in world affairs; military law; map reading; obligations and responsibilities of an officer; leadership and command (drill). Academic subjects in related fields. 4 lectures. One hour and 20 minutes field instruction required during fall, winter and spring quarters. Prerequisite: MS III or equivalent.

MUSIC**Mu 101 Music Theory (3)**

Elements of music theory covering: notation, construction of major and minor scales and keys, signatures, intervals, diatonic triads, triad forms, inversions, transposition, study of meter and rhythm, elementary ear training. 3 lectures.

Mu 111, 112, 113 Class Piano (1) (1) (1)

Fundamentals of piano techniques, tone production, rhythm, sightreading, interpretation, style, and keyboard facility for those with little or no piano experience. Designed to meet the piano requirements for music minors. The classes proceed progressively. 1 activity.

Mu 141 Dance Orchestra (2)

Limited to those who have had considerable experience playing musical instruments. Students in the dance orchestra have an opportunity to play for various College entertainments, dances, community programs, radio broadcasts, and the annual spring tour and Home Concert. 2 laboratories. Total credit limited to 24 units.

Mu 144 Symphony Orchestra (1)

Open to any college student whose technique is adequate. In addition to standard repertory, the orchestra emphasizes unusual or rarely performed works. Select members of the orchestra are given additional opportunities to perform chamber music. 1 laboratory. Prerequisite: Consent of instructor. Total credit limited to 12 units.

Mu 147 Instrumental Ensembles (1)

Open to qualified musicians. Rehearsal and public performances in trios, quartets, and quintets. 1 activity. Prerequisite: permission of the instructor. Total credit limited to 12 units.

Mu 151 Band (1)

Limited to those students who have had experience with band instruments. The band plays for many college functions, assemblies, athletic games, and rallies, and makes at least one trip each year. Smaller groups are organized from the band for special functions. 1 laboratory. Total credit limited to 12 units.

Music

Mu 154 Men's Glee Club (1-2)

Four- to eight-part vocal compositions; fundamentals of breathing, tone production, diction, and interpretation. Quartets, small groups, and soloists are developed, for which additional credit may be given. The club sponsors an annual spring tour and Home Concert. Tryouts in fall only. 1 or 2 laboratories. Total credit limited to 24 units.

Mu 157 Women's Glee Club (1-2)

Choral literature for women's voices; independence and skill in part singing; care and development of the voice; choral interpretation; performances in public concerts, campus functions, and the annual Home Concert. Small groups and soloists may earn additional credit. 1 or 2 laboratories. Prerequisite: Permission of the instructor. Total credit limited to 24 units.

Mu 201 Basic Music (3)

Development of basic music proficiency; singing, conducting, playing simple instruments, accompaniment, rhythmic activities. Assumes a knowledge of music fundamentals. 3 lectures. Prerequisite: Mu 101

Mu 203 Elementary Harmony (3)

Melodic form; recognition, construction, and use of primary chords and inversions; cadences, enharmonic change, harmonization of simple melodies, and arranging for four-part strings. 3 lectures. Prerequisite: Mu 101

Mu 204, 205, 206 Appreciation (3) (3) (3)

Introduction to the elements and concepts of music, leading to greater understanding of art music. Discussion of the styles, forms, and specific composers in Western music. May be taken in any order. 3 lectures.

Mu 208 Ethnic Music of the World (3)

Contemporary concepts of ethnomusicology. Discussion of folk music of the world by geographic area. History and development of musical instruments. Each course will have a subtitle descriptive of the content. May be repeated to 12 units. 3 lectures.

Mu 211, 212, 213 Class Piano (1) (1) (1)

Intermediate level piano techniques with emphasis on style, interpretation, sight-reading, basic performance practices, and the solution to general musical problems. The classes proceed progressively. Total credit in each course limited to 2 units. 1 activity. Prerequisite: One year of piano or equivalent.

Mu 231, 232, 233 Instruments—Theory and Performance (1) (1) (1)

Study of the fundamentals of playing and teaching woodwind, brass, string, and percussion instruments. Separate sections arranged with instructor. 1 activity.

Mu 237, 238, 239 Voice—Theory and Performance (1) (1) (1)

Study of the fundamentals of singing; breathing, posture, diction, development of voice, resonating chambers, vocal interpretation, sight singing. Theory of music as applied to voice production; notation, intervals, triad forms, meter and rhythm, major and minor scales. 1 activity.

Mu 307, 308, 309 Conducting (2) (2) (2)

Principles and techniques in conducting with experience in score reading. 2 lectures.

Mu 311, 312, 313 Class Piano (1) (1) (1)

Designed for the advanced and semi-advanced student. Emphasis on general knowledge of piano literature, interpretation, style, and performance practices. Admission to the class by audition. Fall quarter emphasis, Baroque keyboard literature; winter quarter, Classic; spring quarter, Romantic and Contemporary. Total credit in each course limited to 2 units. 1 activity.

Mu 331, 332, 333 Instruments (1) (1) (1)

Study of the fundamentals of playing and teaching woodwind, brass, string, and percussion instruments. Continuation of Mu 231, 232, 233. 1 activity.

Mu 337, 338, 339 Voice (1) (1) (1)

Study of the fundamentals of singing; breathing, posture, diction, development of voice, resonating chambers, vocal interpretation, sight singing. Theory of music as applied to voice production; notation, intervals, triad forms, meter and rhythm, major and minor scales. Continuation of Mu 237, 238, 239. 1 activity.

Mu 404, 405, 406 History of Music (2) (2) (2)

Intensive study of a selected topic in music history each quarter through the use of readings, recordings, and scores. Prior completion of at least one quarter of music appreciation is recommended. 2 lectures.

Mu 407 Form and Analysis (3)

Intensive survey of musical forms from the 17th century to the 20th century. Analysis of musical structure, melodic invention and elaboration. 3 lectures. Prerequisite: Mu 101

Mu 431, 432, 433 Advanced Instruments—Theory and Performance (1) (1) (1)

Emphasis placed on the physiological and acoustical principles of tone production. Selected readings on the history and literature of each family of instruments. 1 activity.

Mu 436 Music Concepts (3)

Creative approach to history, theory, appreciation, and criticism of music. Currently employed materials in the light of new musicological findings. Development of original musical themes utilizing scalar, chordic, and pentatonic approaches. 3 lectures. Prerequisite: Mu 201 or consent of instructor.

Mu 437, 438, 439 Advanced Voice—Theory and Performance (1) (1) (1)

Selected readings in the theory of voice production. Study of many types of vocal literature. 1 activity. Prerequisite: Mu 237

NATURAL RESOURCES MANAGEMENT

NRM 101 Recreation Systems and Management (3)

Introduction to national, state, county, city and private park systems. History, policy and principles of the formation, administration and functioning of recreational limits at the park, district and regional levels. 3 lectures.

NRM 102 Forest Resources (3)

Fundamentals of forestry including basic silviculture, forest protection, and multiple use of forest lands. Emphasis is placed on forest recreation. 3 lectures.

NRM 223 Resource Survey (3)

Survey, inventory and assessment techniques used for evaluation of physical, biological and cultural resource features of a land area. Interpretation and correlation of geology, soils, topographic, climatic, vegetative and cultural maps. 2 lectures, 1 laboratory. Prerequisite: SS 121, AE 145, OH 124, Bot 121, NRM 101, 102

Ornamental Horticulture

NRM 224 Resource Planning (3)

Field and laboratory analyses and development of plans for land resource uses following survey and inventory application of multiple use principles; integrated and commensurate management of resource areas. 2 lectures, 1 laboratory. Prerequisite: NRM 223

NRM 323 Site Ecology (3)

Interrelationships of the environmental features of a resource area as influences on development of the recreational site and human use. The recreationist in the ecosystem. 2 lectures, 1 laboratory. Prerequisite: NRM 224, Bot 123; Bio 325 to be taken concurrently.

NRM 326 Environmental Interpretation (3)

Interpretation of the biological, physical and aesthetic values of the recreation area environment; organization and presentation of interpretive materials by oral, written, and display methods of communication. 2 lectures, 1 laboratory. Prerequisite: NRM 323 and Junior standing.

NRM 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: Permission of department head.

NRM 429 Site Development and Maintenance (4)

Basic planning and design principles of selected outdoor recreation sites. Area layout, facility design, construction, and maintenance of structures, grounds, roads, and trails. 3 lectures, 1 laboratory. Prerequisite: NRM 326

NRM 438 Recreation Resource Management (4)

Administration of private and public outdoor recreation, including interrelationships among planning, budgeting, organizing, programming, interpreting and maintaining the recreational unit. 3 lectures, 1 laboratory. Prerequisite: NRM 429 and senior standing in the major.

NRM 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.

NRM 463 Undergraduate Seminar (2)

Study and oral presentation of current developments and problems in the subject field. Discussion of recent findings and research and their application. 2 lectures.

NRM 502 Resource Conservation (3)

Conservation developments for broad treatment of land, water, mineral, forest, range, and wildlife resources. 3 lectures. Prerequisite: Graduate status, Cons 311

ORNAMENTAL HORTICULTURE

OH 100 Orientation to Ornamental Horticulture (1)

Ornamental Horticulture as a career. Preview of the nursery, florist, and landscape industries. Discussion of student projects and project records. 1 lecture.

OH 121 Nursery Practices (4)

Commercial nursery operations. Propagation, nursery layout, seed sowing, transplanting, potting, canning, fertilizing, irrigation; and pest control. Bedding plants, greenhouse plants, trees, and shrubs. 3 lectures, 1 laboratory.

Ornamental Horticulture

OH 122 Ornamental Shrubs (4)

Shrubs and vines used in California. Identification, habits of growth, cultural requirements, and landscape use. 3 lectures, 1 laboratory.

OH 123 Floriculture (4)

The operating of greenhouses and other forcing structures. A study of the relationship of light, heat, temperature, and moisture to plant growth. 3 lectures, 1 laboratory. Prerequisite: OH 121

OH 124 Landscape Drafting (2)

Drafting techniques and standards progressing from tracings to light construction working drawings. 1 lecture, 1 laboratory.

OH 125 Flower Arrangement (4)

A study of the principles of flower arrangement and corsage making. 2 lectures, 2 laboratories.

OH 126 Herbaceous Landscape Plants (4)

The identification, habits of growth, and landscaping uses of ornamental annuals and herbaceous perennials commonly grown for California landscaping. 3 lectures, 1 laboratory. Prerequisite: OH 121, 122

OH 145 Bonsai Culture (2)

Study of the philosophy, history, training, culture, production, and care of the Japanese Bonsai. 1 lecture, 1 activity.

OH 221 Ornamental Trees (4)

Broadleaf trees grown and used in California. Identification, habits of growth, cultural requirements, and landscape use. 3 lectures, 1 laboratory.

OH 223 Principles of Landscape Design (4)

Basic principles of design related to landscape problems. 2 lectures, 2 laboratories. Prerequisite: OH 124

OH 225 Flower Judging (3)

Procedure and practice in score card grading of cut flower and pot plant classes. Commercial grades will be used as well as specimens generally grown by the amateur gardener. 1 lecture, 2 laboratories. Prerequisite: OH 121

OH 227 Flower Shop Management (4)

Practices and problems in the management of the retail flower shop with emphasis upon shop layout, window display, telegraph delivery services, buying, selling, and personnel relations. 2 lectures, 2 laboratories. Prerequisite: OH 125

OH 228 Advanced Floral Design (4)

Advanced styling of floral designs including: wedding flowers, funeral designs, advanced corsages, hospital arrangements and baskets for all occasions. 2 lectures, 2 laboratories. Prerequisite: OH 227

OH 230 Ornamental Gardening (3)

For non-horticulture majors. A general course in ornamental horticulture with emphasis upon plant production. Includes budding, potting, seed sowing, transplanting, pest control, and the planting of lawns, trees, shrubs, and flower beds. 2 lectures, 1 laboratory.

OH 233 Plant Propagation (4)

Principles of asexual propagation. Budding, cutting, layering, division, and separation. 3 lectures, 1 laboratory. Prerequisite: OH 123

Ornamental Horticulture

OH 321 Residential Landscaping (4)

Principles of landscape design for residential properties. Designing of several small home properties. 2 lectures, 2 laboratories. Prerequisite: OH 122, 221, 223

OH 322 Advanced Landscape Design (4)

Principles of landscape design of public properties and the application of these principles in solving of landscape design problems. 2 lectures, 2 laboratories. Prerequisite: OH 121, 221, 223

OH 323 Greenhouse Management (4)

Scheduling greenhouse crops and planning crop rotations. Economics of the florist business. 4 lectures. Prerequisite: OH 123

OH 325 Pot Plant Production (4)

The production of major commercial potted plants under glass and lath. Preparation for sale and merchandising of greenhouse crops. 3 lectures, 1 laboratory. Prerequisite: OH 334, SS 221

OH 327 Diseases and Pests of Ornamental Plants (4)

A detailed study of diseases and pests of ornamental plants, their effect on plants, their prevention and control. 3 lectures, 1 laboratory. Prerequisite: OH 122, Ent 126, Bot 323

OH 331, 332 Landscape Contracting (4) (4)

Practices in supervising men and applying approved techniques in landscape construction. Cost finding and estimating for landscape trades. Contract writing, accounting systems, and legal aspects of landscape contracting. 3 lectures, 1 laboratory. Prerequisite: OH 124

OH 333 Turf Management (4)

Practice in the maintenance and management of turf areas, including golf greens, athletic fields and park lawns. 3 lectures, 1 laboratory. Prerequisite: OH 121, and junior standing.

OH 334 Cut Flower Production (4)

The production of cut flowers in the field, under cloth, and under glass. Preparation of cut flowers for market. 3 lectures, 1 laboratory. Prerequisite: OH 123, SS 221

OH 337 Park Planning and Management (4)

Design, management and maintenance of private and public parks and recreational areas. 3 lectures, 1 laboratory. Prerequisite: AE 122, OH 122, 221, 333

OH 338 Advanced Plant Propagation (4)

Advanced nursery and plant propagation practices. Grafting, dormant budding, lining out, balling out, bare rooting, and making hardwood cuttings. Construction and operation of forcing structures. 3 lectures, 1 laboratory. Prerequisite: OH 233

OH 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: Permission of department head.

OH 402 Garden Center Management (4)

Legal aspects and economics of operating a commercial nursery and garden center. State and county regulations, quarantines, grades and standards of nursery stock. Purchasing, merchandising and record keeping. Trade associations and co-operative buying. 3 lectures, 1 laboratory. Prerequisite: Ec 201 or 211, Actg 131, junior or senior standing.

Philosophy/Physical Education

OH 421 Arboriculture (4)

The care and management of large ornamental trees. The use of ropes and other safety equipment in tree climbing. Cavity work, bracing, cabling, and pruning. 3 lectures, 1 laboratory. Prerequisite: OH 221, 327

OH 430 Landscape Plants (2)

The identification and landscape use of trees, shrubs and herbaceous plant materials. For non-OH majors. 1 lecture, 1 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.

OH 581 Graduate Seminar in Ornamental Horticulture (3)

Group study of current problems of the ornamental horticulture industry; current experimental and research findings as applied to production and to the teaching of horticulture.

PHILOSOPHY

Phil 201 Introduction to Philosophy (3)

The relationships among the sciences and between science and philosophy. The principal types of philosophy in their relation to science. How philosophy has influenced the growth of ideas in the sciences and how present scientific developments are related to basic philosophical ideas. 3 lectures.

Phil 202 Logic (3)

Brief survey of classic deductive and inductive logic. Methods of clear thinking in English prose sentences. Analysis of fallacies. Introduction to modern symbolic logic including Boolean algebra of classes and propositions, with applications. 3 lectures.

Phil 204 Ethics (3)

Implications of ethics and ethical systems; scientific inquiry into the principles of the morality of human actions. 3 lectures. Prerequisite: Phil 201 or instructor's permission.

Phil 211 History of Philosophy (3)

Western philosophy and science from its beginnings to the modern era. The Pre-Socratics through Democritus, Plato and Aristotle to Descartes, Spinoza, Leibniz, Locke, Berkeley, Hume, and Kant. 3 lectures. Prerequisite: Phil 201

Phil 302 World Religions (3)

Survey of the major living religions of mankind, their histories, teachings about man, his origin, way of life and destiny. 3 lectures.

PHYSICAL EDUCATION

PE 107 Health Education (2)

Topics designed to acquaint the student with the major health problems of everyday living. 2 lectures.

Physical Education

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 Community Recreation (3)

The community recreation program. Activities and responsibilities of playground leaders and their supervisors. 1 lecture, 2 two-hour laboratories.

PE 141 Physical Education (½)

Swimming; field and court sports; gymnastics; social, folk and square, and modern dance; body mechanics for women; weight training, combatives for men. 2 one-hour periods. Total credit limited to 1½ units.

PE 144, 145 Beginning Swimming (½) (½)

Beginning swimming for students who are unable to swim 100 yards using each of the following strokes: crawl, back, side, and breast. 2 one-hour periods.

PE 147 Adaptive Activities (½)

Group and individual exercise based upon individual needs in posture, body mechanics, nutrition, post injury and illness, and cardiac cases. Students take this course in lieu of PE 141 or 241 upon recommendation of the college physician. 2 one-hour periods. Total credit limited to 3 units.

PE 151 Competitive Athletics (½)

May be substituted for required physical education by those qualified to compete in intercollegiate sports program. 10 hours activity. Total credit limited to 1½ units.

PE 201 Principles of Physical Education (3)

History of physical education and the concept of physical education as a profession. Correlation between principles and methods. 3 lectures.

PE 203 School and Community Health Education (2)

The school health program in relation to community health agencies. Underlying principles, legal aspects, administrative divisions of health instruction, health services and healthful school living. 2 lectures.

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.

PE 232 Intramural Sports (3)

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

PE 241 Sports Education (½)

Tennis, golf, badminton, handball, basketball, advanced basketball, volleyball, advanced volleyball, archery, fencing, modern dance, body mechanics. Synchronized swimming, advanced swimming, American Red Cross lifesaving. 2 one-hour periods. Total credit limited to 1½ units.

PE 245 Advanced Swimming and Lifesaving (1)

Lifesaving techniques. The Senior Red Cross Life Saving and Water Safety Certificate will be issued to those students who satisfactorily complete this course. 2 one and one-half hour laboratories.

Physical Education

PE 251 Competitive Athletics (½)

May be substituted for required physical education by those qualified to compete in intercollegiate sports program. 10 hours activity. Total credit limited to 1½ units.

PE 255 Apparatus and Gymnastics (2)

A critical analysis of the methods and problems in teaching and coaching apparatus and gymnastics. Application is made to the secondary teaching situation with emphasis on lesson planning, development of teaching units, organization for class activity and administration of the program. 1 lecture, 1 two-hour laboratory.

PE 256 Apparatus and Gymnastics (2)

Theory of teaching and coaching apparatus and gymnastics. Women PE majors and minors. 2 two-hour laboratories. Prerequisite: PE 141 gymnastics.

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 302 Kinesiology (2)

Energy, leverage, angle positions, sequence, and efficiency applied to body movements in sports and working conditions. 2 lectures. Prerequisite: Zoo 337

PE 303 Physiology of Exercise (2)

Effects of various forms of physical activity on the circulatory, respiratory, and other physiological processes; physiological problems in athletic competition. 2 lectures.

PE 321 Football Coaching Theory and Practice (2)

Fundamentals and systems of offensive and defensive football. Care and purchase of equipment, supplies and facilities. Rules of the game. 1 lecture, 1 two-hour laboratory.

PE 323 Baseball Coaching Theory and Practice (2)

Fundamentals of baseball with emphasis on strategy, selection of players, officiating, interpretation of rules, scoring, and administration of interschool games. 1 lecture, 1 two-hour laboratory.

PE 324, 325, 326 Team Sports for Girls (2) (2) (2)

Theory of teaching the following sports: volleyball, field hockey, basketball, field sports, softball, track and field. 2 two-hour laboratories. Prerequisite: PE 141, 241

PE 327 Wrestling Coaching Theory and Practice (2)

Coaching techniques of wrestling. Emphasis on skill instruction, dual meet and tournament organization, officiating, interpretation of rules. 1 lecture, 1 two-hour laboratory.

PE 328 Individual and Dual Sports (3)

Theory of teaching golf, badminton, tennis, and archery. 1 lecture, 2 two-hour laboratories. Prerequisite: PE 141, 241

PE 331 Techniques of Officiating (2)

Techniques of officiating men's sports. 1 lecture, 1 two-hour laboratory.

PE 332 Teaching Elementary School Physical Education (3)

Prepares the student to guide elementary school age children through a well-balanced program in physical education. Aims, objectives, procedures, methods, evaluation and program planning. 1 lecture, 2 two-hour laboratories.

PE 333 Track and Field Coaching Theory and Practice (2)

Coaching techniques for various track and field events. Problems of team balance; study of rules. 1 lecture, 1 two-hour laboratory.

Physical Education

PE 334 Introduction to Dance (3)

History of dance, qualities of movement, media of dance and basic elements of music as applied to movement. 1 lecture, 2 two-hour laboratories.

PE 337 Camping and Outdoor Education (3)

Introduction to current status, principles, organization and administration of outdoor education and camping. 2 lectures, 1 two-hour laboratory.

PE 341, 342, 343 Physical Education Activity (1) (1) (1)

Required of all physical education majors. Emphasis will be given to class organization of required physical education classes. 2 one-hour periods.

PE 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 permission of the instructor.

PE 401 Organization and Administration of Health and Physical Education (3)

Underlying philosophy, principles, policies, and procedures of administration as applied to health and physical education. Legal aspects and the interrelationships with the general school curriculum at the local, state, and national levels. 3 lectures.

PE 405 Administration of School Health Education (2)

Current procedures and practices in the administration of the school health program. Problems analyzed and recommended procedures stressed. 2 lectures.

PE 406 Adaptive Physical Education (2)

Growth and development patterns; their relation to special and regular physical education programs. Analysis of postural divergence and procedures for prevention and correction. 2 lectures. Prerequisite: PE 303

PE 422 Basketball Coaching Theory and Practice (2)

Fundamental individual basketball skills. Theories of offensive and defensive team play. 1 lecture, 1 two-hour laboratory.

PE 425 Tests and Measurements in Physical Education (3)

Physical tests and measurements of skill, strength, speed, and endurance as a basis for grading and as a measure of progress in activities. 3 lectures.

PE 432 Athletic Training and Massage (1)

Modern principles and practices in conditioning and care of athletes. Theory and practice in the scientific manipulation of the muscles as related to therapeutic exercise. 1 combined lecture and laboratory.

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

Fundamentals and techniques of the following minor sports: wrestling, tennis, golf, gymnastics, badminton, and handball. 1 two-hour laboratory.

PE 446, 447, 448 Dance (2) (2) (2)

Theory of teaching social, modern, folk and square dance. 2 two-hour laboratories. Prerequisite: PE 141 or 241, 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 120 hours total time.

PE 463 Undergraduate Seminar (2)

Discussion of new developments in recreation, health, and physical education. 2 lectures.

PE 500 Individual Study (1-3)

Advanced study planned and completed under the direction of a member of the department faculty. Open only to graduate students who have demonstrated ability to do independent work. Enrollment by petition. Prerequisite: Consent of department head, graduate adviser, and supervising faculty member.

PE 501 Advanced Adaptive Physical Education (3)

Advanced techniques in the detection of defective body mechanics and establishment of class procedures for prevention and elimination of these defects. 3 lectures.

PE 502 Advanced Seminar in Problems of Physical Education (3)

Practical problems in physical education and their solution in terms of desired objectives in this field. 3 lectures.

PE 506 Physical Education for the Mentally Retarded (2)

Development of concepts and activities for trainable and educable mentally retarded. Contributions of physical education to the growth and development of the mentally retarded as an integral tool in their education and training. 2 lectures. Prerequisite: Graduate standing.

PE 511 Supervision in Physical Education (3)

Principles and techniques in supervision of physical education on the elementary and secondary school levels. 3 lectures.

PE 512 Advanced Seminar in Health Education (3)

Rules of hygiene; problems of healthful living, and school hygiene. 3 lectures.

PE 513 Evaluation of Current Studies (3)

Analysis and evaluation of published studies in physical education, health education and recreation. 3 lectures.

PE 516 Physical Education Facilities, Equipment and Finance (3)

Design and construction of physical education facilities. Budgeting and financing physical education, intramural, and athletic facilities and programs. 3 lectures. Prerequisite: Graduate standing.

PE 517 Investigative Techniques in Physical Education (3)

Evaluative aspects of physical education; laboratory planning, descriptive methods, anthropometry, body mechanics, methods of instruction, analysis of findings. 3 lectures. Prerequisite: PE 425

PE 521 Curriculum and Methods in Health and Physical Education (3)

Methods, curricular materials, and evaluation procedures in elementary and secondary schools health and physical education. 3 lectures.

PE 522 Mechanical Analysis of Sports (3)

Application of principles of body mechanics to physical education and sports activities as a basis for analyzing and improving motor performance. 3 lectures. Prerequisite: PE 302, 303

PE 599 Thesis (2) (2) (2)

Independent research under the guidance and supervision of the staff.

PHYSICAL SCIENCE

PSc 101, 102, 103 Structure and Behavior of Matter (4) (4) (4)

Integrated course involving the basic principles of physics and chemistry. A quantitative study of matter and energy and the principles and laws that describe their behavior and applications. Not open for credit to students who have completed a college course with laboratory in physics or chemistry. 3 lectures, 1 recitation. Prerequisite: Math 100, 103, or 117

Physics

PSc 209 Geology (3)

Fundamental geologic processes. General surface features of the earth. Rocks and minerals. 3 lectures.

PSc 216 Elementary Astronomy (3)

Descriptive astronomical properties of the earth, solar system, stars and galaxies. Opportunities for descriptive observations and star identification. Not open to students who have completed or are taking PSc 321. 3 lectures.

PSc 321 General Astronomy (4)

Quantitative and descriptive properties of the earth, solar system, stars and galaxies. Astronomical applications of the laws of the physical sciences. Laboratory periods devoted to observational astronomy and associated techniques. 3 lectures, 1 laboratory. Prerequisite: Phys 132, Math 241; Phys 211 or 223 strongly recommended.

PSc 512 Philosophy of Science (3)

The relationship of philosophy and science. A presentation of problems in the logic of science and in the analysis of the concepts of science. 3 lectures. Prerequisite: Graduate standing.

PSc 521 Curriculum and Methods in the Physical Sciences (3)

Techniques, aims and objectives in the teaching of physics, chemistry, physical science, and general science at the secondary school level. Selection and organization of teaching material. Evaluation of results. 3 lectures. Prerequisite: Graduate standing.

PHYSICS

Phys 104 Introductory Physics (4)

Fundamental principles of mechanics, heat, light and electricity. Not to be taken by students who have taken a college course in Physics. 4 lectures. Prerequisite: Math 103 or 200 or 117

Phys 121, 122, 123 College Physics (4) (4) (4)

Fundamental principles of mechanics; hydraulics, heat, light and sound; magnetism, electrostatics, current electricity, atomic and nuclear physics. Not open to students who have previously taken corresponding college courses in physics. 3 lectures, 1 laboratory. Prerequisite: Math 103 or 113 or 117 or 200

Phys 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 laboratory. Prerequisite: Math 141

Phys 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 laboratory. Prerequisite: Phys 131

Phys 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, electrochemistry, magnetism and magnetic fields, measuring instruments, magnetic field of a moving charge, induced e.m.f., a.c. circuits, electronics. 3 lectures, 1 laboratory. Prerequisite: Phys 132, Math 142

Phys 206 Electrical Circuits (3)

Direct current, alternating current, and electronic circuits. 3 lectures. Prerequisite: Phys 133, Math 143

Phys 211 Introduction to Optics and Atomic Physics (4)

Fundamental principles of optics and atomic physics. Basic geometric optics, optical instruments, introductory physical optics. Introduction to the fundamental particles of matter, interpretation of spectra, relativity, atomic structure. 4 lectures. Prerequisite: Phys 133 or equivalent.

Phys 212 Sound (3)

Introductory treatment of waves and mechanical radiation. Fourier series. Damped oscillations. Electrical analogs. The wave equation and solutions. Bio-acoustics. 3 lectures. Prerequisite: Phys 133, Math 242

Phys 213 Introduction to Nuclear Physics (3)

Nuclear radiations and interactions. Detection methods, instruments and radioactive hazards. Nuclear reactions and induced radioactivity. Nuclear energy. 3 lectures. Prerequisite: Phys 211

Phys 223 Physical Optics (4)

The physical nature of light. Reflection, refraction, diffraction, interference, polarization and absorption phenomena. 3 lectures, 1 laboratory. Prerequisite: Phys 211, Math 241

Phys 243 Introductory Nuclear Physics Laboratory (1)

Techniques of measurement including Geiger, proportional and scintillation counting. Properties of alpha, beta and gamma radiation. 1 laboratory. Prerequisite or concurrent: Phys 213, Phys 256 or equivalent.

Phys 256, 257 Electrical Measurements Laboratory (1) (1)

Electrical measurements using direct current, alternating current, and electronic methods. 1 laboratory. Prerequisite or concurrent: Phys 206

Phys 301 Heat (3)

The kinetic theory of gases. Distribution of molecular velocities. Transport phenomena. First and second law of thermodynamics. 3 lectures. Prerequisite: Phys 133, Math 241

Phys 302 Analytic Mechanics (3)

Laws of motion. Statics of a particle and rigid bodies. Work and stability of equilibrium. Rectilinear motion of a particle in a plane. Oscillatory motion of a particle in one-dimension. Introduction to relativistic mechanics. 3 lectures. Prerequisite: Math 242, Phys 133

Phys 303 Analytic Mechanics (3)

Statics and dynamics of particles and rigid bodies including an introduction to Lagrange's and Hamilton's equations. 3 lectures. Prerequisite: Phys 302

Phys 306, 307 Electricity and Magnetism (4) (3)

Electric and magnetic field theory using vector treatment. Electric fields, dielectric materials, magnetic fields, induced emf's and induction, magnetic materials, general field and wave equations, plane electromagnetic waves. 4 lectures, 3 lectures. Prerequisite: Phys 133, Math 404

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

Individual or group investigations, research, studies, or surveys of selected problems. Total credit limited to 4 units, with a maximum of 2 units per quarter. Prerequisite: Permission of the department head.

Phys 401 Atomic Physics (3)

Foundations of atomic theory, atomic structure, electron energy levels, X-rays. Introduction to quantum theory and special relativity. Wave-particle duality. 3 lectures. Prerequisite: Phys 211, Math 241

Physics

Phys 403 Nuclear Physics (3)

Nuclear reactions. Structure of the nucleus. Nuclear energy levels. Radioactive decay processes. Nuclear fission. Nuclear spin and magnetic moment. Elementary particles. 3 lectures. Prerequisite: Phys 213, 405

Phys 405 Quantum Mechanics (3)

The experimental basis of quantum mechanics. The wave equation and interpretation. Solutions for one dimensional problems and the one electron atom. 3 lectures. Prerequisite: Math 242, Phys 401

Phys 406 Solid State Physics (3)

Crystalline structure of solids. Vibrational and electronic energies in the crystal lattice. Electrical, thermal, and magnetic properties of metals, insulators, and semiconductors. 3 lectures. Prerequisite: Phys 405

Phys 407 Quantum Mechanics (3)

Interaction of an atom with an external magnetic field. Angular momenta of electrons and atoms. Perturbation theory. Multi-electron atoms. Radiative transitions. 3 lectures. Prerequisite: Phys 405

Phys 412 Solid State Physics for Engineers (3)

Crystalline structure of solids. Basic quantum mechanics. Electronic energy levels and binding of solids. Electrical, thermal, and magnetic properties of metals, insulators, and semiconductors. 3 lectures. Prerequisite: Phys 211, Math 242

Phys 421 Nuclear Reactor Physics (4)

Nuclear fission. Nuclear chain reaction. Neutron diffusion. Thermal reactor critical equation. Time varying system. Reactor control and factors affecting multiplication. 3 lectures, 1 laboratory. Prerequisite: Phys 243, Math 242

Phys 441 Atomic Physics Laboratory (1)

Experimental studies of the properties of electrons and quanta and their interactions with atoms. Experiments include the determination of electron charge and mass, Planck's constant, atomic energy levels and properties of X-rays. 1 laboratory. Prerequisite: Phys 211

Phys 443 Nuclear Physics Laboratory (1)

Energy spectra of nuclear particles. Coincidence measurements. Absolute activity determinations and selected specialized techniques. 1 laboratory. Prerequisite or concurrent: Phys 403. Prerequisite: Phys 243

Phys 452 Solid State Physics Laboratory for Engineers (1)

Selected experiments on the solid state of matter using electrical, optical, and x-ray methods. 1 laboratory. Prerequisite or concurrent: Phys 412

Phys 456 Solid State Physics Laboratory (1)

Experimental study of the solid state of matter using X-ray, electrical and optical methods. 1 laboratory. Prerequisite or concurrent: Phys 406. Prerequisite: Phys 441 or consent of instructor.

Phys 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.

Phys 463 Undergraduate Seminar (2)

Study of current developments in physics and discussion of periodicals of an appropriate level. 2 meetings.

Phys 501 Selected Topics in Advanced Physics (3)

Topics in mathematical physics or advanced experimental work. 3 lectures. Prerequisite: Graduate standing.

Phys 502 Nuclear Physics (3)

Instrumentation, methods, and results of experiments. Systematics and theory of nuclear structure. 3 lectures. Prerequisite: Graduate standing.

POLITICAL SCIENCE

Pol Sc 100 U. S. History and Government (3)

Basic structure and operation of the federal government. The constitution as a modern regulatory instrument; bases of American ideals. Function of state and local government. This course may not be substituted for Hist 304, 305, Pol Sc 301 or 401. 3 lectures. Not open to degree students for degree credit.

Pol Sc 101, 102, 103 Principles of Political Science (3) (3) (3)

Introduction to current political problems and their solutions; emphasis upon the governmental institutions of the United States and California. Pol Sc 101 and 102 satisfy state requirement in American government and California government. 3 lectures.

Pol Sc 301 American Government (3)

The origin, nature, and distribution of political power. Declaration of Independence. The Constitution of the United States. Function and current problems of national, state and local government. Finding and evaluating authoritative source materials on political affairs. Not open to students with credit in or enrolled in Pol Sc 101. 3 lectures. Prerequisite: Sophomore standing.

Pol Sc 302 American Political Process (3)

Political parties, pressure groups, public opinion and the role of each in contributing to the dynamics of the American political process. 3 lectures. Prerequisite: Junior standing and Pol Sc 101 or 301

Pol Sc 306 Modern Political Thought (3)

Theories of political control and the relationship between man and the state. 3 lectures. Prerequisite: Junior standing.

Pol Sc 311 Inter-American Relations (3)

Inter-American affairs. Political, economic, and social problems; forces motivating cultural behavior, industrial development, trade techniques, agriculture methods. Opportunities for employment in agriculture, engineering, and business. Finding and evaluating authoritative source materials on Latin American affairs. 3 lectures. Prerequisite: Pol Sc 301, Hist 304

Pol Sc 312 International Politics (3)

International political processes and problems; foreign policies and politics in relations among states; conflicts and adjustments. Analyses of selected problems. Prerequisite: History 305

Pol Sc 313 Comparative Government (3)

Study of the governmental organization, domestic policies, and political structure of a selected group of nations. 3 lectures. Prerequisite: Hist 305

Pol Sc 314, 315, 316 Public Administration (3) (3) (3)

Processes and techniques of public policy development and administration. Emphasis on the problems encountered by the career civil servant. Fall: application to national departments and agencies; Winter: application to state agencies and resources; Spring: application to cities, counties, and special districts. 3 lectures. Prerequisite: Pol Sc 103 or 301

Pol Sc 401 State and Local Government (3)

Structure, function and problems of state, county, and city governments. 3 lectures. Prerequisite: Pol Sc 301, Hist 304 or equivalent.

Poultry

Pol Sc 402 Politics and Governments of Developing Areas (3)

Institutions and processes of governments in a selected world area experiencing economic and political development. Each time the course is offered it will bear a subtitle descriptive of the particular area studied. 3 lectures. May be repeated to a total of 9 units. Prerequisite: Pol Sc 301 and Hist 305 or equivalent.

Pol Sc 418 Contemporary Problems and Institutions of the U.S.S.R. (3)

Study and analysis of political, economic, and social institutions and conditions of the U.S.S.R. 3 lectures. Prerequisite: Junior standing or consent of instructor.

Pol Sc 465 Contemporary Problems and Institutions of the Middle East and Africa (3)

Study and analysis of political, economic, and social institutions and conditions of the countries of the Middle East and North Africa. 3 lectures. Prerequisite: Junior standing or consent of instructor.

Pol Sc 468 Contemporary Problems and Institutions of Africa South of the Sahara (3)

Study and analysis of indigenous institutions, Western influences, and nationalism in Africa south of the Sahara. Selective area studies illustrative of colonialism and the politics of independence. 3 lectures. Prerequisite: Junior standing or consent of instructor.

POULTRY INDUSTRY

PI 121 Poultry Industry Development (4)

Scope and importance of the poultry industry as a part of California agriculture. Poultry organizations, publications, employment opportunities. Basic skills in industry organization. 3 lectures, 1 laboratory.

PI 122 Replacement Programs and Broiler Production (4)

Organization and planning of the replacement program on the commercial poultry enterprise. Modern techniques and practices including costs, facilities, and management of the replacement program. 3 lectures, 1 laboratory.

PI 123 Poultry Feeding and Nutrition (4)

Nutritional requirements, feeding principles and modern practices. Formulation of rations for specific purposes and commercial economy practices. Feed industry distributive procedures. 3 lectures, 1 laboratory. Prerequisite: AH 101

PI 221 Poultry Selection and Egg Production (2)

Biological environmental factors that affect quality, size, and number of eggs produced. Techniques and practices of working with the commercial producing flock. 1 lecture, 1 laboratory.

PI 222 Poultry Products, Processing and Marketing (3)

Assembling, processing, distributing and merchandising of poultry meat and eggs. Standardization and regulations applicable to the marketing of poultry products. Development and promotion of consumer products. 2 lectures, 1 laboratory.

PI 223 Poultry Incubation (2)

Embryology fundamentals and metabolism of the developing embryo. Artificial incubation practices as applied in the commercial hatchery. Nutritional, genetic and environmental factors that affect the hatch. 1 lecture, 1 laboratory.

PI 230 General Poultry Production (3)

Survey of the various phases of the modern poultry industry including nutrition, breeding, flock health, production and management. Business aspects of poultry production and marketing of products. Not open to poultry majors. 2 lectures, 1 laboratory.

PI 231 Poultry Anatomy and Physiology (3)

Structural aspects and normal functions of the principal systems of domestic poultry. 2 lectures, 1 laboratory. Prerequisite: Zoo 131 or Bio 100

PI 233 Poultry Plant Design and Equipment (2)

Design and planning a modern commercial poultry operation. The engineering of buildings and equipment to specific commercial functions. Coordination of buildings, equipment and operations designed for maximum plant efficiency. 1 lecture, 1 laboratory.

PI 248 Hatchery Operation (1)

Hatchery practice in care and operation of incubators. Servicing and adjusting the equipment and controlling sanitation. Skills in grading chicks, pedigree banding, and keeping hatchery records. 1 laboratory.

PI 303 Poultry Hygiene and Flock Health (3)

Management, sanitation and vaccination programs for the maintenance of the flock health. Control and prevention of diseases and parasites. 3 lectures. Prerequisite: Bact 221, PI 231

PI 320 Poultry Consumer Education (2)

Buyer's guide for poultry products. Consumer grade standards of eggs and poultry meat. Surveys of live and market classes of poultry. Testing eggs and egg products. The use of embryos and baby chicks for demonstration and teaching in the classroom. 1 lecture, 1 two-hour activity.

PI 321 Applied Poultry Breeding (3)

Genetic applications in the development of commercial poultry stocks for specific productive designs. Application of commercial breeding techniques for flock improvement. Analysis of breeding records. 2 lectures, 1 laboratory.

PI 322 Hatchery Business Organization (4)

Organization and management of a commercial hatchery operation. Recruiting and supervising personnel, organizing flow of products and planning the distribution systems. Managing the finance, advertising, public relations, and sales phases of the hatchery organization. 3 lectures, 1 laboratory. Prerequisite: PI 321

PI 402 Advanced Poultry Enterprise Supervision (3)

Coordination and supervision of the modern commercial poultry enterprise. Analysis of operational procedures, efficiency practices, cost and quality control techniques. Interrelationship of business practices to the enterprise success. 3 lectures. Prerequisite: All required freshman and sophomore poultry courses and PI 321

PI 421 Turkey Industry (3)

Coordination and operation of a commercial turkey enterprise. Application of nutritional, breeding, disease control and marketing practices. Planning and supervising the specialized phases of the turkey enterprise. Development of new products and specialized marketing techniques. 2 lectures, 1 laboratory. Prerequisite: PI 123, 231, 321

PI 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.

PI 463 Undergraduate Seminar (2)

Preparing and presenting in an organized manner reports on new trends, special problems, research developments related to the poultry industry. Group discussion of industry special problems. 2 meetings.

PI 581 Graduate Seminar in Poultry (3)

Current trends and characteristics of the poultry industry enterprise. Group discussions of skills, techniques and practices to improve teaching of vocational agriculture as it applies to poultry. 3 meetings.

Printing

PRINTING TECHNOLOGY AND MANAGEMENT

PT 101 Introduction to Printing Technology (2)

Orientation to the program and objectives of the Printing Technology and Management Department. History and traditions of the printing industry. Analysis of technological change. Employment opportunities. 2 lectures.

PT 102 Proofreading (2)

Copy editor's and proofreader's marks, spelling, punctuation, division of words, compounding, and style. Methodical approach to proofreading. 2 lectures.

PT 104 Graphics (3)

Principles of design and display. Type classifications, copy preparation, copy fitting, schools of typography and the influence printing processes have on the selection of type. 3 lectures.

PT 111 Printing Papers (2)

Analysis of the papermaking processes for coated and uncoated papers. Paper properties and terminology. Characterization of papers and other printing stocks. Paper testing. 2 lectures.

PT 122 Typography (3)

Fundamentals of design with type. The point system, type identification, printing vocabulary, and copy markup systems. Introduction to cold type processes. 2 lectures, 1 laboratory. Prerequisite: PT 104 or consent of instructor.

PT 123 Binding and Finishing (3)

Planning of printing to be bound. Cutting, folding, assembling of folded material, binding of finished material in final form. Case and perfect bookbinding. 2 lectures, 1 laboratory.

PT 126 Relief Plates (2)

Characteristics and making of photoengravings, electrotypes, plastic wrap-around plates, stereotypes, and rubber plates. 1 lecture, 1 activity.

PT 127 Graphic Arts Processes (3)

Introduction to the graphic arts. Printing processes, design, layout, composition, presswork, cold type, binding, silk screen, offset, photography, and duplicating processes. For non-majors. 1 lecture, 2 laboratories.

PT 132 Letterpress (3)

Operation and maintenance of platen and cylinder presses. Introduction to imposition, lock-up, makeready, registration, ink control. Analysis of rollers, ink and paper. 1 lecture, 2 laboratories.

PT 133 Letterpress (3)

Characteristics and operation of automatic letterpresses. Techniques and procedures for ink mixing and color matching. Advanced study of makeready systems. Ink and paper relationships. 1 lecture, 2 laboratories. Prerequisite: PT 132

PT 201 Theory of Color (2)

Light and color theory. Understanding of the physical, chemical, and psychological concepts of color. Relationship of color to temperature. Color systems. Application of color theory to full-color printing. 2 lectures.

PT 204 Introduction to Printing Management (2)

Structure of the industry, levels and management, foremanship, materials handling, inventory control, plant safety, and management of printing processes. 2 lectures.

PT 223 Copy Preparation for Reproduction (3)

Preparation of line and tone copy for offset and gravure reproduction. Designing roughs and visuals and preparation of single and multi-color mechanicals for use in commercial and publication printing. 2 lectures, 1 laboratory.

PT 224 Composing Machines (3)

Keyboard operation of linecasting machines using the touch system. Care and adjustment of machines for efficient production of quality type. 1 lecture, 2 activities. Prerequisite: PT 122, or consent of instructor.

PT 225 Composing Machines (3)

Newspaper, bookwork, magazine and commercial composition. Instruction and practice in the maintenance and repair of linecasting machines and composing room equipment. 1 lecture, 2 activities. Prerequisite: PT 224

PT 227 Process Camera (3)

Characteristics of photographic materials for the graphic arts. Theory and practice in the use of gallery and vertical process cameras for the production of line and halftone negatives. Densitometry. Sensitometry. Applications for special purpose screens. 1 lecture, 2 laboratories. Prerequisite: Sophomore standing or consent of instructor.

PT 228 Stripping and Platemaking (3)

Planning for lithographic press plates. Ruling, scribing, opaquing, and retouching negatives. Preparation of supports for stripping. Layout and assembly of stripped flats. Selection, care, and making of pre-sensitized and deep etched lithographic plates. Proofing techniques. 1 lecture, 2 activities. Prerequisite: PT 227

PT 229 Lithography (3)

Theory and practice in the use of single-color sheet-fed offset presses. Sheet feeders, printing units, inking units, dampening units and deliveries. Characteristics of papers and inks for offset lithography. 1 lecture, 2 laboratories. Prerequisite: PT 228

PT 236 Automated Typesetting (3)

Theory and operation of automated typesetting devices. Various processes and component systems. Computerized typesetting. Photocomposition. 2 lectures, 1 activity. Typing proficiency required.

PT 238 Advanced Graphic Arts (3)

Advanced study and related applications of design, layout, composition, press work and bindery. For non-majors. 3 activities. Prerequisite: PT 127

PT 303 Estimating (3)

Estimating commercial printing produced by letterpress and offset processes. Use of catalogs and standard price lists. Analysis of material, labor, and machine cost factors. 3 lectures.

PT 307 Purchasing for Printing (2)

Procurement procedures for printing equipment, raw materials, trade services. Trade customs and practices concerning quantity buying, discounts, leasing and insurance. Securing the service of industry consultants and specialists. 2 lectures.

PT 312 Theory of Lithography (3)

The lithographic process in relation to pH and water controls. Surface plates to deep etch. Film emulsions, reducers and intensifiers. Paper tests and ink reactions. 3 lectures.

Printing

PT 323 Pre-Separated Art for Camera (3)

Manual preparation and separation of line and continuous tone images for multi-color reproduction. Preparation of complex full-color mechanical layouts. 1 lecture, 2 activities. Prerequisite: PT 223

PT 326 Printing Equipment Maintenance (3)

Maintenance practices and procedures for all types of printing plant equipment. Designing and administering maintenance systems for various types of plants. Inventory systems for repair parts. 1 lecture, 2 activities. Prerequisite: PT 225

PT 329 Reproduction Engineering (3)

Orientation to high-speed, short-run reproduction. Microfilming, blueprinting, xerography. Direct image masters. Programmed duplicators. Specialized finishing operations. Coordination of rapid printing in captive and specialty printing plants. 2 lectures, 1 activity. Prerequisite: PT 229

PT 332 Publication Systems (3)

Modern production systems used by newspaper and magazine publishers. Production procedures, with emphasis on organization of composition facilities. 2 lectures, 1 laboratory. Prerequisite: PT 122

PT 333 Plant Organization and Layout (3)

Printing plant design and layout based on production analysis, work flow patterns, and utilization of space. Organization of plant services. 2 lectures, 1 activity.

PT 334 Commercial Typography (3)

Design and composition for commercial printing. Corporate stationery, business forms, annual reports, folders, book, and direct mail pieces. Analysis of process limitations. 1 lecture, 2 activities. Prerequisite: PT 223

PT 336 Advanced Letterpress (3)

One and two revolution flat bed and rotary letterpresses. Two color presses. Specialty presses. Die-cutting, embossing, die-stamping, and foil printing. Three and four-color process printing. 1 lecture, 2 laboratories. Prerequisite: PT 133

PT 338 Survey of Lithography I (3)

Camera copy preparation for offset, gravure and letterpress. Basic line and half-tone photography. For non-majors only. 2 lectures, 1 laboratory. Prerequisite: PT 104 or 127, or consent of instructor.

PT 339 Survey of Lithography II (3)

Introduction to stripping methods. Preparation of paper and presensitized plates for offset printing. Offset presswork procedures. For non-majors only. 2 lectures, 1 laboratory. Prerequisite: PT 104 or 127, or consent of instructor.

PT 341 Tape Perforation (2)

Standard and multiface tape perforators, transmitting equipment, reperfoming and composing machine keyboard operating units. Operation of Teletypewriter tape perforating units. 2 activities. Prerequisite: Bus 141 or demonstrated typing proficiency.

PT 357 Screen Processes (3)

Screen process reproduction methods with applications to industry and communications. Includes paper, tusche and glue, knife-cut and photographic stencils. Printing mediums, surfaces, and industrial applications such as printed circuits and packaging. 3 activities. Prerequisite: PT 238 or consent of instructor.

PT 401 Printing Sales (2)

Sales management, salesmanship, printing trade customs, and promotion of printed products. Servicing printing accounts. 2 lectures. Prerequisite: Senior or advanced junior standing.

PT 407 Photocomposition (3)

Non-metallic composition for display and text types. First, second and third generation phototypesetting machines. Computerized photocomposition systems. 2 lectures, 1 activity. Prerequisite: PT 236

PT 408 Newspaper Production Management (2)

Sequential analysis of newspaper production processes. Organization of the production function. Personnel and industrial problems peculiar to the industry. 2 lectures. Prerequisite: PT 332

PT 411 Estimating and Pricing (3)

Development of an estimating system. Establishment of unit costs and operational time requirements. Analysis of process limitations, time standards, production coordination, service, subcontracting, overhead and profit. 3 lectures. Prerequisite: PT 303

PT 416 Web Printing (3)

Theory and practice in the use of web presses for letterpress, offset, rotogravure, and flexographic printing. Applications for packaging, business forms, magazines, books, catalogs and advertising materials. 2 lectures, 1 laboratory. Prerequisite: PT 229

PT 421 Printing Management (3)

Principles and applications of printing production forecasting. Functions of printing production control including orders, planning, scheduling, and dispatching. Printing production records. 2 lectures, 1 activity. Prerequisite: PT 204

PT 422 Printing Management (3)

Establishment of inspection standards for the printing industry. The appropriateness of judgment and measurement inspection. Instruments for quality control in the printing industry. 2 lectures, 1 activity. Prerequisite: PT 421

PT 423 Printing Management (3)

Organization and coordination of sales production, pricing and administrative aspects of printing operations. Industrial relations relative to commercial printing and publishing. 3 lectures. Prerequisite: PT 422

PT 434 Color Separation (3)

Equipment, materials, and techniques for color separation photography. Three and four color separations from opaque and transparent copy. Introduction to retouching, dot etching and color etching. 1 lecture, 2 laboratories. Prerequisite: PT 201, 227

PT 435 Advanced Lithography (3)

Single and multi-color sheet-fed offset presses. Process color printing and precision control of inking and dampening. Practice in quality control. 1 lecture, 2 laboratories. Prerequisite: PT 229

PT 441 Applied Printing Technology (3)

Practice in production of offset and letterpress printing. Planning, typesetting, copy preparation, camera, preparation of press forms and plates, presswork, binding and finishing. 3 laboratories. Prerequisite: Senior or advanced junior standing.

Psychology

PT 459 Graphic Communication Developments (3)

Developments and trends in processes, methods, materials and equipment used in graphic communication. 3 activities. Prerequisite: Senior standing or consent of instructor.

PT 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 formal report. Minimum 120 hours total time. Prerequisite: Senior standing.

PT 463 Undergraduate Seminar (2)

Preparation, oral presentation, and discussion by students of technical papers on recent developments in the industry and senior project material. Each student is required to conduct the seminar class, under supervision of instructor, at least twice during the quarter. 2 lectures. Prerequisite: Senior standing.

PSYCHOLOGY

Psy 104 Effective Study Techniques (2)

Designed to acquaint students with basic aims and objectives of going to college, and to provide adequate instruction and practice in specific study skills; effective study methods, note-taking, time-planning, memory, concentration. 1 lecture, 1 quiz section.

Psy 202 General Psychology (3)

Biological individuality; heredity and environment; motives; emotions; sensory activity and its use by the individual; learning and remembering; thinking and creating; intelligence; abilities; personality; culture and the individual; oneself and others. 3 lectures.

Psy 301 Personality and Mental Health (3)

Factors of mental health; achieving efficiency; personality development; emotional control; social adaptation; improvement of thinking; religion; program for mental health. 3 lectures. Prerequisite: Psy 202

Psy 302 Psychology of Business and Industry (3)

Psychological factors involved in employer-employee relationships, an analysis of the current practices of business and industry relative to personnel procurement, placement, training, conditions of work and productivity, human relations, human engineering, wages, and job evaluation. 3 lectures. Prerequisite: Psy 202

Psy 304 Physiological Psychology (3)

Relations between behavioral and physiological processes, with emphasis on endocrine and nervous systems, special senses, and physiological processes in motivation, emotion, and learning. 3 lectures. Prerequisite: Psy 202, Zoo 122, or consent of instructor.

Psy 307 Abnormal Psychology (3)

Abnormal behavior of individuals. Dynamics, etiology, symptoms, treatment and prevention of the more severe personality and behavior disorders. Includes the psychoneuroses, psychoses, alcohol and drug addiction, psychosomatic illnesses, and character disorders. 3 lectures. 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 432 Psychological Testing (3)

Principles and procedures of the selection, the administration, scoring, and the interpretation of achievement tests, aptitude tests including scholastic aptitude, interest inventories, and personality inventories. 3 lectures. Prerequisite: 9 units of psychology.

Psy 433 Individual Intelligence Testing (4)

The concept of intelligence. Principles and procedures of individual intelligence testing. Supervised experience in the administration, scoring, and interpretation of standard individual intelligence tests. 2 lectures. 2 activity periods. Prerequisite: Psy 432

Psy 534 Dynamics of Individual Behavior (3)

Integration of the findings from perception, learning, motivation, and social psychology directed toward helping the individual to understand himself and others and utilize this knowledge in his vocation. 3 lectures. Prerequisite: Psy 301

Psy 535 Psychology of Learning (3)

Principles and practices in the field of educational psychology including learning and its variables, general and specific abilities, and measurements as they apply to this area. 3 lectures. Prerequisite: Ed 312

SOCIAL SCIENCES

Soc Sc 101 Introduction to the Social Sciences (3)

The social sciences in their relationship to modern living; an overview of the contributions of social sciences to cultural, social, and economic development. 3 lectures.

Soc Sc 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: Permission of the department head.

Soc Sc 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.

Soc Sc 463 Undergraduate Seminar (2)

Intensive study of selected social problems with application of techniques for analysis. 2 meetings.

Soc Sc 511 Sources in Social Sciences (3)

Methods of finding and adapting authoritative source materials in the social sciences to the elementary, junior, and senior classroom situation. 3 lectures. Prerequisite: Graduate standing.

Soc Sc 521 Curriculum and Methods in Secondary Social Studies (3)

Content, organization and scope of social studies curriculum in secondary schools, methods of teaching. Evaluation of procedures. 3 meetings. Prerequisite: Major or minor in Social Sciences, admission to teacher education program and graduate standing.

Soc Sc 590 Seminar in Social Sciences (3)

Special problems in selected areas of the Social Sciences. Each seminar will have a subtitle describing its nature and content. 3 lectures. Maximum of 9 units may be earned. Prerequisite: Graduate standing.

Sociology

SOCIOLOGY

Soc 105 Introduction to Sociology (3)

Orientation to the nature of the study of society; survey of approaches to social analysis. Emphasis upon primary concepts describing environment, social structure, and social change for increased understanding of human relations. An overview of the systems of social relationships. Not open to students with credit in or enrolled in Soc 201. 3 lectures.

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. Prerequisite: Social Sciences major or consent of instructor.

Soc 206 The Sociology of Family Life (3)

Description and analysis of the social relationships within the family group. Examination of alternative solutions to problems which arise in family living. 3 lectures.

Soc 251 Laboratory in Group Activities (1)

Skills and techniques of solving problems in large and small groups; conducting and reporting meetings; analyses of leadership dynamics in campus organizations. 1 two-hour laboratory. Total credit limited to 6 units.

Soc 301, 302 Sociology of Social Work (3) (3)

Theory, principles, and methods of social work. Analysis of professional service as offered by organized public and private programs. Stress upon relations of professional social worker to the broader institutional framework of the American society. 3 lectures. Prerequisite: 9 hours of sociology or consent of instructor.

Soc 303 Social Problems (3)

An appraisal of various factors from which social problems of the contemporary American society emerge and alternative procedures for dealing with such problems. 3 lectures.

Soc 313 Urban Sociology (3)

Structure of social relationships in the community; physical structure of communities; patterns of community cooperation and conflict; changing patterns of urban community life; social class and political influence on the community level. 3 lectures. Prerequisite: One quarter of sociology or consent of instructor.

Soc 315 Race Relations (3)

Structure of relationships among ethnic and racial groups. Sources of discrimination and prejudice in personality and social structure. Patterns of segregation. Evaluation of current techniques for restructuring intergroup relations. 3 lectures. Prerequisite: 6 hours of sociology or consent of instructor.

Soc 323 Social Stratification (3)

Social class and the distribution of status and power in society, with emphasis on contemporary United States; social mobility; relationships of stratification to mental illness, race, family systems, crime and delinquency, etc. 3 lectures. Prerequisite: 6 hours of sociology or consent of instructor.

Soc 344 Sociology of Poverty (3)

Variable indications of poverty in modern society. Chief features of the subculture of the poor. Analysis of different explanations for the persistence of poverty. Survey of proposals for reducing poverty. 3 lectures. Prerequisite: College course in sociology or consent of instructor.

Soc 402 Crime and Delinquency (3)

Theories of delinquent and criminal behavior; analysis of institutional and other approaches to rehabilitation of criminals and delinquents. 3 lectures. Prerequisite: Two courses in sociology or consent of instructor.

SOIL SCIENCE**SS 121 Soils (4)**

Physical, chemical, and biological properties of soils as related to agriculture. 3 lectures, 1 laboratory.

SS 122 Soil Management (4)

Effect of tillage, manuring, drainage, and irrigation practices on soil productivity. 3 lectures, 1 laboratory. Prerequisite: SS 121

SS 123 Soil Materials (3)

Origin, composition, and identification of rocks, minerals, and other materials important in the development of soils. Land forms as related to the nature and properties of soils. 2 lectures, 1 laboratory. Prerequisite: SS 122

SS 202 Soil Conservation (3)

Climate, topography, soils and land use in relation to soil and water losses. Evaluation of soil and water conservation programs and practices. 3 lectures. Prerequisite: SS 121

SS 221 Fertilizers (3)

Composition, value, and use of fertilizer materials and soil correctives. Methods employed in the manufacture, distribution, and application of fertilizers. 2 lectures, 1 laboratory. Prerequisite: SS 121

SS 230 General Soils (3)

Soil properties and common soil management, fertility, and conservation practices. A general course for other than soils majors. 2 lectures, 1 laboratory.

SS 321 Soil Classification (4)

Systems used in soil and land classification. Methods employed in soil surveying. Mapping of assigned areas and the preparation of survey reports. 3 lectures, 1 laboratory. Prerequisite: Completion of 18 units in Soils Science courses.

SS 322 Soil Fertility (3)

Plant nutrient requirements of crops. Effect of soil and climatic conditions on the availability of nutrients in the soil. Diagnostic techniques in soils and crops. 2 lectures, 1 laboratory. Prerequisite: Completion of 18 units in Soils Science courses.

SS 332 Conservation Techniques (3)

Development of subject matter, materials, and activities for class instruction on soils, water, range, woodland and recreational resources. 2 lectures, 1 laboratory.

SS 333 Tropical Soils (4)

Nature and properties of tropical soils, their origin, morphology, classification, fertility, utilization, and conservation. 3 lectures, 1 laboratory. Prerequisite: SS 121

SS 422 Soil Microbiology (3)

Biochemical activities of soil organisms. Effect of soil organisms on the formation, characteristics, and productivity of soils. Methods of studying soil organisms. 2 lectures, 1 laboratory. Prerequisite: Senior standing in Soil Science.

Spanish/Speech

SS 423 Soil Chemistry (3)

Fundamental concepts and practices in soil chemistry. Methods of analysis and interpretation of significant investigations for the management of soils. 2 lectures, 1 laboratory. Prerequisite: Senior standing in Soil Science.

SS 432 Soil Physics (4)

Advanced study of the physical properties of soils. Application of physical-chemical soil relationships to farming and engineering practices. 2 lectures, 2 laboratories. Prerequisite: Senior standing in Soil Science.

SS 433 Land Use Planning (3)

Evaluation of land use capabilities. Development of plans and practices for the management of crop, range, and forest land. 2 lectures, 1 laboratory. Prerequisite: Senior standing in Soil Science.

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

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

SS 463 Undergraduate Seminar (2)

Review of current research, experiments, and problems related to the students' major field of interest. Preparation and presentation of reports on problems or research activities. 2 lectures.

SS 508 Conservation Legislation (3)

Legislation enabling and implementing conservation programs. Legal responsibilities of individuals and groups in the development of natural resources. Proposed or needed legislation for more effective conservation. 3 lectures. Prerequisite: Graduate standing, Cons 311

SS 521 Soil Morphology (3)

Advanced study of the morphological characteristics of soils. New techniques used in modern systems of soil classification and mapping. 2 lectures, 1 laboratory. Prerequisite: Graduate standing.

SS 581 Graduate Seminar in Soils (3)

A review of current research, experiments and problems related to soil science. Development of special demonstration and field plot trials for educational groups. 3 lectures.

SS 582 Graduate Seminar in Land Management (3)

Development of plans and practices for the management of crop, range, and wood land. 2 lectures, 1 laboratory.

SS 599 Thesis or Internship (3) (3) (3)

Problems and topics in advanced soil conservation according to interests and needs of the students enrolled. Prerequisite: Graduate standing.

SPANISH

(See Foreign Language)

SPEECH

Sp 200 Principles of Speech (3)

Introduction to the fundamentals and principles which underlie effective speaking. Practical experience in presenting speeches before an audience. A student may not receive credit for both Sp 200 and Sp 201. 3 lectures. Prerequisite: Eng 105

Sp 201 Public Speaking (2)

Training in giving speeches before audiences. Experience in practical speaking situations. 1 lecture, 1 two-hour laboratory.

Sp 202 Advanced Public Speaking (2)

Practice in the composition and delivery of various types of speeches. Emphasis on speeches related to the student's vocational objective. 1 lecture, 1 two-hour laboratory. Prerequisite: Sp 200 or 201

Sp 214 Introduction to Broadcasting (3)

History of American broadcast media. FCC licensing and control, advertising practices, and trends in programming. Production of special types of programs. 3 lectures. Prerequisite: Sp 200 or 201

Sp 215 Introduction to Debate (3)

Analysis of evidence and reasoning. Preparation and delivery of speeches based on logical proof. Practice in refutation. 3 lectures. Prerequisite: Sp 200 or Sp 201, or consent of instructor.

Sp 217 Essentials of Discussion (3)

Basic principles and techniques of discussion. Survey of the importance of discussion in contemporary society, including a study of and practice in informal group discussion, panel discussion, symposium, and forum. 3 lectures. Prerequisite: Sp 200 or Sp 201

Sp 300 Forensic Activity (1)

Participation in intercollegiate forensic activities. Any student who expects to participate in such activities during the quarter should enroll. Specific assignments will be determined by instructor. May be repeated to 6 units.

Sp 301 Argumentation and Debate (3)

Techniques of argumentation and their application to debate; logic and reasoning; fallacies of reasoning; experience in various forms of formal argument and debate; techniques of debate program administration. 3 lectures. Prerequisite: Sp 202 or Sp 215

Sp 302 Introduction to Speech Correction (3)

Survey of speech disorders emphasizing causes, symptoms, and treatment of functional defects; preparation of records and case studies; role of the speech therapist in the community and in public schools; role of the public school teacher in speech improvement. 3 lectures.

Sp 303 Industrial and Professional Speech (3)

Speech in industrial, professional, and informal business including interviews, sales talks, and conference speaking. 3 lectures. Prerequisite: Sp 200 or Sp 201

Sp 304 Persuasion (3)

Basic theory of persuasive speaking; methods of attention, suggestion, motivation and adaptation as applied to speechmaking for the influencing of group opinion and action; emphasis on logical, emotional and ethical processes; presentation of speeches using persuasive methods. 3 lectures. Prerequisite: Sp 202 or Sp 215

Sp 305 Techniques of Oral Reading (3)

Basic theory of interpretation; selection, preparation, and presentation of material for oral reading. 3 lectures. Prerequisite: Sp 200 or Sp 201

Sp 306 Voice and Phonetics (3)

Physiological and anatomical bases of normal voice production. Phonetics as a basis of correct sound formation and standards of pronunciation. Concentration on special skills of enunciation, articulation, and voice improvement. 3 lectures.

Speech

Sp 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: Consent of instructor.

Sp 403 Discussion and Conference Leadership (2)

Relationship of discussion to the democratic processes, critical thinking and the role of leadership in the group process, participation in business and industrial conferences and discussion forums. 2 lectures. Prerequisite: Sp 202 or Sp 217

Sp 405 Advanced Oral Interpretation (2)

Techniques of oral interpretation for special literary forms, interpretation in relation to acting, story interpretation as related to teaching techniques, reading of speech manuscripts. 2 lectures. Prerequisite: Sp 305

Sp 407, 408, 409 History and Criticism of Public Address (3) (3) (3)

Selected speakers and speeches from the ancient Greeks to modern times. Historical survey and evaluation of great speakers and speeches as they pertain to the development of British and American institutions. 3 lectures. Prerequisite: Sp 304, or consent of instructor.

Sp 410 Biblical Reference in Speechmaking (3)

Study of the Bible for understanding of Biblical references used in great speeches, oral presentation of literary passages for appreciation of quotable material. Methods used in speeches contained in the Bible. 3 lectures.

Sp 412 Techniques of Writing for Broadcasting (3)

Development of writing skills peculiar to radio and television media. Writing of original program material, adaptations of short stories, children's books, and the novel. Writing of public service and educational material. 3 lectures.

Sp 451 Applied Broadcasting Practices (2)

Basic television and radio production including live studio, film, and tape techniques. Educational television methods. Preparation of programs for closed circuit viewing and listening. May be repeated to 6 units. 2 laboratories.

Sp 461 Senior Project (2)

Selection and completion of a project under faculty supervision. Projects typify problems which a graduate may face in his field of employment. Project results are presented in a formal written report. Minimum 60 hours total time.

Sp 463 Undergraduate Seminar (2)

Discussion of individual projects, oral reports on material in current professional writings. 2 lectures. Prerequisite: Senior standing.

Sp 511 Rhetorical Theory (3)

Analytical survey of the major contributions of rhetorical authorities; the application of these contributions to current public speaking. 3 lectures.

Sp 521 Curriculum and Methods in Speech (3)

Curricula, methods, and procedures that may be used effectively in teaching speech classes and directing speech activities in secondary schools. Selection and organization of teaching material. 3 lectures. Prerequisite: Admission to teacher education program and graduate status.

Sp 590 Seminar in Speech (1-3)

Readings and papers on special problems in selected areas of speech. Total credit limited to 6 units. 1-3 lectures. Prerequisite: Graduate status.

STATISTICS AND PROBABILITY

Stat 211 Elementary Probability and Statistics (3)

Graphical representation of statistical data; calculation and uses of various averages; measures of variability; permutations, combinations, and elementary probability; binominal and normal distributions; random sampling, testing hypotheses, and confidence limits. 3 lectures. Prerequisite: Math 113 or instructor's permission.

Stat 212 Statistical Methods (3)

Tests of hypotheses, small samples, paired samples; nonparametric methods; linear regression and correlation; chi-square distribution; index numbers; time series; analysis of variance. 3 lectures. Prerequisite: Stat 211 or instructor's permission.

Stat 321 Mathematics of Statistics (3)

Probability, permutations and combinations, discrete and continuous random variables, hypergeometric and binomial frequency functions, frequency distributions, mean, variance, and standard deviation, moments, median and percentiles, the normal distribution, bivariate distributions. 3 lectures. Prerequisite: Math 142

Stat 322 Mathematics of Statistics (3)

Continuation of Stat 321. Concept of statistical inference, tests of hypotheses, confidence intervals, Student's t-distribution, chi-square distribution, F-distribution, Poisson distribution, bivariate normal distribution. 3 lectures. Prerequisite: Stat 321

Stat 323 Mathematics of Statistics (3)

Continuation of Stat 322. Linear regression and correlation; least squares; analysis of variance including the one-way classification, randomized blocks, latin squares, factorial designs, and multiple comparisons of population means; analysis of covariance. 3 lectures. Prerequisite: Stat 322

Stat 425 Probability Theory and Applications I (3)

Mathematical models of random phenomena, basic probability theory, independence and dependence, Markov chains, distribution functions and probability laws, expectation of a function with respect to a probability law. 3 lectures. Prerequisite: Stat 322

Stat 426 Probability Theory and Applications II (3)

Normal, binomial, Poisson, exponential, and gamma probability laws; random variables, probability law of a function of random variables; conditional distributions; expectation of a random variable; sums of independent random variables; characteristic functions. 3 lectures. Prerequisite: Stat 425

Stat 527 Theory and Applications of Statistics (3)

Discrete and continuous random variables, expected values and moments, moment generating functions, multivariate distributions, sampling, sampling distributions, interval estimation, tests of hypotheses. 3 lectures. Prerequisite: Stat 322

VEGETABLE CROP PRODUCTION

VC 230 General Vegetable Crops (4)

Principles involved in production, harvesting, packaging, and marketing of major California vegetable crops. Survey of the vegetable industry. 3 lectures, 1 laboratory.

VC 232 Vegetable Crops Production (4)

Production, adaptation, utilization of vegetable crops such as cole crops, beans, celery, peppers, squash, melons, cucumbers, lettuce, carrots, spinach, sweet potatoes. 3 lectures, 1 laboratory. Prerequisite: CP 131

Veterinary Science

VC 324 Harvesting, Packaging and Marketing Vegetable Crops (4)

Harvesting methods and procedures; current handling and packaging techniques; containers; storage; and grades, grading and laboratory tests for fresh market vegetables. 3 lectures, 1 laboratory. Prerequisite: VC 232

VC 326 Vegetables for Processing (4)

Production principles and methods; cultural and harvesting practices as applied to vegetable crops grown primarily for processing. Emphasis will be on planting schedules, field sampling, maturity tests, and forecasting crop maturity. 3 lectures, 1 laboratory. Prerequisite: CP 131, 133 or VC 230

VC 424 Vegetable Crop Management (4)

Organization, management, and operation of commercial size vegetable production acreages; advanced work in production, harvesting, marketing operations, and the varied aspects of the entire commercial vegetable production industry. 3 lectures, 1 laboratory. Prerequisite: CP 131, 133 or VC 232

VETERINARY SCIENCE

VS 100 Principles of Veterinary Science (5)

Structural aspects and functions of the principal systems of farm animals, control and prevention of common diseases causing economic losses in livestock. 4 lectures, 1 laboratory. To be taken by technical students only, in substitution for VS 123, 202 and 203. Not open to degree students for degree credit.

VS 123 Anatomy and Physiology (3)

Structural aspects and the normal functions of the principal systems of the various farm animals. 2 lectures, 1 laboratory. Prerequisite: Zoo 131, 132

VS 202 Livestock Hygiene and Sanitation (3)

Animal health problems encountered on the farm. The livestock producer's part in disease control and animal health improvement programs. 3 lectures. Prerequisite: Bact 221

VS 203 Animal Parasitology (3)

Identification, life cycles, prevention and control of the common external and internal parasites causing economic loss in livestock. 3 lectures. Prerequisite: Zoo 131, 132

VS 310 Zoonosis (2)

A study of some of the common diseases of domestic animals and birds which can be transmitted to man. 2 lectures. Prerequisite: Zoo 131, Bact 221

VS 522 Seminar in Disease Problems (2)

Farm livestock disease problems related to the specific countries of Latin America, Africa, Middle East and Asia. Familiarization with governmental control, prevention and eradication programs for the common and principal diseases unique to individual countries; also familiarization with special testing procedures in various governmental programs. 2 lectures. Prerequisite: VS 202

WELDING AND METALLURGICAL ENGINEERING

WM 121, 122 Principles of Metallurgy (2) (2)

Nature and identification of metals, metal joining and working processes. Selection of metals. Macroetching. Preparation of metallographic specimens. Writing metallurgical engineering reports. Iron-iron carbide diagram. Calculations associated with metallurgical engineering. 1 lecture, 1 laboratory.

WM 141 Manufacturing Processes (1)

Theory, practice, and application of metal joining processes including oxyacetylene, resistance, tungsten-inert-gas, metallic-inert-gas, aluminum brazing and silver alloy brazing. Mechanical tests of welded joints and related reports. 1 laboratory.

WM 142 Manufacturing Processes (1)

Theory and practice in metal cutting and arc welding processes. Electrode manufacture, classification, and application. Welded joint design. Introduction to codes, testing, joint strength. Mechanical tests of welded joints and related reports. Application of process to industrial uses. 1 laboratory.

WM 151 Miniature Bonding (1)

Fundamentals of tungsten inert gas welding, plasma welding, brazing, low temperature soldering, adhesives, and thermal-free joining processes of miniature electronic component assemblies. Joint design. Application of principles for selection of flux for specific bonding processes. 1 laboratory. Prerequisite: WM 141

WM 155 Fundamentals of Metallic Arc Welding (1)

Shielded metallic arc welding including vertical position. Expansion, contraction, distortion, and residual stresses as applied to welded structures. Various joint types including lap, fillets, and butt joints. 1 laboratory, Prerequisite: WM 142

WM 156 Fundamentals of Metallic Arc Welding (1)

Shielded metallic arc welding of steel plates. Includes butt welding, backing materials, hard surfacing, and cast iron welding. Basic weld tests. Welding of light-gauge steel. 1 laboratory. Prerequisite: WM 155

WM 221, 222 Physical Metallurgy (4)(4)

Lattice structures, cooling curves, alloy systems. Mechanical test methods, strength, ductility, modulus of elasticity. Heat treatment, isothermal transformation diagrams, complex alloy systems. Application of principles for selection of metals for corrosion resistance. Other engineering materials, including ceramics. 3 lectures. 1 laboratory.

WM 240 Additional Metallurgy Laboratory (1-2)

Total credit limited to 4 units, with not more than 2 units in any one quarter. 1 or 2 laboratories.

WM 251, 252 Advanced Metal Joining Processes (1) (1)

High speed automatic and semi-automatic production processes for joining ferrous and non-ferrous metals and alloys. Procedure tests and qualifications in accordance with governing codes. Fundamentals of nondestructive testing. Basic cost estimating. 1 laboratory. Prerequisite: WM 142

WM 254 Elements of Welded Structures (2)

Cost estimating of steel fabrications. Basic strength of materials as related to machinery structural sections. Strength of welded joints. Design of fabricated machinery. Principally for Agricultural majors. 1 lecture, 1 laboratory. Prerequisite: WM 156

WM 301, 302, 303 Theory of Materials (3) (3) (3)

Fundamentals of material science; concepts and problems relating structure of metals to their behavior in use. Uniaxial and complex static stresses; effects of temperature and rate of loading; elastic and plastic deformation; electrical, magnetic, and thermal behavior; fatigue and creep. 3 lectures. Prerequisite: Math 241, Phys 133, ME 211, Chem 125; or consent of instructor.

Welding-Metallurgy

WM 306 Metallurgy for Engineers (4)

Structure of matter. Physical and mechanical properties of metals and alloys. Selection, treatment, and use of metals and alloys. Steel, cast iron, stainless steels, nonferrous metals, and alloys for high temperature service. Identification of microstructures. Application to metallurgical engineering problems. 3 lectures, 1 laboratory. Prerequisite: Sophomore standing in Engineering.

WM 314 Materials Engineering (3)

Selection, fabrication and application of materials useful in electronic industry. Metallic, non-metallic, ceramic, insulating, and semi-conductor materials. Application of materials engineering in glass-to-metal seals, diffusion, thin films, printed and integrated circuits. Corrosion and protective coatings. 3 lectures. Prerequisite: Phys 211

WM 324, 325, 326 Metallurgical Engineering (4) (4) (4)

Theory and application of castings to metal product manufacturing. Casting, heat treatment, and metallurgy of welding. Ferrous and nonferrous alloys. Atmospheres, bright annealing, brazing, carbon restoration. Failure investigation. Application of non-destructive testing, X-ray, magnetic particle, ultrasonic, eddy current techniques. 2 lectures, 2 laboratories. Prerequisite: WM 222

WM 341 Special Problems in Welding by Arrangement (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 laboratories. Prerequisite: WM 142

WM 359 Advanced Welding (1)

The application of the inert-gas shielded arc welding process to the hard-to-weld metals, including aluminum and stainless steel, and titanium. Argon and helium as gas shields. 1 laboratory. Prerequisite: WM 141, 142

WM 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.

WM 421, 422, 423 Advanced Theory of Materials (4) (4) (4)

X-ray diffraction, theory of alloying, imperfections and dislocations, strengthening mechanisms, plastic deformation, strain-hardening, recovery and recrystallization, diffusion, solidification, fracture, creep, fatigue. Metallurgical reactions, thermodynamics of solids, physical chemistry of corrosion gas-metal interactions, corrosion control, polymers, ceramics, cermets. 4 lectures. Prerequisite: WM 303, 326, Chem 432

WM 424, 425, 426 Applied Metallurgical Engineering (5) (5) (5)

Tool and complex alloy steels, advanced metallography and photomicrography, investigation of actual service failures, creep, fatigue, corrosion, metallurgical computations, preparation of formal engineering reports. 3 lectures, 2 laboratories. Prerequisite: WM 303, 326

WM 434 Welding Engineering (3)

Weldability of steels and alloys and other metallurgical aspects of welded fabrication. 1 lecture, 2 laboratories. Prerequisite: WM 306

WM 435 Welding Engineering (3)

Pressure vessel design and other design problems in accordance with governing codes. Cost estimating of steel fabrication. Jig and fixture design for mass production with various welding processes. 1 lecture, 2 laboratories. Prerequisite: WM 434

WM 436 Welding Engineering (3)

Problems in quality control. Process selection and evaluation for high speed production. Process procedure qualification. 1 lecture, 2 laboratories. Prerequisite: WM 435

WM 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.

WM 463 Undergraduate Seminar (2)

Preparation, oral presentation, and discussion by students of technical papers on recent engineering developments. 2 lectures. Prerequisite: Senior standing.

ZOOLOGY

Zoo 122 Elementary Human Physiology (4)

Basic patterns of body functions and structure. 3 lectures, 1 laboratory.

Zoo 131 General Zoology (4)

Cells, tissues, and organ systems of vertebrates; emphasis on man and domestic animals. 2 lectures, 2 laboratories.

Zoo 132 General Zoology (4)

Embryology, genetics, taxonomy, economic zoology, ecology and evolution. 2 lectures, 2 laboratories. Prerequisite: Zoo 131

Zoo 133 General Zoology (4)

The variety, structure and distribution of animals. 2 lectures, 2 laboratories. Prerequisite: Zoo 132

Zoo 303 Vertebrate Embryology (3)

The developmental processes from the egg to the formation of the body and the establishment of the principal organs and systems. 3 lectures. Prerequisite: Zoo 132

Zoo 321 Mammalogy (4)

Identification, life histories, and economic importance of mammals, with special reference to California species. 2 lectures, 2 laboratories. Prerequisite: Zoo 132 or Bio 129

Zoo 322 Biology of Fishes (4)

Identification, physiology, anatomy, and behavior of marine and freshwater fishes with special reference to local and economically important species. 2 lectures, 2 laboratories. Prerequisite: Zoo 132

Zoo 326 Comparative Anatomy of the Vertebrates (5)

Comparative structure of vertebrate organ systems. 3 lectures, 2 laboratories. Prerequisite Zoo 132. Recommended: Zoo 303 and Zoo 353

Zoo 329 Vertebrate Field Zoology (4)

Identification and natural history of terrestrial vertebrates, with emphasis on field study of local forms. 2 lectures, 2 laboratories. Prerequisite: Zoo 132 or Bio 129

Zoo 336 Invertebrate Zoology (4)

Study of invertebrate groups of animals with emphasis on taxonomy, morphology, distribution and economic importance. 2 lectures, 2 laboratories, and field work. Prerequisite: Zoo 133 or Bio 129

Zoology

Zoo 337, 338, 339 Human Anatomy and Physiology (3) (3) (3)

Morphology of man, with laboratory dissection of the cat. Functions of the various organ systems of man with appropriate laboratory experiments. Zoo 337 not open for credit to students who have completed Zoo 326, Comparative Anatomy. 2 lectures, 1 laboratory. Prerequisite: Zoo 132, elementary chemistry.

Zoo 353 Vertebrate Embryology Laboratory (2)

Study of the developmental anatomy of selected stages of the frog, chick and pig. Demonstrations and exercises in the preparation of embryonic materials for study purposes. 2 laboratories. Prerequisite: Zoo 303 (may be taken concurrently).

Zoo 422 Histology (5)

Microscopic anatomy of principal tissues and organs of vertebrates with an introduction to histological techniques. 2 lectures, 3 laboratories. Prerequisite: Zoo 132. Recommended: Zoo 303 and Zoo 353

Zoo 425 Parasitology (4)

External and internal parasites of man and animals; life history; parasite-host relationships; control and recognition of species of clinical importance. 2 lectures, 2 laboratories. Prerequisite: Zoo 132. Recommended: Zoo 133

Zoo 426 Serology and Immunology (4)

Nature of innate and acquired immune reactions; theory and techniques of serological methods in diagnosing disease. Designed for preparing laboratory technologists. 2 lectures, 2 laboratories. Prerequisite: Consent of instructor.

Zoo 428 Hematology (4)

Microscopic and chemical examination of blood. Designed for preparing laboratory technologists. 2 lectures, 2 laboratories. Prerequisite: Consent of instructor. Recommended: Zoo 426

Zoo 590 Seminar in Zoology (1)

Problems and topics in advanced zoology selected according to the interest and needs of the students enrolled. Maximum of 3 units. 1 lecture. Prerequisite: Graduate status and evidence of satisfactory preparation in zoology.

DIRECTORIES

DEPARTMENT HEADS

SCHOOL OF AGRICULTURE

Agricultural Management.....	Chase C. Wilson
Agricultural Education.....	H. H. Burlingham
Agricultural Engineering.....	Lloyd H. Lamouria
Animal Husbandry.....	Richard F. Johnson
Crops.....	Corwin M. Johnson
Dairy.....	Harmon Toone
Food Processing.....	DeWitt F. Sampson
Ornamental Horticulture.....	Howard C. Brown
Poultry Industry.....	Richard Leach
Soil Science.....	Logan Carter
Veterinary Science.....	John Allen

SCHOOL OF APPLIED ARTS

Audio-Visual.....	John A. Heinz
Business Administration.....	Owen L. Servatius
Education.....	Walter P. Schroeder
English.....	Willard M. Pederson
Home Economics.....	Marie S. Pfeiffer
Journalism.....	John R. Healey
Music.....	Harold P. Davidson
Physical Education.....	Robert A. Mott
Printing Technology and Management.....	Roderick W. Carruthers
Speech.....	James R. Emmel

SCHOOL OF APPLIED SCIENCES

Biological Sciences.....	Glenn A. Noble
Chemistry.....	Bruce Kennelly
Mathematical Sciences.....	Milo E. Whitson
Military Science.....	Col. Robert W. Green
Physics.....	Woodford E. Bows
Social Sciences.....	M. Eugene Smith

SCHOOL OF ARCHITECTURE

Directors.....	Paul R. Neel, William R. Phillips, Kenneth E. Schwartz
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SCHOOL OF ENGINEERING

Aeronautical Engineering.....	Charles P. Davis
Electrical Engineering.....	Fred W. Bowden
Electronic Engineering.....	E. R. Owen
Engineering Technology.....	James M. McGrath
Environmental Engineering.....	Walter E. Holtz
Industrial Engineering.....	Donald E. Morgan
Industrial Technology.....	J. M. McRobbie
Mechanical Engineering.....	Leon F. Osteyee
Welding and Metallurgical Engineering.....	Richard C. Wiley

PROFESSIONAL LIBRARY STAFF

L. Harry Strauss	College Librarian
Joy G. Berghell	Reference Librarian
Charles R. Beymer	Head, Technical Services
Mary L. Brady	Cataloger-Curriculum
Frederick L. Genthner	Special Collections Librarian
Phyllis J. Hansen	Assistant Cataloger
Cheri Kong	Assistant Cataloger
F. Helen MacKenzie	Assistant Cataloger
Lois C. Makin	Reference Librarian
Angelina Martinez	Head, Public Services
P. Lane Page	Reference Librarian
Evelyn D. Reagan	Head Cataloger
Catherine A. Schneider	Reference Librarian
Ruth G. Spencer	Assistant Periodicals Librarian
Nicholas Szigethy	Acquisitions Librarian
Pearl Turner	Curriculum Librarian
Sidney S. Wang	Assistant Cataloger
Glenn V. Whaley	Head Reference Librarian
Edward A. Wilk	Assistant Acquisitions
Evelyn L. Wood	Periodicals Librarian

EMERITI

Carl G. Beck	Farm Management
Lyman L. Bennion	Animal Husbandry
Ralph O. Bille	Agricultural Engineering
James H. Carrington	Agricultural Engineering
Spelman B. Collins	Animal Husbandry
George M. Drumm	Dairy Husbandry
Frederick M. Essig	Biological Sciences
A. M. Fellows	Printing Engineering and Management
Stanton Gray	Crops
C. E. Knott	Mechanical Engineering and Dean of Engineering
M. C. Martinsen	Aeronautical Engineering
C. O. McCorkle	Agricultural Economics and Dean of the College
James F. Merson	Agricultural Engineering
Douglass W. Miller	Journalism
Robert H. Reece	Mechanical Engineering
John P. Riebel	English and Speech
Vard M. Shepard	Animal Husbandry and Dean of Agriculture
Ralph E. Weston	Mathematical Sciences
Dorothy S. Wright	Librarian

FACULTY AND STAFF

(Number in parentheses indicates year of appointment)

Listed as of January, 1969

ADAMSON, ROBERT W. (1953) Mechanical Engineering
B.S., Ch.E., Tulane University, 1941; M.S., Ch.E., Oregon State College, 1948.

Experience: Petroleum refinery engineer, Standard Oil Company of New Jersey; instructor, mechanical engineering, Oregon State College; research assistant, industrial sales engineer, Union Oil Company of California. Registered professional engineer, California.

ALEXANDER, WILLIAM M. (1958) Social Sciences
B.S., Oregon State University, 1949; M.S., 1951; M.A., Pennsylvania State University, 1953; Ph.D., University of Oregon, 1962; additional graduate study, University of Stockholm, George Washington University, University of Georgia.

Experience: Management assistant, U.S. Geological Survey; teaching fellow, University of Oregon; instructor, Oregon State University; Fulbright professor of political science, India.

AL-HADAD, SABAH (1965) Mathematical Sciences
B. S., Texas Technological College, 1960; M.A., California State Polytechnic College, 1962; additional graduate study, California State Polytechnic College.

Experience: Director, Ministry of Agricultural Development, Baghdad, Iraq.

ALLEN, JOHN K. (1952) Head, Veterinary Science Department
D.V.M., Iowa State College, 1934.

Experience: Bureau of Animal Industry, State of Iowa; Federal Bureau of Animal Industry; divisional superintendent in charge of feeding operations, Swift & Co., Omaha, Nebraska; U.S. Army Veterinary Corps; general practice of veterinary medicine.

ALLEN, RAY (1955) Engineering Technology
B.A., Santa Barbara State College, 1942; M.A., California State Polytechnic College, 1965; additional graduate study, University of Southern California.

Experience: Chemist, Ventura Coastal Lemon Co.; technician, U.S. Air Force; instructor, U.S. Naval Air Technical Training Center; consultant, USAID, Africa.

AMARAL, ALFRED W. (1967) Agricultural Management
B.S., California State Polytechnic College, 1964; graduate study, Golden Gate College.

Experience: Assistant manager, G. L. Soares Labor Contractor; assistant sales manager, Martin Produce, Inc.; agricultural representative, Wells Fargo Bank.

AMATO, ANTHONY J. (1955) Ornamental Horticulture
B.S., California State Polytechnic College, 1949; graduate study, California State Polytechnic College.

Experience: Instructor, Mt. San Antonio Junior College, Pomona; Oakland Junior College; landscape architect and contractor, Walnut Creek, California; officer, U.S. Air Force.

Faculty and Staff

- ANDERSEN, OLIVE M. (1958)** Mathematical Sciences
B.A., University of Madras, India, 1928; L.T., 1929; M.A., California State Polytechnic College, 1961.
Experience: Teacher, Stanes European High School, Coonoor, India; Baldwin Girls' High School, Bangalore, India.
- ANDERSON, ELIZABETH B. (1958)** English
B.S., Ohio University, 1938; M.A., California State Polytechnic College, 1959; additional graduate study, University of California, Santa Barbara.
Experience: Reporter and feature writer, Athens Messenger, Athens, Ohio; copywriter, Cleveland Press, Cleveland, Ohio; advertising department, General Electric Company, Bridgeport, Connecticut; free-lance writing.
- ANDERSON, RICHARD A. (1947)** Physical Education
B.S., University of Southern California, 1942; M.S., 1947; additional graduate study, University of California at Los Angeles.
Experience: Playground director, Los Angeles Playground and Recreation Department; officer, U.S. Navy; swimming pool director, South Pasadena; assistant instructor in physical education and assistant swimming coach, University of Southern California.
- ANDERSON, ROY E. (1949)** Business Administration
A.B., Pacific Lutheran College, 1940; M.A., Stanford University, 1948; M.B.A., 1952; Ed.D., 1963.
Experience: Assistant manager, Hancock Oil Company, Tacoma, Washington; teacher, Parkland and Tacoma, Washington, public schools systems; officer, U.S. Army; instructor, Monterey Peninsula College, Monterey, California; National Park ranger; dean, arts and sciences division, California State Polytechnic College.
- ANDERSON, RUSSELL K. (1955)** Animal Husbandry
B.S., University of Minnesota, 1948; M.S., Iowa State College, 1950; Ph.D., 1956.
Experience: U.S. Air Force; instructor, Animal Husbandry Department, Iowa State University.
- ANDERSON, WARREN R. (1946)** Electrical Engineering
B.S., University of Minnesota, 1939; B.S., Louisiana State University, 1944; graduate study, Central Signal Corps School, Camp Crowder, Missouri.
Experience: Teacher of agricultural science, Windom, Minnesota; engineer, Plant Engineering Agency, Philadelphia; engineer, Automatic Electric Company, Chicago. Registered professional engineer, California.
- ANDOLI, FREDERICK P. (1968)** Biological Sciences
B.A., Upsala College, 1963; M.S., Utah State University, 1968.
Experience: Teaching assistant, Upsala College, Utah State University; research supervisor, Army Chemical Corps.
- ANDREINI, ROBERT L. (1954)** Speech
B.A., Stanford University, 1941; M.A., 1949; additional graduate study, University of California, Berkeley, Teachers College, Columbia University.
Experience: U.S. Air Force; Royal University of Pisa, Italy; teacher, California high schools.
- ANDREOLI, ALFRED E. (1963)** Aeronautical Engineering
B.S., University of Colorado, 1954; M.S., California Institute of Technology, 1956; additional graduate study, University of Colorado.
Experience: Test engineer, aerodynamicist, Northrop Aircraft; assistant professor, Los Angeles State College; teaching associate, University of Colorado.
- ANDRESEN, JAMES G. (1956)** Mechanical Engineering
B.S., California State Polytechnic College, 1956.
Experience: U.S. Army.

Faculty and Staff

ANDREWS, DALE W. (1950) Academic Vice President
B.S., University of California, Davis, 1941; M.A., California State Polytechnic College, 1952; Ph.D., University of Minnesota, 1957.

Experience: Director of agriculture and supervising teacher, Merced Union High School; director of agriculture and supervising teacher, Arroyo Grande Union High School, Arroyo Grande; officer, U.S. Marine Corps; agricultural teacher trainer, instructional materials coordinator, and special educational services coordinator, Dean of the College, Vice President, California State Polytechnic College; senior Danforth associate.

APLEGARTH, JOHN H. (1952) Biological Sciences
A.B., San Jose State College, 1935; M.A., Stanford University, 1938; additional graduate study, University of Maryland.

Experience: Instructor, San Jose State College; Bureau of Plant Quarantine and Entomology; ranger-naturalist, Sequoia National Park; commodity expert, drug and miscellaneous plants, U.S. Tariff Commission, Chemical Division, Washington, D.C.; assistant professor, University of Maryland.

ARMENTROUT, WILLIAM W. (1953) Coordinator, Secondary Education
B.S., University of Missouri, 1939; A.B., Colorado State College of Education, 1940; M.A., Columbia University, 1940; Ed.D., Stanford University, 1953.

Experience: Guidance counselor, Menlo School and College; personnel classification officer and personnel consultant, U.S. Air Force; associate registrar, Stanford University; test officer and instructor in education, California State Polytechnic College.

ASBURY, ROBERT F., JR. (1964) Architecture
B.S., University of Kansas, 1954; M. Arch., 1961.

Experience: Assistant professor, University of Kansas; designer-draftsman, various architectural firms; U.S. Air Force. Registered architect, Kansas.

BABB, JAMES H. (1959) Printing Technology and Management
Experience: Fifteen years experience in printing, 6½ of which was as owner of Visalla Printing Service.

BACON, JAMES P., JR. (1967) Biological Sciences
A.B., Carleton College, 1961; M.S., Michigan State University, 1962; additional graduate study, University of Chicago.

Experience: Research and field assistant, Field Museum of Natural History of Chicago, Michigan State University; teaching assistant, University of Chicago.

BAILEY, GORDON A. (1966) English
B.A., University of Colorado, 1961.

Experience: Training specialist, U.S. Air Force, U.S. Civil Service, General Electric Company, Martin-Marietta Corporation; human factors specialist, consultant Bruce Erts and Associates, General Electric Company.

BAILEY, ROGER S. (1962) Education
B.A., Allegheny College, 1949; M.A., State University of Iowa, 1951.

Experience: Supervising teacher, State University of Iowa; art instructor, Coronado High School and La Mesa Junior High School; art supervisor, Escondido Union School District; instructor in art education, University of California Extension; Palomar Junior College and Pacific Lutheran University, Washington.

BAKER, E. H. (1968) Mechanical Engineering
B.S., Northwestern University, 1958; M.S., University of California, 1963; Ph.D., Northwestern University, 1965.

Experience: Senior technical specialist, North American Rockwell Corporation.

Faculty and Staff

- BARR, STANLEY L. (1959)**.....English
 B.A., St. Bernardine of Siena College, 1953; M.A., University of Michigan, 1955; additional graduate study, University of Wisconsin, Harvard University, University of Oregon.
 Experience: Teacher, Michigan Public Schools; assistant professor, Lakeland College; instructor, Wisconsin State College.
- BARROWS, FRANK B. (1968)**.....Industrial Technology
 B.S., U.S. Merchant Marine Academy, 1949; additional graduate study, San Francisco State College, University of Houston, Utah State University.
 Experience: Research and teaching assistant, Utah State University; assistant professor, University of Southern California; instructor, College of San Mateo; teacher, Westmoor High School; engineer, various merchant vessels; officer, U.S. Navy.
- BAUR, LAWRENCE E., JR. (1965)**.....Business Administration
 B.B.A., University of Michigan, 1954; M.B.A., 1957
 Experience: Staff accountant, Wagar, Lunt and Oehring, Michigan; accountant, U.S. General Accounting Office, Los Angeles; staff accountant, Touche, Ross, Bailey and Smart, Los Angeles; staff accountant and partner, Charles Belcher and Company, San Luis Obispo; Certified Public Accountant; U.S. Army.
- BEATIE, GEORGE C. (1959)**.....Associate Dean, Special Programs
 A.B., University of California at Santa Barbara, 1949; M.A., California State Polytechnic College, 1956; additional graduate study, University of California at Santa Barbara, Northwestern University.
 Experience: Assistant instructor, University of California at Santa Barbara; music director, USNR, University of Rochester, New York; teacher, Nipomo Elementary School, Oceano Elementary School, Arroyo Grande Union High School; director, student activities, Arroyo Grande Union High School; band director, class program scheduler, California State Polytechnic College, San Luis Obispo.
- BENTLEY, ROBERT A. (1965)**.....Mathematical Sciences
 B.A., College of Wooster, 1929; M.A., University of Chicago, 1932; B.D., 1933; Ph.D., 1951; additional graduate study, University of Michigan, Michigan Technical University, San Diego State College, University of Minnesota.
 Experience: Pastorates, United Church of Christ; Portland, Oregon; Clinton, Iowa; Hancock, Michigan; and San Diego; instructor, Suomi College, Mesa College, California Western University; teacher, Adult Evening High School, San Diego; psychological counselor and dean, Pastoral Counseling Center, San Diego.
- BERGHELL, JOY GARRISON (1956)**.....Library
 B. of Journalism, University of Missouri, 1935.
 Experience: Copywriter, public relations and promotion, Los Angeles Times; account executive, R. W. Webster Advertising, Los Angeles; editorial writer, Southwestern Signal Corps Training Center, San Luis Obispo; free-lance advertising, publicity and newspaper writer.
- BERMANN, JAMES (1964)**.....Agricultural Engineering
 B.S., California State Polytechnic College, 1959, 1961.
 Experience: Chief engineer, Grether Agricultural Co.; Farming; U.S. Army.
- BETHEL, ARTHUR C. W. (1968)**.....Mathematical Sciences
 B.A., University of California, Santa Barbara, 1964; M.A., 1968.
 Experience: Associate instructor, University of California, Santa Barbara.
- BETZ, ELLARD W. (1947)**.....Engineering Technology
 B.A., Santa Barbara State College, 1942.
 Experience: U.S. Navy; teacher, Victorville, California.

Faculty and Staff

- BEYMER, CHARLES R. (1966)** Library
B.S., University of Wisconsin, 1950; M.L.S., 1955.
Experience: Cataloger, Marquette University, Cornell University, Finger Lakes Library System, Ithaca, New York; science reference librarian, University of Notre Dame.
- BIRKETT, RICHARD J. (1955)** Animal Husbandry
B.S., California State Polytechnic College, 1953; M.S., Kansas State University, 1963.
Experience: Feed and milling supervision, Union Stock Farms, Blythe, California.
- BISHOP, CHESTER O. (1957)** Mechanical Engineering
B.S., McPherson College, 1929; M.S., Texas A.&M. College, 1955.
Experience: Professor, Arkansas Tech; Hind Junior College, Raymond, Mississippi; instructor, San Angelo College, Texas; Copiah-Lincoln Junior College, Wesson, Mississippi; Texas A.&M. Radar School; engineer and manager, B & M Machine Co., Grenada, Mississippi.
- BLOOM, EMMETT A. (1946)** Animal Husbandry
B.S., University of California, Davis, 1934.
Experience: Agricultural instructor at Ripon, Laton, and Corning High Schools.
- BONGIO, ENRICO P.** Welding and Metallurgical Engineering
A.B., Chico State College, 1948; M.A., California State Polytechnic College, 1965.
Experience: Welder, Chicago Bridge and Iron Co. and Eureka Boiler Works and Steel Products, Eureka, California; U.S. Army Signal Corps; instructor, Sonoma Valley Union High School, Sonoma, California; metals inspector and welding instructor, Hunters Point Naval Shipyard; nondestructive testing technician, Ferro-Spec Laboratory, Los Angeles; instructor, welding operator qualification tests, Bethlehem Steel Co., Pinole, California.
- BOONE, JOSEPH C. (1968)** Physics
B.A., Earlham College, 1962; M.A., University of Wisconsin, 1967; additional graduate study.
Experience: Instructor, University of Wisconsin.
- BOOTHE, ROBERT O. (1954)** English
B.A., University of Wisconsin, 1950; M.A., Los Angeles State College, 1953; additional graduate study, University of California at Los Angeles, Los Angeles State College, University of Michigan, Stanford University and University of the Americas.
Experience: Toolmaker and tool designer, Electrical Engineering and Mfg. Corp.; project engineer, Virtue Bros. Mfg. Co.; tooling engineer, McCulloch Motors Corp.; free-lance photographer and journalist; instructor, El Camino College, Compton College; Fulbright professor of English, University of Santiago de Compostela, Spain.
- BOSTROM, ROBERT M. (1956)** Director, Housing
B.S., California State Polytechnic College, 1956.
Experience: Graduate manager, California State Polytechnic College.
- BOWDEN, FREDERICK W. (1949)** Head, Electrical Engineering Department
B.S., California Institute of Technology, 1932; M.S., 1933; additional graduate study, California Institute of Technology.
Experience: Geophysics, Shell Oil Company; electrical engineer, Oilfields Service Co.; mechanical and electrical consultant, Walt Disney Enterprises; head electrical research department, Lockheed Aircraft Corp.; associate professor, University of Southern California College of Aeronautics. Registered professional engineer, California.

Faculty and Staff

- BOWLS, WOODFORD E. (1937)**..... Head, Physics Department
 A.B., University of California, 1932; M.A., 1935; Ph.D., 1937.
 Experience: Teaching assistant and teaching fellow in physics, University of California.
- BOYCE, WILLIAM M.**..... Business Administration
 B.S., University of Connecticut, 1938; graduate work at George Washington University, California State Polytechnic College; graduate Command and General Staff College, 1945; Special Weapons Officer Course, 1955.
 Experience: Infantry platoon leader, battalion commander and deputy battle group commander; instructor and committee chairman, U.S. Army Infantry School, Ft. Benning, Georgia; inspector general; member of Department of the Army general staff and the joint staff of the Joint Chiefs of Staff, Washington, D.C.; head, Military Science Department, Director of Developmental Affairs, California State Polytechnic College.
- BRADY, MARY L. (1968)**..... Library
 B.A., Mundelein College, 1960; M.A.L.S., Rosary College, 1967.
 Experience: Editorial assistant, The National Catholic Monthly, Chicago; cataloger, Mundelein College.
- BREAZEALE, CONNIE R. (1966)**..... Home Economics
 B.S., California State Polytechnic College, 1960; M.S., 1966.
 Experience: Chairman, Home Economics Department, Santa Maria High School.
- BRECKAN, ERLING A. (1958)**..... Business Administration
 B.S., University of Illinois, 1941; M.B.A., University of California at Los Angeles, 1952.
 Experience: Officer, U.S. Army; lecturer, University of California at Los Angeles; assistant to plant manager, Neomatic, Inc.
- BRENDLIN, GENE E. (1950)**..... Foundation Manager
 B.S., University of California, 1934.
 Experience: Director, vocational agriculture, Fallbrook Union High School, Linden Union High School, Tracy Union High School, and Arroyo Grande Union High School; farmer, San Luis Obispo County.
- BRENNAN, ANDREW (1968)**..... Physical Education and Athletics
 B.S., University of Southern California, 1958; M.S., 1960.
 Experience: Graduate assistant, University of Southern California; teacher/coach, Mira Loma High School, Glendale High School, Downey High School, Rio Hondo Junior College.
- BROMLEY, J. PHILIP (1947)**..... Agricultural Management
 B.S., University of Southern California, 1934; M.S., 1936; additional graduate study, Columbia, Texas A & M, and University of California.
 Experience: Teacher, Garvey School District; instructor, San Diego State College; officer, U. S. Navy; business education specialist, Evelyn Hone College of Further Education, Lusaka, Zambia, for U.S. Agency of International Development.
- BROWN, HOWARD C. (1946)**..... Head, Ornamental Horticulture Department
 B.S., California State Polytechnic College, 1943; M.S., Ohio State University, 1954; Ph.D., 1963.
 Experience: U.S. Army Air Force.
- BROWN, MARVIN D. (1956, 1966)**..... English
 B.D., Andover Newton Theological School, 1936; Th.D., Iliff School of Theology, Denver, 1952.
 Experience: Pastor, Garden City, Kansas and Santa Barbara and San Luis Obispo, California; instructor, California State Polytechnic College; chaplain, U.S. Army.

Faculty and Staff

- BROWN, WILLIAM H. (1957)** Architecture
B. Arch., University of Florida, 1954; M. Arch., 1968; additional graduate study, University of Sydney.
Experience: Draftsman, Trend Associates, L. C. Kingscott and Associates, Viking Products Company, Valley Metal Products Company; instructor, University of Florida; architectural designer, John E. Piercy, A.I.A., D. Stewart Kerr, A.I.A. Registered architect, California.
- BRUNK, ATHOL J. D. (1957)** Physics
B.S., Northwestern State Teachers College, 1937; M.A., West Texas State Teachers College, 1941.
Experience: Instructor in mathematics and science, high school, Beaver, Oklahoma; elementary principal, Alamogordo, New Mexico; officer, U.S. Navy; mathematics instructor, Atascadero, California.
- BUCCOLA, VICTOR A. (1962)** Physical Education
B.S., California State Polytechnic College, 1956; M.A., 1957.
Experience: Officer, U.S. Army; physical education instructor and athletic coach, The College of Idaho; science and math instructor and athletic coach, Mark Keppel High School.
- BUCICH, RICHARD A. (1963)** Electronic Engineering
B.S.E.E., Illinois Institute of Technology, 1954; M.S.E.E., 1956.
Experience: Sub-station operator, electrical engineer, U.S. Steel Corporation; graduate assistant, Illinois Institute of Technology; assistant professor, Purdue University Center.
- BUCY, L. LAVERNE (1955)** Animal Husbandry
B.S., University of Kentucky, 1943; M.S., 1950; Ph.D., University of Illinois, 1954.
Experience: Graduate assistant in animal science, University of Illinois; teacher of vocational agriculture, Kentucky high schools; farming; U.S. Navy.
- BURK, CARL J. (1968)** Education
A.B., University of Southern California, 1930; M.A., 1939; Ed.D., 1958.
Experience: Teacher, Hermosa Beach City District, Compton Union High School District; curriculum assistant, director of curriculum and research, Compton Union High School and Junior College District; assistant superintendent-instruction, assistant superintendent-building planning, Compton Union High School District; instructor, University of Southern California.
- BURLINGHAM, HERBERT H. (1948)** Head, Agricultural
Education Department
B.S., Oregon State College, 1929; graduate study, University of California.
Experience: Executive student, Swift and Company; director of agriculture, Willits Junior-Senior High School; director of agriculture and critic teacher, Madera Union High School, Paso Robles Union High School; regional supervisor, State Bureau of Agricultural Education, California.
- BURROUGHS, SARAH E. (1967)** Home Economics
B.S. and Certificate in Medical Technology, University of Michigan, 1956; Ph.D., University of California, 1967.
Experience: Senior technician, University Hospital, Ann Arbor; biochemist, Akron General Hospital, Ohio; supervising chemist, Parma Community Hospital, Ohio; biochemist, Stanford Research Institute; research/teaching assistant, University of California, Berkeley.
- BURT, WALLACE H. (1968)** Business Administration
B.S., University of California, 1949; M.B.A., University of Denver, 1962; C.P.A., State of California.
Experience: Teacher, Shasta Union High School; assistant county superintendent of schools, Shasta County; certified public accountant, staff, Muncy and Company, C.P.A.'s instructor, Coalinga College; consultant, State of California.

Faculty and Staff

- BURTON, ROBERT E. (1968)**.....Social Sciences
A.B., San Diego State College, 1962; M.A., University of Oregon, 1964; additional graduate study.
Experience: Instructor, Glendale College.
- BUSCHMAN, WILLIAM O. (1956)**.....Mathematical Sciences
A.B., Reed College, 1941; M.Ed., University of Oregon, 1947; Ed.D., Oregon State University, 1953.
Experience: Marine engineering and naval architecture, Kaiser Co., and others; teaching, Portland Public Schools, Gresham Union High School; instructor, Multnomah College, Oregon State University; assistant professor, Oregon State System of Higher Education, General Extension Division; assistant professor, Portland State College; research, University of Oregon Medical School, Stanford Research Institute, and Institute for Motivational Research.
- BUTLER, ROBERT O. (1964)**.....Mathematical Sciences
A.B., Fresno State College, 1951; graduate study, University of California, Los Angeles State College, California State Polytechnic College.
Experience: Teacher, Reedley, Dinuba, Orosi, Paso Robles; vice principal and principal, Paso Robles Union.
- BUTZBACH, ARTHUR G. (1950)**.....Associate Dean, Graduate Studies
A.B., Stanford University, 1926; M.A., 1929; Ed.D., 1948.
Experience: Teacher and principal, Lower Lake Union High School; assistant professor of education, Drake University and Sacramento State College.
- CALL, TRACEY G. (1962)**.....Biological Sciences
B.S., Idaho State College, 1940; M.S., University of Maryland, 1944; A.B., Brigham Young University, 1947; Ph.D., University of Minnesota, 1956.
Experience: Teaching Assistant, Idaho State College; Teaching Assistant, University of Washington; Teaching Assistant, University of Maryland; Drug Store Manager, Afton, Wyoming; Assistant Professor, Duquesne University; Assistant Professor, University of Wyoming; Associate Professor, Montana State University; Research Pharmacologist, Sunkist Growers, Inc.; Project Director-Consultant, W.L.R.I., Holland-Rantos Youngs Rubber Corporation.
- CARNEGIE, E. J. (1963) (1965)**.....Agricultural Engineering
B.S., California State Polytechnic College, 1962; M.Engr., University of California, Davis, 1963.
Experience: Research assistant, University of California, Davis; junior agricultural engineer, University of California; officer, U.S. Naval Reserve.
- CARLSON, JOSEPH (1967)**.....Mathematical Sciences
B.A., University of Kansas, 1947; M.A., 1948; additional graduate study, Oklahoma A. and M.
Experience: Instructor, University of Missouri; analytical engineer, Chance Vought Aircraft, Minneapolis Honeywell, research engineer, Jet Propulsion Laboratory; scientist, Lockheed Aircraft, Ames Research Center.
- CARLSTON, RICHARD C. (1968)**.....Welding and Metallurgical Engineering
B.S., University of Missouri, 1951; M.S., 1954; Ph.D., University of Kansas, 1957.
Experience: Visiting professor, Naval Postgraduate School; adjunct professor, American University; physicist, Office of Naval Research, Aerojet-General Corporation; engineer, Grumman Aircraft Engineering Corporation; chemist, Sperry Gyroscope Company; physicist, Pacific Missile Range; editor, Naval Civil Engineering Laboratory.
- CARPENTER, THOMAS W. (1968)**.....Aeronautical Engineering
B.S., Virginia Polytechnic Institute, 1961; M.S., 1964.
Experience: Research assistant, instructor, Purdue University; engineer, Hamilton Standard.

Faculty and Staff

- CARR, LAURENCE H. (1963)Mechanical Engineering
B.S., University of Chicago, 1932; M.S., 1934.
Experience: Director of research and engineering, Edward Valves, Inc.; lecturer and assistant professor, Purdue University. Registered professional engineer, California.
- CARRUTHERS, RODERICK W. (1965)Head, Printing Technology
and Management Department
B.A., St. Martin's College, 1964; graduate study, University of Wisconsin.
Experience: Apprentice printer, Vancouver Sun; linotype operator, Evergreen Press, Vancouver; superintendent, Campbell River Courier, British Columbia; off-set preparation, Washington State Printing Plant, Olympia; printer, Indianapolis Star-News, Olympia News, and Wisconsin State Journal.
- CARSEL, RICHARD A. (1968)Business Administration
B.A., San Francisco State, 1965; J.D., University of Oregon Law School, 1968.
Experience: Restaurant manager; multilith operator; group leader for Upward Bound project; research assistant, University of Oregon Law School.
- CARTER, LOGAN SAMPSON (1947)Head, Soil Science Department
B.S., Oregon State College, 1930; Ph.D., Michigan State College, 1934.
Experience: Instructor, Michigan State College; U.S. Department of Soil Conservation; Bureau of Reclamation, U.S. Department of Interior, Washington, D.C.
- CARTWRIGHT, DONOVAN F. (1964)Education
B.A., University of Oregon, 1925; M.A., 1933.
Experience: Superintendent, Beaumont Schools, San Dieguito Union High School, Tulare Union High School District; summer instructor, Fresno State College, Western State College; professor and project superintendent for development of intermediate school unit, San Francisco State College, Monrovia, Liberia.
- CASS, MARJORIE (1957)Education
B.S., University of Nebraska, 1932; M.A., Columbia University, 1945; additional graduate study, University of Missouri, 1947.
Experience: Teacher, Nebraska and Iowa; instructor, Stephens College; assistant professor, Grinnell College.
- CERVINKA, VACLAV (1969)Agricultural Engineering
M.S., University of Agriculture, Prague, 1955.
Experience: Research assistant, University of Agriculture, Prague; research engineer, Research Institute of Agricultural Engineering, Prague; farm mechanization adviser, United Ghana Farmer's Cooperative Council, Accra, Ghana; lecturer, Agricultural Engineering Division, University of Ghana, Legon, Ghana.
- CHANDLER, EVERETT M. (1951)Dean of Students
A.B., University of California, 1939; graduate study, University of California.
Experience: Administrative officer, U.S. Air Force; personnel technician, State Personnel Board; management analyst, State Department of Finance; extension teacher, Sacramento State College; U.S. Air Force.
- CHASE, DANIEL C. (1954)Agricultural Management Department
B.S., University of Arizona, 1946; M.Agr. Ed., 1951; Ed.D., Pennsylvania State University, 1954.
Experience: Teacher of vocational agriculture, veterans' instructor, Tolleson Union High School, Tolleson, Arizona; supervising teacher, University of Arizona; veterans' co-ordinating teacher, State Department of Vocational Education, Phoenix, Arizona; farm editor and columnist, *Arizona Republic*; assistant professor and head, division of farm management, Arizona State College, Tempe, Arizona.

Faculty and Staff

- CHESTNUT, F. STUART (1963)**.....Physical Education
B.S., Indiana University, 1951; M.S., 1963.
Experience: Technical supervisor of industrial athletics, Commercial Solvents Co.; coach-teacher, senior high school, Terre Haute, Indiana, senior high school, Washington, Indiana, senior high school, Brazil, Indiana.
- CHIZEK, GAYLORD J. (1958)**.....Agricultural Management
B.S., Kansas State College, 1957; M.S., 1958.
Experience: Assistant instructor, Kansas State College, Manhattan, Kansas; farmer; U.S. Army.
- CHOU, THOMAS T. L. (1961)**.....Electronic Engineering
B.S., Chinese National Chekiang University, 1947; M.S., University of Washington, 1956; U.S. Signal Corps Officers Advanced Course, Fort Monmouth, N.J.
Experience: Associate professor, Institute of Electronics, National Chiotung University, Taiwan; senior engineer, Sverdrup-Parcel, San Francisco; research assistant, University of Washington; instructor, Chinese Army Signal School, Taiwan.
- CIROVIC, MICHAEL M. (1968)**.....Electrical and Electronic Engineering
B.E., New York University, 1965; M.S., 1968.
Experience: Assistant professor, Academy of Aeronautics; engineer, General Cable Corporation.
- CLEATH, ROBERT L. (1968)**.....Speech
B.A., Northwestern College, 1950; M.A., University of Oregon, 1951; Ph.D., University of Washington, 1963; B.D., San Francisco Theological Seminary, 1965.
Experience: Assistant professor, Westmount College, Whitworth College, University of California; teaching assistant, University of Washington; instructor, California State Polytechnic College; assistant editor, *Christianity Today*, Washington, D.C.
- CLEMENTS, WILLIAM E. (1966)**.....Physics
B.S., Texas A. and I. University, 1965; M.A., 1966.
Experience: Laboratory assistant, research assistant, assistant instructor, Texas Arts and Industries University; teaching specialist in mathematics, Presbyterian Pan American School.
- CLERKIN, EDWARD J. (1964)**.....Electronic Engineering
B.S., Colorado State University, 1950; M.S., University of Idaho, 1962.
Experience: Instructor, Chico State College, University of Idaho; technical associate, Argonne National Laboratory; engineer, Diversified Builders, General Electric Company. Registered professional engineer, California.
- CLOGSTON, FRED L. (1960)**.....Biological Sciences
B.A., B.S., Western Washington College, 1950; M.S., University of Washington, 1956; Ph.D., 1965.
Experience: Instructor, public schools; teaching and research assistant, University of Washington; research associate, Office of Naval Research; instructor, Western Washington College; associate, University of California at Santa Barbara.
- CLOONAN, CLIFFORD B. (1957)**.....Electronic Engineering
B.S., University of Colorado, 1955; M.S.E.E., Montana State College, 1961.
Experience: Instructor, U.S. Army Signal Corps; physical science aide, National Bureau of Standards, Boulder, Colorado; systems design engineer, Collins Radio Company, Cedar Rapids, Iowa; research associate and research assistant, Electronic Research Laboratory, Montana State College; consultant, McDonnell Aircraft Company, St. Louis, Missouri; microwave engineer, Hewlett-Packard Company, Palo Alto.

Faculty and Staff

CLUCAS, GEORGE G. (1956) (1968).....Director, Research and Development
A.B., University of Michigan, 1947; M.P.A., 1949; Ph.D., University of Southern
California, 1969.

Experience: Senior budget analyst, Office of Legislative Analyst, Sacramento;
dean, Finance and Development, California State Polytechnic College; chief, Budget
Planning and Operations, Chancellor's Office, The California State Colleges, Los
Angeles; research associate, Municipal Information Systems, University of Southern
California; faculty member (part-time) University of Southern California and Cali-
fornia State College at Long Beach.

COATS, DONALD M. (1964).....Associate Dean,
Educational Services

B.S., California State Polytechnic College, 1964.

Experience: Branch manager, Southern Pacific Milling Co., San Luis Obispo;
sales representative and materials engineer, Walter B. Roselip Co., Atascadero;
quality control inspector, Lindero Investment Co., San Luis Obispo; U. S. Navy.

COBB, ALAN W. (1964).....Chemistry
B.S., Oregon State University, 1932; M.S., 1934; Ph.D., University of Wisconsin,
1936; additional graduate study, University of Houston.

Experience: Chemist, Pan American Refinery, American Liberty Oil Company;
self-owned drug stores, Texas City; teacher, Alvin College, Monterey Peninsula
College; New Mexico Institute of Mining and Technology.

COCKRIEL, GEORGE W. (1957).....Industrial Engineering

Experience: Chief, Pacific Fire District, Sacramento; special agent, U.S. Army
counterintelligence; investigator, office of the District Attorney, Reno, Nevada;
instructor, fire safety and control, California Highway Patrol Academy, Sacra-
mento.

COLLINS, RALPH C. (1955).....Education

B.S., Drake University, 1932; M.A., 1941; Ed.D., University of Colorado, 1951.

Experience: Officer and navigation instructor, U.S. Navy; physics instructor,
East High School, Des Moines, Iowa; graduate assistant, Iowa State College and
University of Colorado; head, Science Department, Eugene High School, Eugene,
Oregon; assistant professor, Central Washington College of Education, Drake
University, University of Oregon.

CONNER, E. WESLEY (1963).....Ornamental Horticulture

B.S., California State Polytechnic College, 1956.

Experience: Manager, Landscape Department, Yosemite Park & Curry Com-
pany; landscape consultant, Spencer & Lee, Architects, San Diego and Napa
County; assistant to landscape architect, Huettig & Schromm, Palo Alto.

COOK, DAVID W. (1941).....Associate Dean, Curriculum
and Instruction

B.S., University of California, 1937.

Experience: Examiner, Board of Fire Underwriters of the Pacific; engineer,
Insurance Company of North America; instructor, electrical engineering and
mathematics; coordinator of navigation instruction, U.S. Naval Flight Preparatory
School; registrar; chairman, Mathematics Department, California State Polytechnic
College.

COSMA, EARL J. (1967).....Food Processing

B.S., California State Polytechnic College, 1965; M.S., New Mexico State Uni-
versity, 1967.

Experience: U.S. Air Force; ranching; meat research and teaching assistant, New
Mexico State University.

Faculty and Staff

- COTA, HAROLD M. (1965)** Environmental Engineering
B.S., University of California, 1959; M.S., Northwestern University, 1960; Ph.D., Oklahoma University, 1966.
Experience: Graduate assistant, University of Oklahoma; research engineer, Lockheed Missiles; engineer, Westvaco (FMC).
- COYES, FRANK G. (1965)** Agricultural Engineering
B.S., California State Polytechnic College, 1950; M.A., 1957.
Experience: Instructor, Coalinga Union High School, Coalinga College.
- CRANE, FRANKLIN S. (1958)** Mechanical Engineering
Petroleum Engineer, Colorado School of Mines, 1943; graduate study, Massachusetts Institute of Technology.
Experience: Division engineer, Oil Well Supply Company; chief engineer, Martin-Decker Corporation; secretary-treasurer and director, Decker Engineering Corporation; officer, U.S. Navy; registered petroleum engineer, California.
- CRUIKSHANKS, A. NORMAN (1947)** Social Sciences
A.B., University of California, 1931; M.A., Stanford University, 1933; Ed.D., 1957; additional graduate study, University of London, University of Geneva, University of Paris.
Experience: Instructor, California secondary schools; educational advisor, U.S. Department of Interior, CCC; director of adult education and community forums, Fort Bragg, California; tour director, Europe and the Middle East; head, Social Sciences Department, California State Polytechnic College.
- CULBERTSON, JAMES T. (1953)** Mathematical Sciences
A.B., Yale University, 1934; Ph.D., 1940; other graduate study, University of Pennsylvania.
Experience: Research fellow, Yale University; professor, mathematics and physics, Cumberland University; head of mathematics department, Southwestern University; research associate mathematical biology, University of Chicago; assistant professor of philosophy, University of Southern California; research associate Rand Corporation; research psychologist, UCLA.
- CUMMINS, CARL C. (1958)** Dean, School of Applied Arts
A.B., University of California, Santa Barbara, 1948; M.S., University of Southern California, 1952; Ed.D., University of California, 1957.
Experience: Construction supervisor, National Shipbuilding Corporation, San Diego; plant engineer, Ryan Aeronautical Co.; professor, San Diego State College; engineer; General Electric Company.
- CURTIS, CHARLES D. (1968)** Mathematical Sciences
A.B., San Diego State, 1965; M.S., 1967; additional study, University of California, Santa Barbara.
Experience: Bandsman, U.S. Army; salesman and assistant manager, Coles Colonial Furniture; teaching assistant, San Diego State College; research assistant, University of California, Santa Barbara.
- CURTIS, DONALD J. (1960)** Senior Clinical Laboratory Technologist
R.N., Hospital Corps, Medical Department, U.S. Navy.
Experience: Chief warrant officer, USN; nursing and laboratory service, USNH; laboratory service, USNH, Pearl Harbor; personnel and medical records, USNH; Epidemiology Control Units, Pearl Harbor; administrative officer, Fourth Marine Division; assistant medical property and accounting officer, Camp Pendleton; clinical laboratory technologist, Patton State Hospital; senior clinical laboratory technologist, Atascadero State Hospital.

Faculty and Staff

- CURTIS, WILLIAM D. (1961)**.....Education
B.A., University of Redlands, 1948; M.A., University of California, Los Angeles, 1951; Ph.D., University of Denver, 1960.
Experience: Probation officer, Riverside County, California; school psychometrist, San Bernardino City Schools; teacher, San Bernardino High School; instructor, San Bernardino Valley College; part-time instructor, University of Redlands, University of Denver, International Business Machines Corporation.
- DARNIELLE, MAX E. (1967)**.....English
B.S., University of Oregon, 1950; M.S., Indiana University, 1967; additional graduate study, Indiana University.
Experience: Teacher, South San Francisco, Oakland, Cincinnati, Columbus; teaching assistant, university fellow, Indiana University.
- DAVIDSON, HAROLD P. (1936)**.....Head, Music Department
B.A., Pomona College, 1929; M.A., Claremont College, 1932; additional graduate study, University of Southern California.
Experience: Head of Music Department, Emerson Junior High School, Pomona; master training teacher, Claremont College.
- DAVIDSON, OTTO C. (1968)**.....Mechanical Engineering
B.S., Bucknell University, 1955; M.S., Massachusetts Institute of Technology, 1956; Ph.D., Stanford University, 1960.
Experience: Assistant professor, University of Utah, Robert College; officer, U.S. Army; engineer, various engineering firms in New York, Utah, California.
- DAVIES, GEORGE R., II (1962)**.....Admissions Officer
B.S., University of Pittsburgh, 1939; Command and General Staff College, 1960.
Experience: Assistant professor of military science, California State Polytechnic College; assistant professor of military science, Valley Forge Military Academy; training officer, 1st Guided Missile Group, Fort Bliss; executive officer and battalion commander, Fifth Howitzer Battalion, Korea.
- DAVIS, CHARLES P. (1958)**.....Head, Aeronautical Engineering Department
B.S., Rensselaer Polytechnic Institute, 1948.
Experience: Instructor and assistant professor, Rensselaer Polytechnic Institute; development engineering and product engineer leader, General Electric Company.
- DEAN, ARNOLD M. (1949)**.....Soil Science
B.S., University of Alberta, Canada, 1943; M.S., 1946; Ph.D., University of Wisconsin, 1949.
Experience: Laboratory assistant, Dominion Department of Agriculture, Edmonton, Alberta; teaching assistant, University of Wisconsin; industrial fellowship, University of Wisconsin.
- DEMPSEY, AUDREY J. (1968)**.....Foreign Student Adviser
B.A., University of Wisconsin; additional graduate study, Stanford University, California State Polytechnic College.
Experience: Program supervisor, Community Services, Radio Station KUOM, University of Minnesota.
- DETTLOFF, ERLAND G. (1967)**.....Education
B.S., Minot State College, 1956; M.A. University of Wyoming, 1962; Ed.D., 1963.
Experience: Teacher, Great Falls, Montana; visiting professor, part-time instructor, assistant professor, University of Wyoming; assistant professor, Northern State College, South Dakota.

Faculty and Staff

DE VOROS, EVELYN K. (1955)..... Speech
B.A., University of Texas, 1936; M.A., University of Michigan, 1941; Ph.D., University of Michigan, 1945.

Experience: Instructor in Texas Public Schools; instructor, Louisiana Polytechnic Institute; assistant professor, Bowling Green State University, Ohio, University of California, Santa Barbara College.

DICKEY, RICHARD K. (1956)..... Electrical Engineering
B.S., University of California, 1948; M.S., 1956.

Experience: Project engineer, Berkeley Scientific Co.; design engineer, Remler Co., Ltd.; engineer, Alameda Naval Air Station. Registered professional engineer, California.

DICKSON, BRUCE A. (1952)..... Soil Science
B.S.A., University of British Columbia, Canada, 1940; M.S.A., 1942; Ph.D., University of California, Berkeley, 1952.

Experience: Teaching assistant, University of British Columbia; teaching assistant, University of California at Berkeley; assistant in plant nutrition, Dominion Experimental Station, Saanichton, B.C.; soil specialist; Dominion Experimental Farm, Agassiz, B.C.

DILLS, CHARLES E. (1963)..... Chemistry
B.S., North Dakota State University, 1949; M.S., George Washington University, 1951; Ph.D., Harvard University, 1956; additional graduate study, Columbia University.

Experience: Professor, Deep Springs College; assistant editor, American Chemical Society; chemist, National Research Corporation; assistant professor, Northwest Missouri State College.

DILTS, RALPH W. (1944)..... Social Sciences
A.B., Montana State University, 1936; M.A., 1938; additional graduate study, University of California, 1940-41.

Experience: Stevensville High School, Stevensville, Montana; graduate assistant, Montana State University; graduate assistant, University of California; U.S. Bureau of Reclamation.

DLUHOSCH, ERIC (1967)..... Architecture
B.Arch., McGill University, 1960; M.Arch., Cornell University, 1965.

Experience: Teaching assistant, Cornell University; instructor, Ohio University; staff architect, Bolton, Ellwood, & Almers; associate, Arnold Schrier; draftsman, Canadian National Railways; supervising architect, Pont Rouge Pulp & Paper Company; engineering assistant, McNamara, Piggot & Peacock Construction Company; Canadian Pratt & Whitney Aircraft Corporation; Northern Electric Company; Longlac Pulp & Paper Company; Office of U.S. High Commissioner for Germany.

DONALDSON, DOUGLAS D. (1968)..... Biological Sciences
A.B., University of California, Berkeley, 1962; M.A., California State College, Los Angeles, 1964; additional graduate study, Oklahoma State University.

Experience: Laboratory assistant, University of California, Berkeley, California State, Los Angeles; instructor and assistant professor, California State, Los Angeles.

DOURSON, ROBERT H. (1967)..... Mathematical Sciences
B.S., California Institute of Technology, 1935; M.S., 1941; Ch.E., 1942; additional graduate study, Case Institute of Technology, Southern Illinois University.

Experience: Laboratory chemist, research chemical engineer, Union Oil Company; research chemist, Cutter Laboratories; laboratory assistant, California Technology; various engineering and administrative positions, Shell Oil Company.

Faculty and Staff

DUARTE, ARTHUR C. (1967).....Agricultural Management
B.S., California State Polytechnic College, 1964; M.S. Oregon State University, 1965.

Experience: Farming.

DUNIGAN, LOWELL H. (1961).....Director of Institutional Studies
B.S., Iowa State University, 1947; M.S., 1948; additional graduate study, University of Southern California.

Experience: Officer, U.S. Navy; instructor in sociology, Iowa State University; claims adjuster, Employers Mutuals Insurance Company; research technician, California Highway Planning Survey; research technician, California State Department of Education, Division of State Colleges and Teacher Education.

DUNN, JOHN E. (1961).....Agricultural Engineering
B.S., Oregon State College, 1943; graduate study, Oregon State College, California State Polytechnic College, USNRMS Columbia University, Naval Diesel School, Cornell University.

Experience: Engineering officer, USNR; wholesale farm machinery 10 years, retail farm machinery 4 years; instructor, California State Polytechnic College 1948-1952.

DUNN, WESLEY T. (1959).....Printing Technology and Management

Experience: Instructor, Compton High School; rotary press operator, Moore Business Forms; 11 years experience as composition-press operator for various printing firms.

DUSEK, BERNARD W. (1965).....Education

A.B., University of California, 1951; M.A., University of Southern California, 1955.

Experience: Instructor, Bellflower Unified School District, Fullerton Junior College, Palomar Junior College.

EASTHAM, GEORGE M. (1966).....Business Administration

B.A., Chico State College, 1961; M.A., University of California, Santa Barbara, 1965; additional graduate study, University of California.

Experience: Revenue officer, Internal Revenue Service; teaching assistant and research assistant, University of California, Santa Barbara.

EATOUGH, NORMAN L. (1968).....Chemistry

B.S., Brigham Young University, 1947; B.E.S., 1958; M.S., 1959; M.S.Ch.E., 1960, Ph.D., 1968.

Experience: Senior development engineer, Hercules Powder Company; assistant professor, Dixie Junior College; instructor, Brigham Young University.

EDMISTEN, JOHN W. (1968).....Architecture

B.S.Arch., California State Polytechnic College, 1965; M.E., University of California, Berkeley, 1967.

Experience: Teaching assistant, University of California, Berkeley; project engineer-designer, Reid & Tarics, Architects and Engineers; draftsman, Kenneth Vinolia, Structural Engineer; designer-draftsman, Walter Constant, Structural Engineer.

EGENHOFF, FRANK C., JR. (1967).....Physical Education

B.S., University of Nevada, 1965; M.A., California State Polytechnic College, 1966; additional graduate study, University of Iowa.

Experience: Student trainer, track coach, University of Nevada, California State Polytechnic College; part-time instructor, track and field coach, graduate assistant, University of Iowa.

EILERS, PATRICIA (1956).....Graduate Nurse

R.N., San Diego County Hospital, 1936.

Experience: San Luis Obispo County General Hospital.

Faculty and Staff

- ELLIOTT, WALTER E. (1965)** **Physics**
B.S., McNeese State College of Louisiana, 1954; M.Ed., Northwestern State College of Louisiana, 1957; M.S., 1963.
Experience: Instructor, Beauregard Parish Schools; teaching fellow, Northwestern State College of Louisiana; assistant professor, Springfield College; U.S. Navy.
- ELSTON, CHARLES A. (1947)** **Mathematical Sciences**
A.B., Santa Barbara State College, 1932; M.S., University of Southern California, 1940; additional graduate study, University of Southern California.
Experience: Teacher, Santa Barbara County Schools; instructor, head, Mathematics, Junior High School and Adult Evening School, San Luis Obispo; surveyor, U.S.E.D. and Southern Pacific Railroad.
- ELTZROTH, THOMAS E.** **Ornamental Horticulture**
B.S., The Ohio State University, 1965; M.S., 1966.
Experience: Research fellow, The Ohio State University.
- EMMEL, JAMES R. (1967)** **Head, English Department**
B.A., Eastern Nazarene College, 1945; Speech Therapy Certification, Northwestern University, 1946; M.A., University of Oklahoma, 1950; Ph.D., Pennsylvania State University, 1959.
Experience: Chairman, Department of Speech, Bethany Nazarene College; part-time instructor, Pennsylvania State University; speech consultant, U.S. Dependent Schools, Germany; chairman, Division of Letters, full professor of speech, Pasadena College.
- EMMONS, MICHAEL L. (1968)** **Counselor**
B.S., Illinois State University, 1963; M.S., 1964; Ph.D., University of Wyoming, 1968.
Experience: Graduate assistant, Counseling Center, University of Wyoming; counselor-teacher, Palatine High School, Illinois; residence hall counselor, Illinois State University; U.S. Navy.
- ERNATT, EDWARD J. (1958)** **Education**
A.B., Wayne State University, 1946; M.Ed., 1950; Ed.D., University of Michigan, 1956.
Experience: Elementary schoolteacher, Taylor Center Schools, Inkster, Michigan; district superintendent, Nankin-Dearborn Schools, Inkster, Michigan; elementary schoolteacher, Santa Barbara, California; supervising teacher, University of California, Santa Barbara College; district superintendent, West Park School District, Fresno, California.
- EVANS, HAROLD D. (1965)** **English**
B.A., Duke University, 1949; M.A., Columbia University, 1956; additional graduate study, Columbia University.
Experience: Instructor, Fairfax Public Schools, South Carolina; public information specialist, U.S. Air Force; instructor, McBurney School, New York City; registrar for graduate faculties, Columbia University; free-lance writer; research and writing, U.S. Office of Education; instructor, Texas Western College; lecturer, American University, Washington, D.C.; assistant professor, St. Andrews College, Laurinburg, North Carolina.
- EVANS, J. HANDEL (1967)** **Architecture**
Diploma of Arch., University of Manchester, England, 1965; M.Arch., University of Oregon, 1967.
Experience: Graduate teaching assistant, University of Oregon; draftsman, Arthur R. Johnson & Partners, England, Lowton Construction Company, Balzhiser, Rhodes, Smith, Morgan, Architects; designer, R. Seifert & Partners; research assistant, Bureau of Municipal Research Service, University of Oregon.

Faculty and Staff

EYLER, MARY F. (1960) Financial Aid Counselor
B.S., Western Michigan University, 1959; graduate study, California State Polytechnic College.

Experience: Secretary, Simplex Paper Corporation, Adrian, Michigan; Ford Motor Company, Dearborn, Michigan; intermediate stenographer; placement interviewer and Placement Supervisor, California State Polytechnic College; business teacher, San Luis Obispo Adult Evening School.

FALKENSTERN, OSWALD J. (1953) Mathematical Sciences
B.S., Montana State College, 1939; M.S., San Jose State College, 1952; additional graduate study, University of Colorado, Colorado A & M College.

Experience: High school teacher and coach, Baker and Opheim, Montana; air navigation officer, U.S. Navy; mathematics instructor, Colorado A & M College; instructor and chairman of junior high school mathematics, Salinas.

FARRELL, WARREN S. (1967) Agricultural Management
B.S., California State Polytechnic College, 1963; M.S. University of California, Davis, 1964; Ph.D., 1968.

Experience: Research assistant, Department of Agricultural Economics, University of California, Davis.

FEDERER, M. DALE (1963) Education
B.S., University of Wyoming, 1961; M.Ed., 1961; Ph.D., 1962.

Experience: Officer, U.S. Army; instructor, Saratoga School District, Wyoming; assistant instructor, extension instructor and assistant professor, University of Wyoming.

FIERSTINE, HARRY L. (1966) Biological Sciences
B.S., Long Beach State College, 1957; M.A., University of California, Los Angeles, 1961; Ph.D., 1965.

Experience: Student assistant, Los Angeles County Museum; teaching and research assistant, cardio-vascular trainee, University of California, Los Angeles; instructor, Long Beach State College.

FINCH, HARRY C. (1962) Biological Sciences
B.S., Iowa State University, 1946; M.S., 1947; Ph.D., 1950.

Experience: Instructor, Iowa State University; research associate, Iowa State University; assistant professor, North Carolina State College, Agricultural Experiment Station; associate professor, Pennsylvania State University; project leader, fungicide and nematocide research, Monsanto Chemical Company, St. Louis, Missouri.

FISHER, CLYDE P. (1947) Dean, School of Applied Sciences
A.B., University of Oklahoma, 1942; M.A., University of Southern California, 1947; Ph.D., 1955.

Experience: Teaching assistant in mathematics, lecturer in mathematics, University of Southern California; officer, U.S. Army; instructor, mathematics; assistant to the dean, Liberal Arts Division; assistant to the executive dean; building program co-ordinator, executive secretary to the President's Cabinet; supervisor of Special Studies Staff; Dean, Educational Services and Curriculum Development; Dean of the College, California State Polytechnic College.

FITTS, JAMES L. (1967) Social Sciences
A.B., Seattle University, 1950; M.A., University of Washington, 1951; additional graduate study, Fordham University Graduate School, University of California, Los Angeles.

Experience: Teacher, All Hallow's High School; claims supervisor, Social Security Administration; assistant professor, Immaculate Heart College, San Fernando Valley State College.

FLANAGAN, JAMES ROBERT (1959) Animal Husbandry
B.S., California State Polytechnic College, 1959.

Experience: Rancher.

Faculty and Staff

- FOLSOM, VOLMAR A. (1946)**..... **Mathematical Sciences**
 B.S., Iowa State College, 1934; M.E., Colorado University, 1937; additional graduate study, Southern Methodist University.
 Experience: High school and junior college teaching; officer, U. S. Navy; assistant professor, mathematics, Southern Methodist University; coordinator, relations with schools, California State Polytechnic College.
- FOTTER, MILLARD J. (1954)**..... **Industrial Engineering**
 B.S., Armour Institute of Technology, 1935; M.S., University of Southern California, 1956.
 Experience: Officer, U. S. Air Force; sales engineer, Stanley E. Morris Co., Los Angeles; production engineer, Southland Paper Co., Los Angeles; industrial engineer, Southwestern Engineering Co., Los Angeles; industrial engineer, International Harvester Co., Chicago and Memphis. Registered professional engineer, California.
- FOUNTAIN, H. PAUL (1965)**..... **Crops**
 B.S., California State Polytechnic College, 1963.
 Experience: Orchard manager, Ballico, California; agriculture inspector, Santa Barbara County.
- FOWLER, ANNE C. (1965)**..... **Social Sciences**
 B.A., Douglass College, 1939; M.A., Vanderbilt University, 1959; additional graduate study, Tulane University.
 Experience: Instructor, University of Nevada; research sociologist—head of department, Charity Hospital, New Orleans; assistant research sociologist, Council of Social Agencies, New Orleans.
- FOX, FRANK W. (1957)**..... **Animal Husbandry**
 B.S., California State Polytechnic College, 1951; M.A., 1957.
 Experience: Director of vocational agriculture, Lassen Union High School, Susanville.
- FRANCK, MICHEL N. (1956)**..... **Social Sciences**
 B.S., City College, New York City, 1934; M.A., New York University, 1935; Ph.D., 1949.
 Experience: Trade delegate; commercial attaché, Brussels, Belgium; associate professor, Pacific Lutheran College; administrative assistant, Olin-Mathieson Chemical Corp.
- FREITAG, FREEMAN (1966)**..... **Electronic Engineering**
 B.S., Arizona State University, 1963; M.S., 1965.
 Experience: Engineer, Motorola Semiconductors, Bell Aero Systems.
- FRIETZSCHE, ARTHUR H. (1965)**..... **English**
 B.A., University of California, 1944; M.A., 1945; Ph.D., 1949.
 Experience: Teaching assistant, lecturer, University of California; supervisor, technical publications, General Electric Company; associate professor, Utah State University.
- FROGGATT, CLARA B. (1964)**..... **Psychometrist**
 B.A., University of Wyoming, 1940; M.A., California State Polytechnic College, 1968.
 Experience: Teacher, Secondary School, Wyoming; personnel department, United Air Lines.
- FROST, ROBERT H. (1953)**..... **Physics**
 A.B., University of California, 1939; M.A., 1945; Ph.D., 1947.
 Experience: Teaching assistant, University of California; assistant professor, University of Missouri.

Faculty and Staff

FULLER, KENNETH G. (1960).....Mathematical Sciences
A.B., Indiana University, 1925; A.M., University of Nebraska, 1927; Ph.D., Columbia University, 1948.

Experience: Instructor of mathematics, Northwestern University, Brown University, Long Island University, The College of the City of New York; officer and instructor, U. S. Military Academy; professor and chairman, mathematics department, Central Connecticut State College.

FURIMSKY, GEORGE S. (1955).....Engineering Technology
B.S., Bradley University, 1949; M.S., 1950.

Experience: Instructor, Peoria Manual Training High School; graduate assistant, Bradley University; superintendent, buildings and grounds, Blackburn College; instructor and chairman, Department of Technology, Evelyn Hone College of Further Education, Lusaka, Zambia, for U.S. Agency for International Development.

GANG, DONNA D. (1967).....Graduate Nurse
R.N., Regina General Hospital, Saskatchewan; additional studies, Jersey City Medical Center, Greystone Park, New Jersey.

Experience: Regina General Hospital, Morristown Memorial Hospital, New Jersey; Weyburn Union Hospital, Saskatchewan; Sierra Vista Hospital, San Luis Obispo.

GARNER, EDWARD R. (1967).....Mechanical Engineering
B.S., Bradley University, 1962; M.S., University of Arizona, 1965.

Experience: Instructor, Rose Polytechnic Institute; graduate assistant, University of Arizona; mechanic, Groskorth Marine.

GATES, VINCENT J. (1958).....Journalism
B.S., University of Oregon, 1939; graduate study, Sacramento State College.

Experience: Editorial positions on daily newspapers in San Francisco, San Jose, Santa Rosa, Salinas; industrial editorial positions, Henry J. Kaiser Industries; public relations and press positions, U. S. Navy, California State Employees Association, California State Polytechnic College.

GAWAIN, EUGENE J. (1965).....English
B.A., University of California, 1959; M.A., San Francisco State, 1962.

Experience: Instructor, San Bernardino Valley College, San Bernardino, California.

GEDAYLOO, TEYMOOR (1965).....Physics
B.A., Macalester College, 1957; M.S., University of Washington, 1959; additional graduate study, University of Washington.

Experience: Laboratory assistant, chief laboratory supervisor, University of Washington; instructor, Lawrence College; teacher and research associate, Argonne National Laboratory.

GENTHNER, FREDERICK L. (1952).....Library
B.A., Ohio Wesleyan, 1940; B.S. in L.S., George Peabody, 1941; A.M.L.S., University of Michigan, 1950.

Experience: Periodicals librarian, Ball State Teachers College; officer, U. S. Army; assistant reference librarian, Ohio State University.

GERALD, CURTIS F. (1964).....Mathematical Sciences
B.S., Iowa State University, 1936; M.S., University of Cincinnati, 1938; Sc.D., Massachusetts Institute of Technology, 1941; additional graduate study, University of Chicago Evening School.

Experience: Graduate assistant, University of Cincinnati, Massachusetts Institute of Technology; research fellow, Massachusetts Institute of Technology; research engineer, supervising research chemist, Universal Oil Products Co.; assistant professor, University of Washington; associate director of research, El Paso Natural Gas Products Co. Registered professional engineer, Illinois.

Faculty and Staff

- GERARD, E. DOUGLAS (1951)**.....Associate Dean, Facilities Planning
 B.S., University of British Columbia, 1950; M.S., University of Saskatchewan, 1951.
 Experience: Instructor, University of British Columbia; instructor, University of Saskatchewan; shop superintendent, British Columbia Forest Products, Pitt Lake, British Columbia; service manager, Tractor and Allied Equipment, Limited, Mel-fort, Saskatchewan.
- GERSTEN, CAROLYN J. (1967)**.....Foreign Student Adviser
 B.A., Sacramento State College, 1965; additional study, Sacramento State College.
 Experience: Psychiatric social worker, intake case worker, adult services, Sacra-mento County; instructor, English Language Department, Hokusei Gakuen, Sap-poro, Hokkaido, Japan; administrative assistant, U.S. Civil Service Commission and Personnel, U.S. Air Force.
- GERSTEN, ROY (1967)**.....Business Manager, Associated Students, Inc.
 B.S., Sacramento State College, 1966; graduate study, Sacramento State College.
 Experience: Staff adviser, Presidential Communications, White House Communi-cations Agency, The White House. Officer, U.S. Army.
- GIBFORD, WILLIAM R. (1955)**.....Animal Husbandry
 B.S., California State Polytechnic College, 1947.
 Experience: Horse trainer, Ed Wright Stables and 1001 Ranch, Riverside; horse trainer and horseshoer, San Luis Obispo; employee, Humphrey Meat Packing Com-pany, San Miguel; Pacific Valley Cattle Company, King City; U.S. Marine Corps.
- GIBSON, J. CORDNER (1949)**.....Dean, School of Agriculture
 B.S., University of California, 1937; M.S., University of Southern California, 1955.
 Experience: Director of vocational agriculture, Downey and Whittier Union High Schools; U.S. Army; regional supervisor, Bureau of Agricultural Education; Dean, Student Personnel and Business Management, California State Polytechnic College, Kellogg-Voorhis.
- GILBERTSON, OSMUND S. (1968)**.....Agricultural Education
 B.S., University of Minnesota, 1958; M.A., 1966; additional graduate study.
 Experience: Director of agriculture and supervising teacher, St. Charles Consoli-dated High School, Minnesota; instructor, agricultural education and international programs manager, University of Minnesota.
- GILLIS, ELAINE (1967)**.....Activities Adviser
 B.S., California State Polytechnic College, 1967.
- GLASSCO, D. EDWARD (1968)**.....Mathematical Sciences
 B.S., Harvey Judd College, 1963; M.A., University of California, Los Angeles, 1966; additional study, University of Southern California.
 Experience: Teaching assistant, University of California, Los Angeles.
- GLIDDEN, WALLACE F. (1961)**.....Veterinary Science
 B.S., California State Polytechnic College, 1962; B.S., University of California, Davis, 1955; D.V.M., 1961.
 Experience: U.S. Army Veterinary Corps; poultry research, U.C.D.; large and small animal practice, southern California.
- GOEBEL, KAREN P. (1966)**.....Home Economics
 B.S., Purdue University, 1962; M.A., Ball State University, 1966.
 Experience: Advertising representative, American Zinc Institute; camp counselor and dining hall supervisor, Michigan; home demonstration agent-in-training, State of Indiana; foreign exchangee, International Farm Youth Exchange; home eco-nomics teacher, Mishawaka, Indiana; graduate assistant, Ball State University.
- GOLD, MARCUS (1947) (1954)**.....Audio-Visual Service Coordinator
 B.A., University of California, 1942; B.L.S., 1947; additional graduate study, Uni-versity of California.
 Experience: U.S. Army; library, University of California; audio-visual librarian, California State Polytechnic College; research assistant, University of California.

Faculty and Staff

- GOLDEN, JAMES R. (1966)**.....Industrial Engineering
B.S., U.S. Military Academy, 1945; M.S., Ohio State University, 1961.
Experience: Chief, Technical Integration Division, Technical Requirements and Standards Office, Air Force Aeronautical Systems Division.
- GOMES, GEORGE J. (1967)**.....Agricultural Management
B.S., California State Polytechnic, 1966; M.A., 1968.
Experience: Farming; restaurant manager.
- GORDON, RAYMOND G. (1967)**.....Mechanical Engineering
B.S., Western New England College, 1966; M.S., University of Michigan, 1967.
Experience: Design engineer, Universal Design, Inc.; draftsman, Duchess Design and Development, Oriole Engineering Company, Combustion Engineering; laboratory assistant, Western New England College.
- GRAN, RUTH (1957)**.....Supervising Nurse
R.N., Mary's Help Hospital, San Francisco, 1936.
Experience: San Mateo Clinic; Army Nurse Corps; San Luis Obispo General Hospital.
- GRANT, DAVID M. (1950)**.....English
B.A., Iowa State Teachers College, 1935; M.A., University of Iowa, 1940; Ph.D., Stanford University, 1953.
Experience: Instructor in public schools in Iowa; chairman, Department of Speech, Hastings College, Hastings, Nebraska; officer, U.S. Navy; instructor, Stanford University.
- GRANT, DONALD P. (1967)**.....Architecture
B. Arch., University of Oklahoma, 1961; M. Arch., University of Utah, 1964.
Experience: Construction and architectural firms in Utah; Moore Simpson and Partners, London; Ulrich Franzen, A.I.A.; Raymond and Rado, A.I.A.; Victor Lundy, F.A.I.A. Registered architect, New York and California.
- GRAVES, R. L., JR. (1951)**.....Architecture
B.S., Architecture, University of Kansas, 1948; M. Arch. and Urban Design, Cranbrook Academy of Art, 1950.
Experience: Associate Professor, Auburn University; assistant professor, University of Florida; instructor, Washington State University; private practice, Kansas City; architectural designer-draftsman with architectural firms in North Carolina, Michigan, California; U.S. Naval Construction Battalion. Registered architect, Kansas.
- GRAVES, THEODORE G. (1947)**.....Engineering Technology
B.A., Humboldt State College, 1940; M.S., Oregon State College, 1957.
Experience: Instructor, Paia School, Paia, Maui, Hawaii; instructor, Maui High School, Maui, Hawaii; teacher, San Francisco, California; lecturer, University of California, Santa Barbara College.
- GREEN, ROBERT W., Col. (1968)**.....Head, Military Science Department
B.S., University of Maryland, 1962; M.A., George Washington University, 1967.
Graduate, The Armored School; Command and General Staff College; Army War College; National War College.
Experience: Secretary of General Staff, Fifth U.S. Army; executive secretary and chairman, Research and Review Board, Army General School; battalion and brigade commander; senior aide to Commander in Chief, U.S. Army, Europe, branch and division chief (Personnel), Department of Army General Staff and the Joint Staff of the Joint Chiefs of Staff; deputy director of Personnel, USMACV, Vietnam; course director, National War College.

Faculty and Staff

- GREEN, WILFRED M. (1966)**.....English
B.S., Drake University, 1951; M.A., California State Polytechnic College, 1965; additional graduate study, University of California and University of Illinois.
Experience: Instructor, Bering Institute, Adak, Alaska, Fresno Adult School, Allan Hancock College, San Luis Obispo Adult School; teacher, Hartley High School, Stanwood Consolidated School, Iowa, Fresno High School, Orcutt School; contractor.
- GREENBERG, JOSEPH I. (1968)**.....Architecture
B. Arch., Georgia Institute of Technology, 1967; M. Arch., University of Florida, 1968.
Experience: Graduate assistant, University of Florida; draftsman, Alan Pokras, Architect; draftsman-delineator, Toby Vece, A.I.A.
- GREGORY, C. HEROLD (1960)**.....Printing Technology and Management
B.S., California State Polytechnic College, 1952.
Experience: Superintendent and manager of printing plants, Los Angeles; instructor, U. S. Navy.
- GRINNELL, ROBIN R. (1967)**.....Agricultural Engineering
B.S., Purdue University, 1955; M.S., University of Minnesota, 1961; additional graduate study, University of Illinois.
Experience: Research assistant, Iowa State University, Purdue University, University of Illinois; research and teaching assistant, University of Minnesota; student engineer, John Deere Waterloo Tractor Works; assistant professor, University of Guelph, Ontario, Canada; U.S. Army QM and Signal Corps.
- GROSZ, DAVID W. (1967)**.....Physical Education
B.S., University of Oregon, 1960; M.S., 1965.
Experience: Professional football player, Saskatchewan, Edmonton, Montreal, Oregon; high school biology instructor, Oregon; substitute teacher, Washington; high school physical education instructor and football coach, Hoquiam, Washington; director, summer program, Hoquiam Park Board.
- GROVES, JOHN E. (1968)**.....Mathematical Sciences
B.A., Pasadena College, 1963; M.A., University of California, Riverside, 1965; additional study, Iowa State University.
Experience: Member technical staff, T.R.W. Systems Group; instructor, Iowa State University.
- GUSTAFSON, LESTER W. (1947)**.....Aeronautical Engineering
B.S., University of Minnesota, 1932; graduate study, University of Minnesota.
Experience: Assistant in experimental engineering, University of Minnesota; experimental engineer, Minneapolis Moline Power Implement Company, Minneapolis; Tropic Air Corporation, Chicago; aerodynamics engineer, Lockheed Aircraft Corporation; Hughes Aircraft Company.
- GUSTAFSON, ROY W. (1964)**.....Industrial Engineering
B.S., University of Washington, 1935; M.S., Stanford University, 1948; additional graduate study, Air Force Institute of Technology
Experience: professor of air science, University of Washington; Air Force plant representative, Lockheed Missiles and Space Division, Sunnyvale; executive assistant to Assistant Secretary of the Air Force (Materiel); chief, Industrial Plans Division; chief of logistics; Procurement and Production Department, Wright Field and the Pentagon; United States Air Force.
- HADLEY, ROBERT E. (1967)**.....Animal Husbandry
B.S., California State Polytechnic College, 1955.
Experience: U.S. Army; show horse trainer, Southern California; stallion manager, Shamel Ranch, Murrieta; large animal veterinary assistant, Murrieta; artificial insemination technician-distributor, dairy and beef cattle, Oakdale.

Faculty and Staff

HAGGARD, KENNETH L. (1967).....Architecture
B.S., Texas A & M, 1958; B. Arch., North Carolina State University, 1963;
M. Arch., University of Pennsylvania, 1967.

Experience: Principal planner, Department of Planning and Renewal, Camden,
New Jersey; instructor, University of Miami; designer, City Planning & Archi-
tectural Associates, North Carolina; research scientist, Radio Biological Laboratory,
Balcones Research Center; U. S. Army; tool engineer, Boeing Aircraft.

HALE, THOMAS E. (1966).....Mathematical Sciences
B.S., Indiana State University, 1960; M.S., 1963; additional graduate study, St.
Louis University.

Experience: Teacher, Vigo County School Corporation, Terre Haute, Indiana.

HALL, KENNETH M. (1969).....Architecture
B.S., University of Arkansas, 1962; M.S., 1963; Ph.D., Arizona State University,
1968.

Experience: Teacher, Cherry Valley High School, Arkansas; teaching assistant,
University of Arkansas, Arizona State University; instructor, Arizona State Uni-
versity; Corps of Engineers. Registered civil engineer, Arizona.

HALL, LLOYD A. (1966).....Medical Officer
B.A., Stanford University, 1947; M.D., 1952.

Experience: Internship, San Francisco City and County Hospital; residency,
Monterey County Hospital; postgraduate training, anesthesia, Cook County Hos-
pital, Chicago; private practice, Fort Bragg, California; college physician, Fresno
State College.

HALL, MICHAEL C. (1967).....Animal Husbandry
B.S., California State Polytechnic College—Kellogg, 1965; M.S., Kansas State
University, 1967.

Experience: Graduate research assistant; general farming.

HALL, RICHARD E. (1947).....Engineering Technology
B.S., California State Polytechnic College, 1952.

Experience: Aircraft mechanic, Lockheed Aircraft, and Hancock Field, Santa
Maria; engine mechanic and supervisor, McClellan Air Field.

HALL, RONALD W. (1967).....Industrial Technology
B.A., Chico State College, 1961; M.A., 1962; additional graduate study, Chico State
College, Arizona State University.

Experience: U.S. Air Force; high school industrial arts instructor, Oroville, Chico;
teaching assistant, Arizona State University.

HALLETT, JAMES T. (1967).....Crops
B.A., San Francisco State College, 1959; additional study, California State Poly-
technic College.

Experience: Research biologist, Stauffer Chemical Company; field research agron-
omist, U.S. Borax Research Corporation and Germain's Inc.

HAMMITT, LEWIS E. (1946).....Physics
B.S., Whitman College, 1926; M.A., University of Washington, 1940; additional
graduate study, University of Washington. U.S. Navy Air Navigation School, 1943.

Experience: Laboratory assistant, Whitman College; principal, Mabton High
School, Mabton, Washington; instructor in physics and chemistry, Longview High
School, Longview, Washington; officer, U.S. Navy.

HANKS, CHARLES J. (1954).....Mathematical Sciences
B.S., Pennsylvania State Teachers College at Shippensburg, 1942; M.A., Univer-
sity of Pennsylvania, 1949; Ed.D., University of Arkansas, 1954.

Experience: Assistant professor, Drexel Institute of Technology; assistant football
coach, University of Arkansas; officer, U.S. Coast Guard.

Faculty and Staff

- HANNULA, REINO (1962)**.....Mathematical Sciences
B.A., University of California, Los Angeles, 1960; M.A., 1965; additional graduate study, Tulane University.
Experience: Manager, grocery, Santa Monica; self-employed, Los Angeles; teacher, Redondo Beach High School.
- HANSEN, PHYLLIS JEAN (1963)**.....Library
A.B., University of Illinois, 1960; M.S.L.S., 1961.
Experience: Student assistant, University of Illinois Library; librarian, Queens Borough Public Library; reference librarian, Community Library, San Leandro, California.
- HARDEMAN, SARAH A. (1960)**.....Home Economics
B.S., Tennessee College, 1930; M.S., Iowa State University, 1946; additional graduate study at University of Tennessee (Martin Branch), Iowa State University.
Experience: Vocational Home Economics teacher, high schools in Tennessee.
- HARDEN, F. SHELDON (1948)**.....Physical Education
B.A., Santa Clara, 1943; M.A., College of the Pacific, 1950.
Experience: Player-coach, Sacramento Nuggets professional football team; playground supervisor, City of Sacramento; Red Cross swimming instructor, San Luis Obispo High School; officer, U.S. Army.
- HARPER, RICHARD R. (1968)**.....Director of Athletics
B.S., University of California, Los Angeles, 1959; M.S., 1960.
Experience: Assistant freshman coach, UCLA; head football coach, Riverside City College; line coach, Colorado State University, University of California at Santa Barbara, University of Colorado.
- HARRIS, ROY M. (1954)**.....Animal Husbandry
B.S., Utah State Agricultural College, 1952; M.S., 1954.
Experience: American Packing and Provision Company, Swift and Co., Ogden, Utah; meatcutter, U.S. Army; breeding herdsman, Suncrest Hereford Ranch, Springerville, Arizona; Gibbs Quarter Horse and Hereford Ranch, Mackay, Idaho; assistant livestock husbandman, U.S.A.C. farm, Logan, Utah.
- HASKELL, BARBARA D. (1968)**.....Home Economics
B.S., University of California, Davis, 1966; M.S., 1968.
Experience: Recreation director, Davis, Modesto; student assistant, research assistant, University of California, Davis.
- HASKELL, CHARLES THOMSON (1963)**.....Mathematical Sciences
B.A., University of Washington, 1946; M.S., University of Arizona, 1961; Ph.D., 1965.
Experience: Teacher, Fallon, Nevada, High School; trust clerk, Peoples National Bank of Washington; trust clerk, assistant trust officer, First National Bank of Nevada; graduate assistant, University of Arizona.
- HASSLEIN, GEORGE J. (1949)**.....Dean, School of Architecture
B. of Arch., University of Southern California, 1945, F.A.I.A.
Experience: Road and bridge design in Mexico and Central America for Pan-American Highway; airport design for Army Engineers; development work at M.I.T. for Gilfillan Bros.; with architects and practice in Los Angeles area; designer for Summer Spaulding and Wurdeman and Becket; chief designer, Kistner, Curtis and Wright. Registered architect, California. NCARB Certificate.
- HATFIELD, R. C. (1949)**.....Biological Sciences
B.Sc., University of Dayton, 1941; M.A., University of California at Los Angeles, 1947; Ph.D., 1950.
Experience: Chemist, Research Division, National Cash Register Co.; U.S. Navy; assistant in bacteriology, University of California at Los Angeles; chief of laboratories, F.O.D. Assessment Branch, U.S. Army Biological Warfare Laboratories, Fort Detrick, Maryland; U.S. Public Health Service, World Health Organization, Pan-americano de Zoonosis in Argentina.

Faculty and Staff

HAZEBROOK, HARRY (1968).....Electronic Engineering
B.S., Michigan College of Mining and Technology, 1949; M.S., University of Wisconsin, 1951.

Experience: Chief systems engineer, Navigation Computer Corporation; engineering manager, Electro-Mechanical Research, Inc.; engineer, General Electric Company, Convair, Jansky and Bailey; instructor, University of Wisconsin.

HEAD, DWAYNE G. (1966).....Physical Education
B.S., Jamestown College, 1958; M.S., South Dakota State University, 1963; Ed.D., University of Oregon, 1967.

Experience: Instructor, West Fargo High School, South Dakota State University, University of North Dakota; teaching assistant, University of Oregon.

HEALEY, JOHN R. (1947).....Head, Journalism Department
B.A., San Jose State College, 1941; M.S., University of California at Los Angeles, 1964.

Experience: Reporter, San Jose News; public relations, McClellan Field, Sacramento; reporter, Sacramento Union; Valley editor, Modesto Bee.

HEIFETZ, EMANUEL R. (1962).....Music
B.A., University of Redlands, 1950; M.M., 1958; additional graduate study, Claremont Graduate School. Extensive private music study with Luboviski, Pollak, Zaslavsky, and Meremblum.

Experience: Instrumental music instructor, San Bernardino Valley College; string and orchestra director, Summer Music Workshops; instructor-director, Community Orchestra, San Bernardino Adult Education; master teacher, University of Redlands; instrumental music teacher, Redlands City Schools and Inglewood Unified School District; composer of published violin method and other works.

HEINZ, JOHN A. (1953).....Head, Audio-Visual Department
B.A., University of Washington, 1950; M.A., Ohio State University, 1964.

Experience: Technical and research assistant, University of Washington; production assistant, Korry Film Productions; free lance photographer, Seattle; production co-ordinator, Criterion Films, Inc., Seattle; film editor, KRON-TV, San Francisco.

HELMAN, ANATOL (1957).....Architecture
B.S., Warsaw Polytechnic Institute, 1934.

Experience: Designer, Associated Architects and Planners, Dallas, Tex.; The Anglo-Iranian Oil Co., Abadan, Iran; master-planner, International Technical Associates (ITA); Architects-Planners, Milan, Italy; architect, T. B. Bourne Associates, Washington, D.C. and Tokyo, Japan; Tecnicos Expanoles Asociados, Madrid, Spain; Warsaw Municipality; instructor, University of Nebraska; University of Oklahoma; Navy Orientation School. Visiting Fulbright professor in Architecture, University of Guayaquil and Central University, Ecuador.

HENDEL, FRANK J. (1967).....Aeronautical Engineering
B.S., Polytechnika Lwowska, Poland, 1935; M.S., 1937; Ph.D., 1941.

Experience: Consultant and technical specialist, North American Aviation; technical staff, Jet Propulsion Laboratory; engineer, Aerojet General Corp., Wigton-Abbott Corp., Anglo-American Oil Co., Foster-Wheeler, Ltd., Iraq Petroleum Co.; instructor, Polytechnika Lwowska.

HENDRIKS, HAROLD J. (1952).....Electronic Engineering
B.S., Iowa State University, 1940; M.S., 1941; additional graduate study, University of Colorado, 1949.

Experience: Engineer, Collins Radio Co., Cedar Rapids, Iowa; engineer, U.S. Naval Ordnance Test Station, China Lake; industrial experience program, Westinghouse Electric Corp., East Pittsburgh, Pennsylvania; engineer, Radio Corporation of America, Camden, New Jersey; engineer, Burroughs Corp., ElectroData Division, Pasadena; faculty associate, The Boeing Company, Seattle, Washington; associate professor, electrical engineering, University of Nevada, Reno, Nevada.

Faculty and Staff

- HENNIG, LLOYD R. (1963)**.....Medical Officer
B.S., University of California, 1927; M.D., 1932.
Experience: Internship, San Francisco General Hospital; residency, Franklin Hospital, San Francisco; U.S. Army; private practice, Willows.
- HENSEL, DONALD W. (1960)**.....Social Sciences
B.S., University of North Dakota, 1949; M.A., University of Colorado, 1953; Ph.D., 1957.
Experience: Instructor, public schools in Colorado, New Mexico, Arizona; graduate assistant, University of Colorado, Boulder; instructor in history and coordinator of Arts and Sciences instruction, University of Colorado, Denver; head, Social Sciences Department, Associate Dean, Academic Planning, California State Polytechnic College.
- HERALD, CHARLES A. (1958)**.....Electronic Engineering
B.Sc., M.Sc., Dalhousie University, Halifax, Nova Scotia, 1935.
Experience: Assistant professor, University of Massachusetts; instructor, Pennsylvania State University; instructor, Communication School, Canadian Department of National Defense; lecturer, McGill University; lecturer, University of British Columbia; special gauge examiner, assistant and junior physicist, National Research Council, Ottawa.
- HESCH, EARL R. (1956)**.....Engineering Technology
B.S., University of New Mexico, 1955; M.S., Oklahoma A. & M. College, 1956.
Experience: U.S. Army; draftsman, Los Alamos Scientific Laboratory; survey party chief, C. H. Cole; surveyor-draftsman, City of Albuquerque.
- HICKS, WILLIAM R. (1957)**.....Physical Education
B.S., University of California, Los Angeles, 1950; M.A., Long Beach State College, 1959.
Experience: United States Army; teacher, Long Beach City Schools.
- HIGDON, ARCHIE (1967)**.....Dean, School of Engineering
B.S., South Dakota State University, 1928; M.S., Iowa State University, 1930; Ph.D., 1936.
Experience: Chairman, Engineering Science Division; professor and head, Mechanics; Associate Dean, U.S. Air Force Academy; professor, U.S. Military Academy, Iowa State University; instructor, North Dakota State University; management analyst, Headquarters 15th Air Force (SAC); officer, U.S. Army Air Force. Registered professional engineer, Colorado.
- HITCHCOCK, VAUGHAN D. (1962)**.....Physical Education
B.S., Washington State University, 1956; M.A., San Francisco State, 1965.
Experience: Physical education instructor, football and wrestling coach, Castro Valley High School; physical education instructor, football and wrestling coach, Hayward High School; teacher, Juvenile Hall, Alameda County Special Schools; playground, swimming and recreation director, Hayward Area Recreation Department, Hayward.
- HOFFMAN, GEORGE E. (1956)**.....Industrial Engineering
B.S., Carnegie Institute of Technology, 1951; B.S., California State Polytechnic College, 1962; M.B.A., University of Southern California, 1959; M.S., Stanford University, 1960; additional graduate study, Oregon State University.
Experience: Time and methods engineer, Robertshaw Fulton Controls; Kennecott Copper Corporation, Ray, Arizona. Registered engineer, California.
- HOGAN, WILBUR C. (1959)**.....Mathematical Sciences
B.S., United States Coast Guard Academy, 1928; M.S., Purdue University, 1959.
Experience: Officer, U.S. Coast Guard; commanding officer, Port Townsend Training Station; director, U.S. Coast Guard Institute.

Faculty and Staff

- HOLLEY, F. JERALD (1961)**.....Registrar
B.S., Utah State University, 1961; M.A., California State Polytechnic College, 1968.
Experience: U.S. Air Force; private business, Rexburg, Idaho.
- HOLMQUIST, ROBERT E. (1946)**.....Physics
B.A., University of Oregon, 1932; M.A., Oregon State College, 1936; additional graduate study, Purdue University and University of Washington.
Experience: Teaching assistant, University of Oregon and Oregon State College; instructor, University of Oregon; teaching fellow, Purdue University and University of Washington; inspection supervisor, Boeing Aircraft Company.
- HOLT, RAY J. (1955)**.....Physics
A.B., University of California, 1939; M.A., 1949.
Experience: Physicist, University of California Radiation Laboratory; aircraft inspector, Consolidated Vultee Aircraft Corporation; high school and junior college teacher.
- HOLTZ, WALTER E. (1954) (1968)**.....Head,
Environmental Engineering Department
B.S., Illinois Institute of Technology, 1949; M.S., California Institute of Technology, 1953; M.S., University of Washington, 1964.
Experience: Professor, California State Polytechnic College, Pomona; project engineer, engineer, U.S. Naval Air Missile Test Center; U.S. Air Force; consultant, USAID. Registered professional engineer, California.
- HOMAN, DENNIS N. (1966)**.....Biological Sciences
B.A., University of Iowa, 1955; M.S., 1958; Ph.D., 1960.
Experience: Instructor, University of Iowa; assistant professor, Illinois State University; associate professor, Wisconsin State University.
- HOMFELD, GILBERT L. (1960)**.....Mathematical Sciences
A.B., Santa Barbara State College, 1936; M.A., California State Polytechnic College, 1960.
Experience: Tulare County Schools Office, teaching; school building draftsman and inspector; engineering draftsman, Southern California Gas Company, Visalia; ranching in Visalia; teaching, Selma Junior High School, Fresno County.
- HONEGGER, HARRY H. (1961)**.....Welding and Metallurgical Engineering
B.S.M.E., Oregon State College, 1950; M.S.M.E., 1952.
Experience: Welder, Oregon Shipyards; U.S. Army; laboratory supervisor, Metallurgical Engineers, Inc.; registered professional engineer, Oregon.
- HOOK, RUTH E. (1968)**.....Graduate Nurse
R.N., Methodist Hospital School of Nursing, Peoria, Illinois.
Experience: General duty and administrative, University of Chicago Hospital; tissue technician, Arroyo Grande.
- HOOKS, ROBERT D. (1966)**.....Animal Husbandry
B.S., California State Polytechnic College, 1961; M.S., Iowa State University, 1964; Ph.D., 1966.
Experience: Swine herdsman, State College of Washington, Pullman, Washington; manager and part-owner, orchard and swine farming enterprise, Orland, California; U.S. Marine Corps.
- HORTON, WILLIAM F. (1968)**.....Electrical Engineering
B.S., California Institute of Technology, 1946; M.S., 1948; Ph.D., UCLA, 1966.
Experience: Department head, senior staff engineer, Hughes Aircraft Company; design specialist, section head, Lear Siegler, Inc.; engineer, Westinghouse Electric; resident engineer, associate in engineering, UCLA.

Faculty and Staff

- HOSTETTER, H. CLYDE (1958)** Audio-Visual
B.J., University of Missouri, 1949; graduate study, University of Kansas, University of Southern California, American University.
Experience: Officer, U.S. Navy; feature writer and chief photographer, Topeka (Kansas) Daily Capital; public relations director, United States Junior Chamber of Commerce; public relations consultant, Hughes Aircraft Company; editor official Kansas magazine, To the Stars; editor official Junior Chamber magazine, Future; associate editor, Pathfinder and Town Journal; free-lance writer and photographer.
- HOUK, A. L. (1946)** Chemistry
B.S., Michigan State College, 1926; M.S., 1928; Ph.D., Pennsylvania State College, 1933.
Experience: Graduate assistant in chemistry, Michigan State College and Pennsylvania State College; instructor in chemistry, Michigan State College; research chemist and group leader, Rohm and Haas Company, Philadelphia, Pennsylvania.
- HOULIS, JEROME F. (1959)** Chemistry
B.S., California State Polytechnic College, 1958; graduate study, California State Polytechnic College.
Experience: Electronics maintenance, U.S. Air Force.
- HOUSTON, ERNEST R. (1957)** Ornamental Horticulture
B.S., Oklahoma State University, 1943; M.S., Ohio State University, 1947; additional graduate study, Oklahoma State University.
Experience: Assistant professor, Oklahoma State University; manager of plant shipments, Furrow and Co., Guthrie, Oklahoma; grower and consultant, Higdon Flower Shop and Nursery, Oklahoma City, Oklahoma; U.S. Army.
- HOWARD, LORRAINE H. (1964)** Associate Dean, Women
B.S., Oregon State College, 1945; Ed.M., Oregon State University, 1961; Ph.D., 1964.
Experience: Assistant buyer, Meier & Frank Co., Portland; assistant chemist, Hawley Pulp and Paper, Oregon City; assistant to director, Fruit & Flower Day Nursery, Portland; teacher, Oregon State University.
- HOWE, HENRY E. (1956)** Printing Technology and Management
B.A., University of Wisconsin, 1930; B.S., Stout Institute, 1942; graduate study, University of Wisconsin, Stout Institute.
Experience: Assistant, newspaper plant; instructor-coordinator, Stout Institute, Racine Vocational School, U.S. Air Corps; editor and publisher, The Dial, Wisconsin.
- HUEHN, KEMPTON L. (1968)** Mathematical Sciences
B.S., Iowa State University, 1957; M.S., 1962; additional study, Iowa State University.
Experience: Member technical staff, T.R.W. Systems Group; instructor, Iowa State University.
- HUGHES, LEROY BARRY (1950)** Physical Education
B.S., University of Oregon, 1931; M.A., Stanford University, 1950.
Experience: Physical education teacher and coach, Monterey High School; head athletic coach, Menlo Junior College; officer, U.S. Navy.
- HUOT, ROBERT J. (1963)** English
B.A., University of Washington, 1946; M.A., 1951; additional graduate study, University of Utah.
Experience: Teaching fellow, University of Washington; instructor, Tulane University; associate, University of Washington; instructor, Montana State College; graduate assistant, University of Utah.

Faculty and Staff

- HUTTON, REX L. (1966)**.....Mathematical Sciences
B.S., Baldwin Wallace College, 1959; M.S.T., Illinois Institute of Technology, 1964.
Experience: Teacher, Brooklyn Junior High School; research assistant, Education Research Council of Greater Cleveland; instructor, Cuyahoga Community College.
- HYER, EDGAR A. (1951)**.....Agricultural Management
B.S., Utah State College, 1939; M.S., 1942; Ph.D., Cornell University, 1948.
Experience: Land use economist, Utah; field supervisor of A.A.A., Utah; U.S. Army; graduate assistant, Cornell University; assistant professor of agricultural economics, Oregon State College.
- HYNES, C. DENNIS (1957)**.....Biological Sciences
B.A., Macalester College, 1951; M.S., University of Michigan, 1953; Ph.D., University of Florida, 1957.
Experience: Museum assistant, University of Michigan; teaching assistant and research assistant, University of Florida.
- IKENOYAMA, GEORGE K. (1964)**.....Architecture
B.S., California State Polytechnic College, 1955; additional graduate study, Pennsylvania State University, Montana State University.
Experience: Draftsman and associate, John Badgley, A.I.A.; lecturer, California State Polytechnic College. Registered architect, California.
- IRVIN, MELVA (1968)**.....Physical Education
A.B., Colorado State College, 1963; M.S., Pennsylvania State University, 1968.
Experience: Teacher, Righetti High School, Santa Maria; graduate assistant, instructor, Pennsylvania State University.
- JACKS, MADGE A. (1964)**.....Medical Officer
M.D., Loyola University Medical School, Chicago.
Experience: Internship, Cook County Hospital, Chicago; residency, Municipal Contagious Disease Hospital, Chicago; residency, Illinois Research & Educational Hospital, Chicago; private practice, Chicago; St. Joseph's Hospital Laboratory, San Francisco; residency, San Luis Obispo General Hospital.
- JACOBS, JAMES W. (1967)**.....Animal Husbandry
B.S., Oklahoma State University, 1967.
Experience: Livestock showing, judging, and ranching operations.
- JAMES, AERNAT S. (1965)**.....Physics
B.S., University of Madras, 1956; M.A., Southern Illinois University, 1963.
Experience: Instructor, Orient Technical College, Frostburg State College; research assistant, Southern Illinois University; assistant, U.S. Embassy, Kabul, Afghanistan.
- JAMES, ARTHUR F. (1956)**.....Medical Officer
M.D., University of Chicago, 1953; B.A., University of California at Los Angeles.
Experience: Internship, U.S.P.H.S. Hospital, Staten Island, New York; U.S. Public Health Service, San Pedro; private practice, Wilmington.
- JAMESON, GLORIA (1967)**.....English
B.A., Texas Woman's University, 1941; M.A., Teacher's College, Columbia University, 1944; Ph.D., University of Texas, 1966.
Experience: Librarian, Galveston Public Schools; elementary teacher in Houston, San Antonio, Texas; Muskogee, Oklahoma; and Montgomery County, Maryland; consultant in education, Montana, and Christ Church, Alexandria, Virginia; professor of English, Ewha Woman's University, Seoul, Korea; research associate, linguistics, University of Texas; director, intensive English program, Vietnamese Leadership/Scholarship Program, California State Polytechnic College.

Faculty and Staff

- JENKINS, STARR (1961)**.....English
B.A., University of New Mexico, 1948; M.A., Stanford University, 1959.
Experience: Navy and Army; instructor, Albuquerque Public High Schools; laborer, firefighter, smokejumper and aerial observer with U. S. Forest Service, California, Oregon, Montana, and Idaho; national park ranger, Yosemite; information specialist (writer-photographer), U. S. Forest Service, Southwestern Regional Office, Albuquerque, New Mexico; free-lance writer-photographer.
- JENNINGS, CHARLES W. (1968)**.....Education
B.A., Wheaton College, 1966; M.A., M.F.A., Northern Illinois University, 1968.
Experience: Factory worker, IBM; graduate assistant, Northern Illinois University.
- JENSEN, JAMES J. (1948)**.....Physical Education
A.B., Washington State College, 1935; M.S., Stanford University, 1940.
Experience: Football and track coach, Shelton High School, Washington; history teacher and football and track coach, Santa Rosa High School, Santa Rosa; track coach and guidance assistant, Menlo Junior College, Menlo Park; U. S. Navy; track coach and instructor in health and physical education, San Francisco Junior College.
- JOHNSON, CORWIN M. (1961)**.....Head, Crops Department
B.S., State College of Washington, 1950; M.S., 1951; Ph.D., Cornell University, 1953.
Experience: Field and laboratory technician, research assistant, Department of Agronomy, State College of Washington; research assistant, Department of Agronomy, Cornell University; research agronomist, Northwestern Washington Experiment Station; assistant professor and agronomist, Mississippi State University.
- JOHNSON, MEAD R. (1956)**.....English
B.A., University of Denver, 1939; M.A., 1949; additional graduate study, University of Denver.
Experience: Advertising manager, Sterling (Colorado) Farm Journal; U. S. Army; instructor in Colorado and California public schools; instructor, Colorado School of Mines; associate professor, Central Missouri State College.
- JOHNSON, MILES B. (1957)**.....English
B.A., Gustavus Adolphus College, 1947; M.A., University of Minnesota, 1951; M.A., University of Denver, 1953; M.A., University of Iowa, 1966; additional graduate study, University of Washington, University of Southern California, University of Iowa.
Experience: Instructor and publications adviser, Florence State College; instructor and publications chairman, Memphis State University; instructor, University of Tennessee, Memphis; assistant professor, Luther College; instructor, University of Puget Sound; presidential assistant, Johnson Wholesale and Manufacturing Company; author.
- JOHNSON, OLA K. (1967)**.....Education
B.A., University of California, 1962; M.A., 1967.
Experience: Lab assistant, research assistant, University of California, Los Angeles.
- JOHNSON, RICHARD F. (1950)**.....Head, Animal Husbandry Department
B.S., Iowa State College, 1942; M.S., State College of Washington, 1947.
Experience: U.S. Army; instructor, College of Agriculture and assistant animal husbandman, Experiment Station, State College of Washington, Pullman, Washington.
- JOHNSON, WILLIAM V. (1966)**.....Music
B.M.E., Indiana University, 1962; M.M., University of Michigan, 1966.
Experience: Instrumental music instructor, Seeger Memorial High School, Indiana; musical director, Light Opera Company, Illinois; assistant to conductor and member of band staff, University of Michigan.

Faculty and Staff

JOHNSTON, ROBERT M. (1946-54) (1956).....Engineering Technology
B.A., Santa Barbara State College, 1937; graduate study, Boeing School of Aeronautics.

Experience: Meteorologist, Pan American Airways and Pennsylvania Central Airlines; meteorology instructor, Randolph Field and Pan American Airways; junior civil engineer, Division of Highways, California.

JOHNSTON, THOMAS V. (1967).....Architecture
Diploma of Teaching, Victoria University, New Zealand, 1948; D.A., Glasgow School of Art, London University, 1952.

Experience: Newspaper Art critic, guest artist, head, Art Department, Palmerston North Teachers College and Waihi College, New Zealand; lecturer, Glasgow School of Art, Glasgow. Member "Queen Elizabeth II Arts Council," New Zealand.

JONES, JOHN R. (1961).....Business Administration
B.S., University of Minnesota, 1931; LL.B., George Washington University, 1938.

Experience: Head, Social Science Department, Sedro Woolley, Washington Union High School; Identification Division, FBI; special agent, Public Works Administration; special agent, FBI.

JORGENSEN, EDWARD J. (1947).....Physical Education
B.A., Chico State College, 1936; M.S., University of Southern California, 1950.

Experience: Instructor, physical education and industrial arts, South Fork, Ferndale, and Watsonville high schools; athletic director, Marin Junior College; officer, U.S. Navy.

JORGENSEN, NANCY ANN (1968).....Counselor
B.A., University of Hawaii, 1957.

Experience: Graduate assistant, University of Hawaii; psychometrist, California State Polytechnic College; senior psychometrist, U. of California, Berkeley; junior assistant-research, U.C.L.A.; psychometrist, County of San Luis Obispo.

JUDD, W. BOYD (1956).....Mathematical Sciences
B.S., St. Mary's College, 1939; M.A., University of California, 1951; additional graduate study, University of California, Pennsylvania State University.

Experience: High school teacher, California; instructor, Army specialized training program, University of Santa Clara; research mathematician, University of California; in charge of statistical operations, Bureau of Research and Guidance, Office of Los Angeles County Superintendent of Schools; I.B.M. supervisor, State of California, Department of Public Health; participant in National Science Foundation Institute, New Mexico State University.

KABAT, HERBERT R. (1952).....Physics
B.S., United States Naval Academy, 1938; M.A., Stanford University, 1951; additional graduate study, University of Southern California, Stanford University, University of Colorado.

Experience: Officer, U. S. Navy; research analyst, Rheem Mfg. Co.; instructor, Pasadena City College, College of the Sequoias.

KAY, THOMAS D. (1958).....Welding and Metallurgical Engineering
B.S., Wayne State University, 1957; M.A., California State Polytechnic College, 1967.

Experience: Assistant training director, Ex-Cello-O Corporation; apprentice instructor, Chrysler Corporation; radio team chief and refrigeration mechanic, U.S. Army; machinist, Detroit-Timken Axle Company; apprentice, Goodyear Tire and Rubber Company.

KEECH, ROGER A. (1965).....Mechanical Engineering
B.S., California State Polytechnic College, 1955; M.S., University of Southern California, 1964.

Experience: Engineer, Menasco Manufacturing Co., Rocky Mt. Arsenal, Lockheed Aircraft; president, Dynalytic Engineering Co.; instructor, California State Polytechnic College, Pomona.

Faculty and Staff

- KEEP, ROGER L. (1968)** Industrial Technology
 B.S., Church College, 1957; M.S., Stout State University, 1968.
 Experience: Building construction supervisor, Polynesian Cultural Center, Hawaii; foreman, Perkins Machine Company.
- KEETCH, BRENT H. (1967)** Journalism
 B.A., Utah State University, 1965; M.A., 1966.
 Experience: Research aide, Utah State University Forestry Department, U.S. Forest Service; senior assistant, Utah State University; U.S. Army; staff writer, The Salt Lake Tribune; correspondent, newsman, The Associated Press, Utah, Arizona.
- KEIF, RODNEY G. (1960)** Environmental Engineering
 B.S., Kansas State University, 1949; graduate study, California State Polytechnic College.
 Experience: Sales and application engineer, O'Connor-Oklahoma Company, Oklahoma City; registered professional engineer, Oklahoma.
- KEILBACH, SHIRLEY E. (1968)** Social Sciences
 A.B., Washington University, 1949; M.S.W., 1952, additional graduate study, University of Southern California.
 Experience: Social worker, acting director, Pasadena Welfare Bureau; teacher-counselor, Los Angeles City and Garden Grove School Districts; dean of girls, Laguna Beach Unified District; girls' vice principal, Anaheim Unified School District; psychiatric social worker, Family Service Center; supervisor, San Luis Obispo County Welfare Department.
- KELLER, ELMO A., JR. (1963)** Mathematical Sciences
 B.A., Brigham Young University, 1959; M.A., 1961; additional graduate study, University of California at Los Angeles.
 Experience: Assistant instructor, Brigham Young University; instructor, Church College of Hawaii.
- KELLERMAN, MARTIN (1968)** Chemistry
 B.S., Polytechnic Institute of Brooklyn, 1953; Ph.D., University of Washington, 1966.
 Experience: Research assistant, Polytechnic Institute of Brooklyn, University of Washington, University of California at San Diego; analytical chemist, Continental Baking Company.
- KELLEY, HELEN P. (1966)** Journalism
 B.P.A., Brooks Institute, 1966.
 Experience: Free-lance writing and newspaper work, Arcadia and Preston, Kansas.
- KENNEDY, ROBERT E. (1940)** President
 A.B., San Diego State College, 1938; M.A., Stanford University, 1950; Ph.D., Claremont Graduate School, 1966.
 Experience: Editorial Staff, San Diego Sun, San Diego Daily Journal, San Luis Obispo Telegram-Tribune, Palo Alto Times; at California State Polytechnic College: Chairman, Journalism Department; Director of Public Relations; Assistant to the President; Dean, Arts and Sciences; Vice President.
- KENNELLY, BRUCE (1947)** Head, Chemistry Department
 B.S., University of Kentucky, 1944; M.S., Purdue University, 1946; Ph.D., Cornell University, 1952.
 Experience: Chemist, department of agricultural chemistry, Purdue University; research chemist, department of biochemistry and nutrition, Cornell University.
- KENYON, PAUL (1957)** Business Administration
 LL.B., Southern Methodist University law school, 1949; M.A., California State Polytechnic College, 1959.
 Experience: Insurance legal staff, investment counseling, methods analyst, and business systems and procedures analyst.

Faculty and Staff

KERR, JOHN F. (1967) English
B.A., Arkansas State University, 1953; M.A., University of Michigan, 1956; Ph.D., University of Texas, 1964.

Experience: High school journalism and speech teacher, Missouri; assistant professor, Westminster College, Missouri; instructor, University of Missouri; teaching assistant, University of Texas; assistant professor, Louisiana State University.

KERR, SHARRON L. (1966) Physical Education
B.A., University of California, Santa Barbara, 1961; M.A., 1963.

Experience: Summer camp counselor; research assistant, University of California; instructor, Crescenta Valley High School.

KIMBALL, KENNETH R. (1967) Industrial Technology
B.E., University of Southern California, 1956; M.S., 1959; B.S., 1965.

Experience: Resident engineer and executive officer, Engineer District; member, War Department General Staff; chief of management branch, Major Air Command; air installation officer and wing staff engineer; member of technical staff and supervisor of Electronics Manufacturing, Hughes Aircraft; industrial engineer, chief of overhaul and repair, engineering group leader, Autonetics; manufacturing manager, California Steel and Tube; general manager, Climax Manufacturing; head, plant maintenance, and chief, industrial engineering, Rocketdyne; staff consultant, H. B. Maynard and Company. Registered professional engineer.

KIRKPATRICK, WILLIAM M. (1949-51) (1953) Agricultural Engineering
B.S., California State Polytechnic College, 1949.

Experience: Welder, Marinship Corporation; diesel and heavy construction equipment mechanic, Corps of Engineers, U.S. Army; machinery and maintenance engineer advisor, (agricultural and industrial) Thai Government, Foreign Operations Administration, U.S. Government.

KISSLING, RICHARD L. (1968) Chemistry
B.S., Otterbein College, 1961; M.S., University of Pacific, 1963; Ph.D., 1968.

Experience: Assistant in Chemistry, Heidelberg College; teaching assistant, University of the Pacific.

KLUSTERMEYER, JAMES A. (1964) Crops
B.S., California State Polytechnic College, 1960; graduate study, 1961.

Experience: Sales and service, Southern Ammonia Service; Vocational Agriculture instructor, Santa Paula, Camarillo; U. S. Army.

KNAPP, ERNA BOWMAN (1962) Education
M.F.A., Otis Art Institute, Los Angeles, 1961.

Experience: Instructing designer, Foremost Studio, New York City; Headon Designers, London and Manchester, England; owner and operator of commercial design studio, Montreal, Canada; freelance designer, Los Angeles; fine arts instructor, private schools, art associations, Los Angeles.

KOBAYASHI, MARY J. (1967) Social Sciences
B.A., St. Mary's College, 1949; M.A., University of Notre Dame, 1959; additional graduate study, University of Washington, Seattle University, University of California, Berkeley, University of Colorado.

Experience: Social case worker, Catholic Social Services; teacher, Bishop Noll High School, St. Joseph's High School, Marlan Central High School; assistant professor chairman Sociology Department, St. Mary's College.

KOBERG, DONALD J. (1962) Architecture
B. of Arch., Tulane University, 1958. Additional graduate study, Harvard.

Experience: Architectural practice as designer and draftsman in New Orleans; instructor, North Dakota State College; lecturer, University of California at Berkeley; research associate, Architectural Prototypes, Berkeley; Corps of Engineers, U.S. Army. Registered architect, Louisiana.

Faculty and Staff

- KOGAN, IRVIN J. (1957)** Engineering Technology
 B.A., Wayne University, 1954; M.A., Stanford University, 1955. Additional graduate study, Stanford University.
 Experience: Instructor, Orange Coast College; U.S. Air Force.
- KOMBRINK, RICHARD T. (1955)** Engineering Technology
 A.B., Loyola University, 1946; B.S.M.E., University of Southern California, 1964.
 Experience: Pilot, U.S. Army Air Corps; draftsman, Hess Greiner, and Polland; sales engineer, T. H. Creears Corp.; civil designer, City of Culver City; assistant project engineer, RCA Radar and Missile Division.
- KONG, CHERIE J. (1967)** Library
 B.A., National Taiwan University, 1962; M.A., Peabody College, 1965.
 Experience: Cataloger, University of Wichita; assistant acquisitions librarian, Virginia Polytechnic Institute.
- KORSMEYER, RUSSELL (1958)** Electrical Engineering
 B.S.E.E., University of Missouri, 1950; M.S.E.E., University of Southern California, 1958.
 Experience: Electrical engineer, Los Angeles Department of Water and Power; junior design engineer, North American Aviation, Inglewood; relay engineer, Gulf States Utilities, Beaumont, Texas. Registered professional engineer, California.
- KREJSA, RICHARD J. (1968)** Biological Sciences
 B.S., Michigan State College, 1954; M.A., University of California, Los Angeles, 1958; Ph.D., University of British Columbia, Vancouver, 1964.
 Experience: Instructor and assistant professor, Western Washington State College, University of Hawaii, Columbia University.
- KRIDLER, CHARLES C. (1968)** Architecture
 B.A., Arch., Oklahoma State University, 1963.
 Experience: Draftsman, Dales & Foster, Pratt Box & Henderson, and M. Arthur Gensler; associate, Max R. Garcia. Registered architect, California.
- KWAN, DAVID W. (1967)** Architecture
 B.S., National Shantung University, 1936; M.S., University of Southern California, 1951.
 Experience: Assistant professor, Humboldt State College; structural engineer, A. C. Martin & Associates and Holmes & Narver; structural department head, Davidson & Maurer; associate, John E. Macket; squad leader, Victor Gruen; structural designer, Joseph Sheffer and Parker & Parker; squad engineer, Pereira & Luckman and Brandow & Johnston. Registered civil engineer and structural engineer, California.
- LABHARD, LEZLIE A. (1967)** Home Economics
 B.S., University of California, 1965; M.S., 1967.
 Experience: Resident assistant, laboratory assistant, research assistant, University of California, Davis.
- LAMOURIA, LLOYD H. (1965)** Head, Agricultural Engineering Department
 B.S., Michigan State University, 1949; M.S., Iowa State University, 1950.
 Experience: U.S. Air Force; instructor, Iowa State University; associate professor and associate agricultural engineer, University of California; manager of product planning, J. I. Case Company, Racine, Wisconsin.
- LANDRETH, JAMES R. (1956)** Associate Director,
 Budgeting and Business Affairs
 B.A., Mexico City College, 1954; M.B.A., Stanford University, 1956; additional graduate study, Claremont University College.
 Experience: Instructor, U.S. Army; explosive ordnance disposal, U.S. Army; college personnel officer, assistant to dean of the college, California State Polytechnic College, Kellogg campus; personnel relations and business management analyst, San Luis Obispo.

Faculty and Staff

LANDYSHEV, ALEXANDER (1956)..... Electrical Engineering
E.E., University of Vladivostok, Russia, 1927; additional study, University of Leningrad, 1935; University of Moscow, 1940, University of California, 1954 and 1956.

Experience: Electrical engineer, Donez Basin Power System, Russia; Energiebaust G.m.b.H., Germany; Brown-Voveri and Co., Germany; U.S. Army Engineers, Germany; U.S. Steel Corp., San Francisco; production engineer, Precision Manufacturing Co.; associate professor, University of California, Berkeley.

LANGFORD, JAMES A. (1955)..... Coordinator, Elementary Education
A.B., Western Kentucky Teachers College, 1937; M.A., 1947; Ph.D., University of Michigan, 1953.

Experience: Teacher in elementary and secondary schools in Kentucky; principal, Cromwell, Kentucky; principal, Jefferson Elementary School, Wayne, Michigan; assistant professor and supervisor of elementary education, University of Nevada; communications officer, U. S. N. R.

LANSMAN, PAUL S. (1964)..... Mathematical Sciences
A.B., M.A., Washington University, 1932; Ph.D., 1934; additional graduate study, California Institute of Technology.

Experience: Instructor, St. Louis Junior College; mathematician, Subterrex Geophysical Company, Airborne Instruments Laboratory and Stoddart Aircraft Radio Company; engineer, Lockheed Corporation; Lawson Crystal Company and Lawson Import Company.

LARSON, LOIS L. (1962)..... Graduate Nurse
R.N., Swedish Hospital, School of Nursing, Minneapolis, Minnesota.
Experience: General duty, office nurse.

LARSON, MARIE A. (1967)..... English
B.A., San Francisco State College, 1964; M.A., 1965.

Experience: Elementary teacher, Williston, North Dakota; personnel clerk, Lockheed Aircraft Corporation; stewardess, sales agent, United Air Lines; instructor, Boise College.

LAUMANN, GEORGE C. (1957)..... Mathematical Sciences
A.B., Chico State College, 1952; M.A., 1953; additional graduate study, University of Oregon, University of California at Los Angeles.

Experience: Instructor, Ordnance Department, United States Army; teacher, California high schools; instructor, Adult Evening College, Chico; participant, National Science Foundation Institute, Portland State College.

LAWSON, J. DAN (1951)..... Associate Dean, Activities
B.S., University of California, Berkeley, 1938; M.Ed., University of California, Davis, 1955; Ed.D., Stanford University, 1963.

Experience: Vocational instructor; officer, U.S. Navy; special supervisor, State Bureau of Agricultural Education.

LAZARUS, ALFRED S. (1966)..... Biological Sciences
A.B., University of California, Berkeley, 1935; M.A., University of California Medical Center, San Francisco, 1937; Ph.D., 1938; additional graduate study, University of Toronto, Canada.

Experience: Instructor, University of Colorado Medical School; associate professor, University of California Medical Center, San Francisco; professor, University of Washington School of Medicine; scientist director, U.S. Public Health Service; officer, U.S. Navy.

LEACH, RICHARD (1930)..... Head, Poultry Industry Department
B.S., Montana State College, 1931.

Experience: Supervisor, feed sales agency, Sweet & Company, Bozeman, Montana; manager and owner commercial poultry plant, Bozeman, Montana.

Faculty and Staff

- LEE, THOMAS J. (1952) Physical Education
 B.A., San Jose State College, 1949; M.A., Stanford University, 1950.
 Experience: Player-coach, All-American Professional Basketball Team; instructor, private gymnasium, Oakland; playground director, Hayward Recreation District; U. S. Army.
- LEFTWICH, BILLY J. (1965) Architecture
 B.Arch., Texas A&M University, 1963.
 Experience: Draftsman, Enslie Oglesby, Architect; George Dahl, Architect; Dales Foster, Architect.
- LEIGHTY, RAYMOND V. (1957) Soil Science
 B.S., University of Maryland, 1938; M.S., 1940.
 Experience: Supervisory soil scientist (Land Classification and Survey), USDA, Soil Conservation Service, Kentucky; party chief, SCS, Virginia, Georgia. U. S. Army, CE.
- LEWELLYN, LOUIS W. (1957) (1961) Counselor
 A.B., University of Arkansas, 1933; M.A., Stanford University, 1950.
 Experience: Office manager, Standard Brands Co.; business manager, Southern Pictorial News; personnel training supervisor, Lansburgh and Brosli; officer, U.S. Navy; counselor, San Francisco Unified School District; associate dean (counseling and testing), California State Polytechnic College, San Luis Obispo.
- LEWIS, GEORGE M. (1967) Mathematical Sciences
 B.A., Stanford University, 1961; M.A., University of Southern California, 1964; additional graduate study, University of Southern California.
 Experience: Instructor, San Fernando Valley State College; teaching and research assistant and instructor, University of Southern California.
- LEWIS, JACK R. (1968) Architecture
 Iowa State College, Burlington Junior College, University of California Extension.
 Experience: Instructor, University of California Extension and Kelsey Jenny College, San Diego; director, Office Services and specification engineer, Frank L. Hope & Associates; senior architect, University of California Scripps Institute of Oceanography; private architectural practice; project and office manager, Sam W. Hamill; job captain, Kistner, Curtis & Wright; line officer, U.S. Navy. Registered architect, licensed contractor.
- LEWIS, VANCE D. (1946) Associate Dean, School of Applied Sciences
 A.B., University of California, 1933; M.A., 1940; Ph.D., University of Southern California, 1954; additional graduate study, University of New Mexico, University of Washington, Rensselaer Polytechnic Institute.
 Experience: Laboratory technician, Shell Development Company; instructor and administrator, California secondary schools; summer staff member, physics institute, University of New Mexico; instructor, California State Polytechnic College; U.S. Naval Aviation officer.
- LINDAMOOD, CHARLES H. (1958) English
 B.A., University of Minnesota, 1949; M.A., Columbia University, 1951; additional graduate study, University of Minnesota, Stanford University, 1957.
 Experience: Teacher, high school, Salinas; instructor, University of Minnesota, College of Puget Sound, and Taft College, Ft. Ord, Ft. Lewis and McChord Field, Washington.
- LINDSAY, WILLIAM B. (1968) Electronic Engineering
 B.S., Morningside College, 1941; M.S., University of Wisconsin, 1953; E.E., Stanford University, 1961.
 Experience: Officer, U.S. Army, Signal Corps, 1942-68.

Faculty and Staff

- LINER, RENIL C. (1966) Assistant to the Dean of Students
B.A., San Jose State College, 1965.
Experience: Placement interviewer, California State Polytechnic College; management trainee, Montgomery Ward & Co.; life underwriter, Acacia Mutual Life Insurance Co.; U.S. Marine Corps.
- LINT, ROBERT G. (1967) English
B.A., University of Michigan, 1948; M.A., 1950; Ph.D., Ohio University, 1967.
Experience: High school teacher, Michigan, Washington; instructor, Lower Columbia College; teaching fellow, instructor, assistant professor, Ohio University.
- LONBORG, REYNOLD H. (1946) Crops
B.S., Agriculture, University of California, 1932.
Experience: Vocational agriculture teacher at Downey and Santa Maria high schools; truck crops production and sales, Santa Maria Valley.
- LOPER, WILLARD H. (1955) Agricultural Engineering
B.S., New York College of Agriculture, Cornell University, 1953.
Experience: Dairy and general farming, New York; machinist, Westinghouse Electric Corp., Buffalo, New York; mechanic-welder, New York State College of Agriculture, Cornell University; student assistant instructor, Cornell University; salesman, Holz Co., Ukiah; journeyman welder, draftsman, Cochran Equipment Company, Salinas.
- LOUGHRAN, BERNICE B. (1958) Education
B.S., Newark State Teachers College, 1940; M.A., Ohio State University, 1946; Ed.D., Stanford University, 1958.
Experience: Elementary school teacher, Southbury, Conn., Santa Barbara, California, and Redwood City, California; elementary art teacher, Irvington, New Jersey; art instructor, Johnson Teachers College, University of Connecticut and Danbury Teachers College.
- LOWRY, JOHN J. (1962) Mathematical Sciences
B.S., United States Military Academy, West Point, 1947; M.A., California State Polytechnic College, 1963; M.S., University of Illinois, 1967.
Experience: Officer and navigation instructor, U.S. Air Force; engineer, Boeing Company.
- LUCIN, JOHN J. (1966) Activities Adviser
B.A., University of Washington, 1966.
- LUKES, THOMAS M. (1962) Food Processing
B.S., San Jose State College, 1947; M.S., University of California at Berkeley, 1949.
Experience: Microbiologist for Real Gold Citrus Products, Anaheim; laboratory supervisor, Gentry Division of Consolidated Foods, Gilroy.
- MACDONALD, LACHLAN P. (1968) Director of Information Services
M.A., University of Chicago, 1957.
Experience: Journalist: Daily Mining Gazette, Michigan; Anchorage Daily Times, Alaska; Associated Press Seattle Bureau; KBYR, Alaska; City News Service, Los Angeles; public information: U.S. Army, Alaska; Alaska National Guard; editor: Chicago Review, Coastlines, The Humanist; lecturer, University College, University of Chicago; teacher, Webb School of California; at California State Polytechnic College, Kellogg-Voorhis, news bureau director, associate professor and journalism coordinator, director of information services; free-lance writer and photographer.
- MACH, GEORGE R. (1954) Mathematical Sciences
B.A., Iowa State Teachers College, 1950; M.S., State University of Iowa, 1951; Ph.D., Purdue University, 1963.
Experience: National Science Foundation faculty fellow, Purdue University; graduate teaching assistant, Purdue University; visiting professor, National Science Foundation Summer Institute, Washburn University, Kansas; officer, U.S. Navy.

Faculty and Staff

- MacKENZIE, F. HELEN (1966)** Library
 B.A., University of California, Berkeley, 1941; Certificate of Librarianship, 1943; M.A., University of Denver, 1961.
 Experience: Librarian, Mary Holmes Junior College, West Point, Mississippi; cataloger, Los Angeles County Law Library, University of Dubuque Seminary Library, California State Library, Sutro Branch, San Francisco, California.
- MACY, GREGG H. (1967)** Animal Husbandry
 B.S., Oregon State University, 1966; M.S., 1967.
 Experience: Feedlot and farm operations.
- MAGER, HANS L. (1949)** Architecture
 M.S., Royal University of Technology, Sweden, 1947.
 Experience: Structural engineer, Building Concern; H.S.B., Stockholm, Sweden; consulting engineer with architects and engineers in Southern and Central California. Registered professional engineer, California and Sweden.
- MAGUR, LEON W. (1958)** Physics
 B.S., California State Polytechnic College, 1958; graduate study, California State Polytechnic College; additional graduate studies, University of California, Berkeley and Davis.
 Experience: Electronic technician.
- MAKIN, LOIS C. (1966)** Library
 B.A., University of California, Berkeley, 1930; Certificate of Librarianship, Library School of the Los Angeles Public Library, 1931; School Librarianship Certificate, UCLA, 1937.
 Experience: Branch Library, Oakland, Bookmobile and branch librarian, Honolulu, Hawaii; Librarian, Elementary Schools, Long Beach, California; humanities reference librarian, San Jose State College.
- MAKSODIAN, Y. LEON (1963)** Mathematical Sciences
 B.S., California State Polytechnic College, 1957; M.S., University of Minnesota, 1961; additional graduate study, University of Minnesota.
 Experience: Instructor, Westmont College, Northwestern College; teaching assistant and instructor, University of Minnesota; junior development engineer, Minneapolis Honeywell Company.
- MANNING, JOHN H. (1956)** Mathematical Sciences
 A.B., Oakland City College, 1937; M.A., University of Cincinnati, 1939; D.Ed., Pennsylvania State University, 1954.
 Experience: Instructor in secondary schools of Ohio and Pennsylvania; U. S. Army Signal Corps; professor at Mansfield, Pennsylvania, State Teachers College.
- MARKOS, HARRY G. (1968)** Dairy
 B.S., Utah State University, 1963; M.S., University of Illinois, 1966; Ph.D., University of Illinois, 1968.
 Experience: Research and teaching assistant, University of Illinois.
- MARSTON, ENA L. (1946)** English
 A.B., Mills College, 1927; A.M., 1928; A.M., Radcliffe College, 1931; additional graduate study, Universities of California, Washington, and Chicago.
 Experience: Instructor and administrator at junior colleges in Oregon and Pennsylvania; instructor, Washington State College; assistant professor, Lewis and Clark College.

Faculty and Staff

- MARTIN, DONALD R. (1968)**.....Speech
A.B., Otterbein College, 1962; M.S., Syracuse University, 1963; Ph.D., Ohio State University, 1968.
Experience: Engineer, Empire School of the Air, New York; radio station WAER, Syracuse; resident advisor, Syracuse University; production assistant, Ohio State University Instructional TV and WOSU Radio, Columbus, Ohio; program assistant, WOSU-TV; research assistant, Ohio State University Research Bureau; instructor, Ohio Wesleyan University.
- MARTINEZ, ANGELINA (1966)**.....Library
B.A., Inter-American University, San German, Puerto Rico, 1943; B.S., Louisiana State University, 1945; M.S., University of Illinois, 1957.
Experience: Librarian, Inter-American University; Pan-American Union, Organization of American States; head librarian, Inter-American Institute of Agricultural Sciences of the Organization of the American States, Costa Rica; head reference librarian, University of California, Davis; director of reader sciences, Nevada State Library.
- MATHENY, ROBERT (1952)**.....Agricultural Engineering
B.S., California State Polytechnic College, 1962.
Experience: International Harvester Company, Des Moines, Iowa; diesel and heavy duty machinery mechanic, Army Air Corps; dealer and sales, Allis Chalmers, Point Arena.
- MAUGHAN, SCOTT J. (1965)**.....Social Sciences
B.A., Brigham Young University, 1957; M.A., University of Utah, 1959; Ph.D., 1968.
Experience: Instructor, Eastern Montana College, University of Utah; U.S. Army.
- MAYO, EDWARD L. (1968)**.....Social Sciences
B.A., Claremont Men's College, 1959; M.A., 1966.
Experience: Securities analyst, Title Insurance and Trust Company; sales representative, Western Airlines; instructor, Pitzer College, Mt. San Antonio College.
- MCCALEB, DONALD L. (1962)**.....Public Information Specialist
B.S., Los Angeles State College, 1958; graduate study, Los Angeles State College.
Experience: Public information, U.S. Air Force; film representative and office manager, Billy Graham Films, North Hollywood; teaching and public relations, Marysville Union High School; director of public relations, associated students of Los Angeles State College.
- MCCOMBS, JOHN W. (1960)**.....Electronic Engineering
B.S., Clemson University, 1950; B.S.E.E., 1957; M.S.E.E., 1961; additional graduate study, Worcester Polytechnic Institute, Arizona State College.
Experience: High school teacher, Greenwood, S.C.; instructor, Clemson University; engineer, Greenwood Mills, Lockheed Aircraft Corp., Autonetics, Inc.
- MCCORKLE, ROBERT E. (1962)**.....Agricultural Management
B.S., California State Polytechnic College, 1960; M.S., University of California, 1962; additional graduate study, Oregon State University.
Experience: Research statistician, Department of Agricultural Economics, University of California; research assistant, Farm Economics Division, Economic Research Service, United States Department of Agriculture; Chief of Party, U.S. Agency for International Development project, Zambia; chief farm management officer, Ministry of Agriculture, Lusaka, Zambia.
- McGONAGILL, WILLARD L. (1967)**.....Architecture
B.S., Colorado University, 1955; B. Arch., 1956.
Experience: Associate, Weaver & Drover, Architects; job captain, Kerr-Beggs, Architectural Engineers; draftsman, Blakey Architects, Langhart Architect.

Faculty and Staff

- McGRATH, JAMES M. (1946)**.....Head, Engineering Technology Department
B.A., Santa Barbara State College, 1941; M.A., California State Polytechnic College, 1953.
Experience: Chief, U.S. Army Transport Service; superintendent of machinery, U.S. Naval Yard, Manila; officer, U.S. Navy; consultant, USAID, Africa.
- McMEEN, GEORGE H. (1960)**.....Mathematical Sciences
B.A., Western Washington College of Education, 1934; M.Ed., University of Washington, 1947; Ed.D., Columbia University, 1953.
Experience: Elementary, junior high, junior college, and state college teaching; air navigation officer, U.S. Navy; professor and chairman, mathematics department, Newark State College, Newark, New Jersey; Special Consultant in Mathematics, California State Department of Education, 1961-62.
- McMORRAN, WAYNE E. (1962)**.....Electronic Engineering
B.S., California State Polytechnic College, 1960; M.S.E.E., New York University, 1962.
Experience: Technician, Western Electric Company, Shell Development Company; member of the technical staff, Bell Telephone Laboratories, Murray Hill, New Jersey.
- McRAE, GLENN G. (1963)**.....Counselor
A.B., University of Tampa, 1949; M.Ed., University of Florida, 1954; D.Ed., 1959.
Experience: Graduate assistant, fellow, teaching assistant, University of Florida; instructor, St. Petersburg Junior College; visiting summer lecturer, Mississippi State University, Louisiana State University, Northwest Louisiana State College, and State College of Iowa.
- McROBBIE, J. M. (1962)**.....Head, Industrial Technology Department
A.B., San Jose State College, 1950; M.A., San Diego State College, 1955; Ed.D., Colorado State College, 1963; additional graduate study, Purdue University, 1967.
Experience: Patternmaker, The Boeing Company, Seattle; trade-technical instructor and civilian personnel recruiter, Puget Sound Naval Shipyard, Bremerton; industrial arts teacher, Santa Clara County; industrial arts teacher-consultant, San Diego County Schools; coordinator of industrial education, Tulare County Schools.
- MENDENHALL, CHARLES E. (1967)**.....Agricultural Information
Experience: Reporter-printer, Livermore, Calif., Herald; personnel clerk, US Army; public relations director, Stockton, Calif.; Union Stock Yards; farm editor, The Modesto, Calif., Bee.
- MENG, KATHLEEN C. (1968)**.....Library
B.A., National Taiwan University, 1964; M.L., University of Washington, 1966.
Experience: Cataloger, Syracuse University Library.
- MENG, SHIEN YI (1968)**.....Electrical Engineering
B.S., Taiwan Provincial Cheng Kung University, 1953; M.S., Oklahoma State University, 1958; Ph.D., Ohio State University, 1968.
Experience: Research associate, Ohio State University; research assistant, Cornell University; engineer, Taiwan Provincial Government.
- MERRIAM, JOHN L. (1958)**.....Agricultural Engineering
B.S., California Institute of Technology, 1938; graduate study, California Institute of Technology.
Experience: Instructor, California Institute of Technology; junior civil engineer, U. S. Army Engineers and private consulting engineers; civil area engineer, Soil Conservation Service, USDA; senior irrigation engineer, Ministry of Agriculture, Kingdom of Saudi Arabia; registered civil engineer, California.

Faculty and Staff

- MESLER, FLORENCE (1962)**.....Graduate Nurse
R.N., Patterson General Hospital, New Jersey, 1939.
Experience: Industrial nurse, Wright Aero Corporation, Patterson, New Jersey; general duty nurse, Santa Monica Hospital, and French Hospital, San Luis Obispo; private duty, San Luis Obispo.
- MEYER, THOMAS O. (1955)**.....Food Processing
B.S., State College of Washington, 1949; M.S., 1953.
Experience: Instructor and meats specialist, State College of Washington; assistant animal husbandman, Experiment Station, State College of Washington, Pullman, Washington.
- MICHELS, ELIZABETH (1961)**.....Physical Therapist
B.A., University of Colorado, 1946; Physical Therapy Certificate, University of Kansas, 1947.
Experience: Tucson Medical Center, Arizona; Kabat Kaiser Institute, Vallejo; Mills Memorial Hospital and San Mateo Clinic, San Mateo; University of Utah, Salt Lake City.
- MILES, HERBERT L. (1963)**.....Electrical Engineering
B.S.E.E., Wayne State University, 1950; M.S.E.E., 1963; additional graduate study, Colorado State University.
Experience: Draftsman, Detroit Edison Co., City Engineer's Office; personnel recruiter and trainer, City of Detroit Civil Service Commission; instructor, Ferris State College; assistant professor, Wayne State University; registered professional engineer, California and Michigan.
- MILLER, ALLEN D. (1960)**.....Mathematical Sciences
B.S., Iowa State University, 1945; M.S., 1948; Ph.D., 1953.
Experience: High school mathematics teacher, Iowa, Nebraska, Wisconsin, and California; college mathematics teacher, Wisconsin, Illinois, Iowa and California; research development in industry, Hughes Aircraft Company; participant in National Science Foundation institutes, Stanford University, Bowdoin College, University of Arizona, University of Southwest Louisiana.
- MILLER, ERNEST C. (1968)**.....Business Administration
B.A., University of Chicago, 1941; M.B.A., 1946; Ph.D., University of Denver, 1954.
Experience: Supervisor, sales promotion, U.S. Rubber Company; director of personnel, comptroller, O. P. Baur Conf. Corp., Denver; part-time instructor, University of Denver; assistant general manager, Western Reddi-Wip Company; lecturer, University of Alaska and George Washington University; Lt. Colonel, U.S. Air Force.
- MILLER, HAROLD R. (1968)**.....Business Administration
B.S., University of Missouri, 1958; M.S., 1959.
Experience: First Lieutenant, U.S. Air Force; staff accountant, Williams, Keepers, Oliver, Payne & Rackers, CPA's, Columbia, Missouri; comptroller, Ozark Tractor and Implement, Springfield; instructor, Southwest Missouri State College.
- MILLER, JEANNE (1961)**.....Graduate Nurse
R.N., St. Alexis Hospital, Bismarck, North Dakota, 1944.
Experience: Mountain View Hospital and French Clinic, San Luis Obispo.
- MILLER, LOUIS C. (1960)**.....Aeronautical Engineering
B.S., Massachusetts Institute of Technology, 1928.
Experience: Administrative, design, and test engineering in aerodynamics and flight testing for Boeing, Douglas, Northrop, Consolidated-Vultee, Goodyear, Wright, Brewster, and Curtis aircraft companies.
- MILLER, RICHARD M. (1967)**.....Pharmacist
Graduate in Pharmacy, University of Southern California, 1920.
Experience: Forty-eight years registered pharmacist.

Faculty and Staff

- MOLNAR, PETER H. (1965)**..... Social Sciences
B.A., Occidental College, 1961; graduate study, University of Delaware, University of Wurzburg.
Experience: Teaching assistant, Occidental College, University of Delaware.
- MONTGOMERY, DAVID H. (1956)**..... Biological Sciences
B.S., California State Polytechnic College, 1954; M.A., College of the Pacific, 1956; additional graduate study, Friday Harbor Laboratories, University of Washington and University of California.
Experience: Laboratory assistant and teaching assistant, California State Polytechnic College; teaching fellow, College of the Pacific; staff Pacific Marine Biological Station, Dillon Beach, California; National Science Foundation fellow, Friday Harbor Laboratories; National Science Foundation fellow, University of California.
- MOORE, LARRY D. (1967)**..... Electronic Engineering
A.B., Centre College, 1936; M.S., U.S. Naval Postgraduate School, 1951.
Experience: Officer, U.S. Navy, 1946-67; teacher, Ashland Senior High School.
- MORGAN, DONALD E. (1968)**..... Head, Industrial Engineering Department
B.S., Oregon State College, 1940; M.S., Stanford University, 1962; Ph.D., 1963.
Experience: Staff technical consultant, ARINC Research Corporation; staff member and partner, Decision Studies Group; professor, Stanford University; manager and partner, Intermountain Surgical Supply Company; engineer, Westinghouse Electric Corporation.
- MORRIS, HAROLD D. (1966)**..... Agricultural Management
B.S., Utah State University, 1953; M.S., 1965.
Experience: Vocational agriculture teacher; county agriculture agent; A.S.C. office manager; commercial pilot and flight instructor; air traffic controller, FAA; research assistant, Utah State University Experiment Station; officer, U.S. Air Force.
- MOTT, JOHN H., SR. (1967)**..... English
B.A., Southern Oregon College, 1962; M.A., California State Polytechnic College, 1965; additional graduate study, University of California, Colorado State College.
Experience: Special agent, U.S. Military Forces; art instructor, Boise Junior College; high school English and art teacher, Oregon, California; graduate assistant, Colorado State College.
- MOTT, ROBERT A. (1946)**..... Head, Physical Education
Department
B.S., University of Akron, 1938; M.A., University of Southern California, 1946; Ed.D., Stanford University, 1953.
Experience: Physical education instructor and athletic coach, Akron Public School System; officer, U.S. Navy; teaching assistant, University of Southern California; visiting professor University of Colorado; chairman, P.E. Department and chief of party, U.S. AID program, Evelyn Hone College of Further Education, Lusaka, Zambia.
- MOUNTS, BILLY W. (1956)**..... Director, Health Services
M.D., Georgetown University, Washington, D.C., 1950.
Experience: Internship, Fitzsimons General Hospital, Denver; residency, San Luis Obispo General Hospital; four years private practice, Pismo Beach.
- MOY, CARL F. (1968)**..... Dairy
B.S., University of Wisconsin, 1967.
Experience: U.S. Air Force; research assistant, University of Wisconsin; laboratory supervisor, The Borden Company; cultured products manager, Pensupreme Dairies, Inc.; quality control director, The Borden Company; member, Wisconsin Dairy Technology Society.

Faculty and Staff

MULDER, GEORGE (1968)..... Associate Dean, Counseling & Testing
B.A., Long Beach State College, 1956; M.A., 1957; additional graduate study, University of Southern California.

Experience: Associate Dean (Counseling) and counselor, California State Polytechnic College, Kellogg-Voorhis; teacher, Excelsior Union High School District; counselor-instructor, Cerritos College; electronic technician, U.S. Army Ordnance; drafting, tool design, and technical illustration, Goodyear Tire and Rubber and Shoffer Tool Company.

NEEL, PAUL R. (1962)..... Director, School of Architecture
B.S., California State Polytechnic College, 1958; B. of Arch., University of Southern California, 1962; additional graduate study, University of Sheffield, 1968-69.

Experience: Designer-draftsman, W. D. Concolino, Monterey, and Jones and Emmons, Los Angeles. Registered architect, State of California.

NEELANDS, JAMES G. (1957) Equipment Technician, Physical and
Biological Sciences

B.S., California State Polytechnic College, 1956; additional graduate study, University of Washington.

Experience: Teaching assistant and research assistant, University of Washington; naval aviator and officer, U.S. Marine Corps.

NELSON, DONALD S. (1943)..... Director, Business Affairs
A.B., Stanford University, 1930.

Experience: California State Department of Finance, Budgets and Accounts; comptroller, Fresno State College.

NELSON, RICHARD F. (1960)..... Biological Sciences
B.S., Brigham Young University, 1955; M.S., 1957; Ph.D., State University of Iowa, 1960.

Experience: Teaching assistant, Brigham Young University, State University of Iowa; research associate in radiation biology, State University of Iowa.

NEWTON, CHARLES H. (1966) Counselor
B.A., San Diego State College, 1950.

Experience: Loftsmen, design draftsman, and tool designer, Ryan Aeronautical, Convair and Multiplex, Inc.; secondary school teacher, counselor and curriculum writer, San Diego City Schools; assistant school psychologist, Mesa, Arizona Public Schools; U.S. Air Force.

NICHOLSON, LOREN L. (1956)..... Journalism
A.B., San Jose State College, 1946; M.B.A., Stanford University, 1947; additional graduate study, Stanford University.

Experience: Advertising sales representative, Watsonville Register-Pajaronian; advertising sales correspondent, Sunset Magazine; advertising director, Redding Record-Searchlight.

NICKELL, DELL O. (1965)..... Architecture
B.A., San Jose State College, 1950.

Experience: Assistant engineer, San Jose Water Works; associate bridge engineer, California State Bridge Department; partner, Gillette-Harris & Associate, Auburn; assistant road commissioner-surveyor, San Luis Obispo County. Registered civil engineer, California.

NIELSEN, KEITH E. (1959)..... Speech
B.A., Alma College, 1953; M.A., Stanford University, 1959; additional graduate study, Stanford University.

Experience: U.S. Marine Corps; welder; power plant engineer, farmer, neuropsychiatric nursing assistant, U.S. Veterans Administration Mental Hospital; ranger-naturalist, National Park Service; high school teacher, Laingsburg, Michigan.

Faculty and Staff

- NIGHTINGALE, KEITH M., Capt. (1968)**.....Military Science
B.A., Claremont Men's College, 1965; Graduate: U.S. Army Infantry School, Parachute Training and Ranger School, 1966; Defense Language Institute (Vietnamese), 1967.
Experience: Senior advisor, Republic of Vietnam Army; command and staff position, 82nd Airborne Division.
- NILES, PHILIP W. B. (1967)**.....Environmental Engineering
B.S., University of California, 1957; M.S., 1958.
Experience: Consultant, Rand Corporation; teaching assistant, University of California; engineer, Rocketdyne.
- NOBLE, GLENN A. (1947)**.....Head, Biological Sciences Department
A.B., University of California, 1931; M.A., 1933; Ph.D., Stanford University, 1940.
Experience: Assistant in zoology, College of the Pacific; instructor, San Francisco City College; consultant in biology, American Military Government in Korea; professor of parasitology, Seoul National University, Korea; Fulbright professor of parasitology, Philippines and Taiwan.
- NOLAN, THOMAS F. (1949)**.....Social Sciences
B.S., University of Wisconsin, 1935; M.A., University of Southern California, 1940; additional graduate study at the University of Zurich, Switzerland.
Experience: Instructor senior high school, Stockbridge, Wisconsin; instructor senior high school, Kaukauna, Wisconsin; instructor, American School, Quito, Ecuador; Economic Analyst, Department of State, Washington, D.C., Montevideo, Uruguay; Officer, U.S. Naval Reserve; Vice-Consul, Department of State, Washington, D.C. at Valparaiso, Chile.
- NORDQUIST, RAYMOND E. (1964)**.....Architecture
B.S. Arch., Montana State College, 1950; additional graduate study, Montana State University, California State Polytechnic College.
Experience: Private architectural practice; principal partner, Nordquist & Sundell, A.I.A., Architects; chief designer, Cushing & Terrell; designer and draftsman for architects and building contractors in Montana and Washington. U.S. Army Air Corps. Registered architect, Montana and Wyoming.
- O'CONNOR, EUGENE L. (1964)**.....Business Administration
B.S., St. Louis University, 1957; M.S., 1963.
Experience: Assistant manager, Knights of Columbus, Inc.; sales representative, Burroughs Corporation; executive director, Madison County Association for the Crippled, Inc.; instructor in business, Belleville Junior College.
- O'DANIELS, HOWARD R. (1933)**.....Business Administration
Bachelor of Commercial Science, University of Santa Clara, 1931; additional graduate study, University of Southern California.
Experience: Coach, California State Polytechnic College; officer, U.S. Navy.
- OLDHAM, CHARLES S. (1968)**.....Social Sciences
B.A., University of Idaho, 1955; M.A., 1960; additional graduate study, Washington State University.
Experience: Visiting assistant professor, Eastern Washington State; research assistant, University of Oregon Bureau of Municipal Research and Services; management intern, Office of Governor, State of Idaho.
- O'LEARY, MICHAEL J. (1951)**.....Social Sciences
A.B., San Francisco State College, 1950; M.A., Stanford University, 1951; additional graduate study, Stanford University, University of Oregon.
Experience: Property accountant, U.S. Marine Corps Supply Depot; instructor and examiner-specialist, Air Force Radar Technical School; instructor, U.S. Armed Forces Institute.

Faculty and Staff

- OLSEN, BARTON C. (1968).....Social Sciences
B.A., University of Utah, 1955; M.A., 1966; Ph.D., 1968.
Experience: Teacher, South High School, Salt Lake City; Washington Union and Sanger Union High School, California; principal, Cardston School District, Cardston, Alberta, Canada.
- OLSTEN, C. JAMES (1968).....Architecture
B.S., California State Polytechnic College, 1964; B. Arch., 1965.
Experience: U.S. Army, engineer assistant; associate, Jennings & Associates.
- OSTEYEE, LEON F. (1957).....Head, Mechanical Engineering Department
B.M.E., Rensselaer Polytechnic Institute, 1945; M.M.E., 1957.
Experience: Instructor, Rensselaer Polytechnic Institute; designer, General Electric Company; American Locomotive Co.; ship superintendent, U.S. Naval Shipyard, Bremerton, Washington; registered professional engineer, California and New York.
- OVERMEYER, PHILIP H. (1958).....Business Administration
B.S., University of Oregon, 1931; M.S., 1936; Ph.D., University of Minnesota, 1939.
Experience: High school instructor; teaching fellow, University of Minnesota; assistant professor, University of Alabama; federal administrator, WCLC of the National War Labor Board; lecturer, De Paul University; professor, Lewis and Clark College; private arbitrator, labor disputes; public member, Region XIII, Wage Stabilization Board; regional director, Office of the Salary Stabilization; co-ordinator of Instruction, Golden Gate College San Francisco; Professional Lecturer.
- OWEN, EVAN R. (1969).....Head, Electronic Engineering Department
B.S., Northwestern Technical Institute, 1945; M.S., University of Pennsylvania, 1947; Ph.D., Northwestern Technical Institute, 1951.
Experience: Manager, Advance Engineering; engineer, General Electric Company; instructor, Northwestern Institute of Technology. Registered professional engineer, California, Florida.
- OZAWA, KENNETH (1963).....Physics
B.S., John Carroll University, 1959; M.S., 1960; additional graduate study, Texas A & M, University of California.
Experience: Graduate assistant and instructor, John Carroll University.
- PAGE, PERRYMAN L. (1963).....Library
B.A., University of Mississippi; M.S.L.S., Louisiana State University, 1963.
Experience: U.S. Air Force; Louisiana State University Library.
- PATTERSON, ROY L. (1968).....Medical Officer
B.S., University of Illinois; B.M., M.D., 1938.
Experience: Internship, Englewood Hospital, Chicago; private practice, Canton, Illinois and Monrovia, California.
- PAUTZ, ROLAND K. (1959).....Poultry Industry
B.S., Oregon State College, 1957; M.S., Oregon State University, 1968.
Experience: Research assistant, Oregon State College, 1957-59.
- PEDERSON, WILLARD M. (1961).....Head, English Department
A.B., Colorado Western State College, 1937; M.A., Colorado State College, 1938; additional graduate study, Colorado State College, Western Reserve University, Colorado State University.
Experience: English teacher and football coach, Shaker Heights High School, Cleveland, Ohio; English instructor, football coach and athletic director, Mount Union College; associate professor and director of athletics, Marshall College; associate professor and athletic coach, Colorado Western State; professional athletics; officer, Navy Underwater Demolition.

Faculty and Staff

- PELLATON, EVELYN I. (1966)** Physical Education
 B.A., San Francisco State College, 1950; M.A., 1953.
 Experience: Director, Oakland Recreation Department; official and gym supervisor, San Francisco Recreation Department; summer camp counselor; WAVE athletic officer, Special Services, U.S. Navy; instructor, Marin Catholic High School, Portola Junior High School; dean-counselor, Portola Junior High School, Downey Junior High School.
- PENDSE, PRATAPSIHA C. (1966)** Biological Sciences
 B.S., Bombay University, 1947; M.S., Poona University, 1951; M.S., Utah State University, 1959; Ph.D., 1965; additional graduate study, Stanford University.
 Experience: Lecturer, Bombay and Poona Universities; teaching and research assistant, Utah State University; assistant professor, Colgate University.
- PERELLO, DOMINIC B. (1954)** Business Administration
 A.B., University of California, Santa Barbara College, 1951; M.S., University of Wisconsin, 1952; additional graduate study, University of California at Los Angeles.
 Experience: Officer, U.S. Air Force; partner, Perello and Sons; teaching assistant, University of California at Los Angeles.
- PETERS, JAMES M. (1958-60) (1963)** Chemistry
 A.B., University of California, 1953; Ph.D., 1957.
 Experience: Biochemist, University of California; instructor, California State Polytechnic College; biochemist, Baltimore City Hospitals; assistant professor, University of Maryland.
- PETERSON, JAMES J. (1964)** English
 B.A., Bradley University, 1952; M.A., University of Pennsylvania, 1956; additional graduate study, Temple University, University of Pennsylvania.
 Experience: Assistant instructor, University of Pennsylvania; substitute teacher, Philadelphia Public Schools; high school instructor, Bryn Mawr, Pennsylvania; instructor, Susquehanna University, New York State University.
- PFEIFFER, MARIE S. (1965)** Head, Home Economics Department
 B.S., Ohio State University, 1941; M.A., 1951; Ph.D., 1961.
 Experience: Instructor, Waverly High School, Beaver High School, Stockdale High School, Ohio; instructor, St. Mary of the Springs, Columbus; director of home economics, Columbus Public Schools; professor, Department of Education, Nova Scotia; assistant professor, Ohio State University.
- PHAKLIDES, WILLIAM J. (1963)** Environmental Engineering
 and Engineering Technology
 B.S., California State Polytechnic College, 1956; graduate study, Montana State University.
 Experience: U.S. Army and U.S. Navy; design engineer, Baker-Newman Co., Inc., and Barium Products, Ltd., Modesto; Conditioned Air, Fresno. Registered professional engineer, California.
- PHILLIPS, DON, Maj. (1967)** Military Science
 A.B., San Jose State College, 1958; Infantry Officers Course, Basic Airborne, 1958.
 Experience: Company commander, 3rd Armored Division, Europe; principal instructor, U.S. Army Infantry School; project officer, U.S. Army Combat Developments Command, Infantry Agency; company commander, battalion operations officer, brigade assistant operations officer, 173rd Airborne Brigade (Separate), Vietnam.
- PHILLIPS, PETER K. (1968)** Facilities Planner
 B.S., California State Polytechnic College, 1959.
 Experience: Designer-draftsman, John R. Ross and Associates, Inc., San Luis Obispo and Arendt/Mosher/Grant, Architects, Santa Barbara; private practice. Registered architect, California.

Faculty and Staff

- PHILLIPS, WILLIAM R. (1957)**.....Director, School of Architecture
B.Arch., University of Southern California, 1952.
Experience: Designer, W. H. Harrison, Architect; Sponseller & Sons; U.S. Engineer Department; engineer, North American Aviation, Inc.; U.S. Army, registered architect, California.
- PIMENTEL, RICHARD A. (1952)**.....Biological Sciences
A.B., San Jose State College, 1947; M.S., Oregon State College, 1950; Ph.D., 1952.
Experience: Officer, U.S. Army; teaching assistant, Oregon State College; ranger-naturalist, Crater Lake National Park; associate professor, University of California Extension Nature Study Institute at Santa Barbara; lecturer, National Science Foundation Summer Science Program.
- PINTO, JOHN D. (1968)**.....Biological Sciences
A.B., Humboldt State College, 1963; Ph.D., University of Illinois, 1968.
Experience: Instructor, Humboldt State College; teaching assistant, University of Illinois.
- PIPER, CURTIS DEAN (1964)**.....Soil Science
B.A., W. T. Bryan University, 1953; M.S., Michigan State University, 1959; Ph.D., 1967.
Experience: Farm operator; food service director, Kings College; instructor in research and teaching, Michigan State University.
- POLK, BENJAMIN K. (1966)**.....Architecture
Diploma, School of Planning and Research in Regional Development, England, 1952.
Experience: Private practice in architecture and planning, 1948-1965. Registered architect, California and New York.
- PRATER, EUGENE G. (1967)**.....English
B.A., Phillips University, 1952; B.D., Vanderbilt University, 1954; M.A., 1955; S.T.M., Harvard University, 1956; additional graduate study, Stockholm University.
Experience: Minister, First Congregational Church, Suddy, Tennessee; instructor, Curry College; assistant minister, Montclair, New Jersey; writer, Department of Interior; researcher, Library of Congress; assistant professor, Ball State University, Washington State College, California State College at Long Beach; instructor, University of San Francisco.
- PRICE, CLIFFORD J. (1956)**.....Aeronautical Engineering
B.S., University College, South Wales, 1932.
Experience: Lecturer, Municipal College, England; South African Air Force School of Technical Training; Pretoria Technical College, South Africa. Chief technical officer, South African Air Force School; Major, South African Air Force; chief inspector of aircraft accidents and aircraft materials; head of Aircraft Accident Investigation Branch, Division of Civil Aviation, Union of South Africa. Instructor, Northrop Aeronautical Institute.
- PRICE, D. JOHN (1957)**.....Mechanical Engineering
National Certificate in M.E., Dudley and Staffordshire Technical College, 1950; B.S., California State Polytechnic College, 1954.
Experience: Engineer, British Electricity Authority; assistant planning engineer, British Columbia Telephone Co.; technical assistant, Vickers Armstrong Ltd.; officer, RCAF.
- PURCELL, RICHARD J. (1965)**.....Physical Education
B.A., Western State College, 1960; M.A., California State Polytechnic College, 1966.
Experience: Instructor, Atascadero High School; lecturer, California State Polytechnic College, San Luis Obispo.

Faculty and Staff

- QUINLAN, CHARLES W. (1966)**.....Architecture
 B.Arch., Cornell University, 1959.
 Experience: Private practice; instructor, University of New Mexico; designer, Kruger, Lake and Henderson, Architects; architect in training, Louis Hesselden, Architect; Ferguson, Stevens, Mallory and Pearl, Architects, U.S. Navy. Registered architect, New Mexico and California.
- QUINN, PETER L. (1967)**.....Mathematical Sciences
 B.S., University of Wales, Cardiff, 1925, B.S., (hons) 1926; Education Diploma, University Reading, England, 1931; Ph.D., University London, England, 1958; Ph.D., University Cork, Ireland, 1967.
 Experience: Lecturer, Beaufoy Technical College, London; lecturer, Hackney Technical College, Stretford Technical College, England; instructor, Tottenham Technical College, London; head of science department, Walworth High School, London, England; lecturer, University Cork, Ireland; assistant professor, College of Education, Monmouth, Oregon.
- RAPP, JOHN B. (1959)**.....Electronic Engineering
 B.S., University of California, 1940; M.S., San Jose State College, 1967.
 Experience: Engineer, General Electric Company, Collins Radio Company, United Fruit Company; instructor, Princeton University; registered professional engineer, California.
- RATCLIFFE, RONALD V. (1963)**.....Music
 B.A., University of Washington, 1956; M.M., University of Southern California, 1958.
 Experience: Piano teacher; assistant professor, The College of the Ozarks; music director, Music-Go-Round Theater; buyer, The Boeing Company.
- REAGAN, EVELYN D. (1946) (1954)**.....Library
 B.S., College of St. Catherine, 1943.
 Experience: Librarian, College of the Holy Cross, Worcester, Massachusetts; librarian, Charity Hospital School of Nursing, New Orleans; cataloger, California State Polytechnic College.
- REECE, OSCAR E. (1956)**.....Crops
 B.S., Kansas State College, 1931; M.S., University of Minnesota, 1945; Ph.D., 1949.
 Experience: Grade school principal, Hopewell and Smith Center, Kansas; agricultural instructor, Norcatur, Hope, and Silver Lake, Kansas; county agricultural agent, Rice County, Kansas; research fellow, University of Minnesota; assistant agronomist USDA, Division of Sugar Plants, Field Office, St. Paul, Minnesota; associate professor of agriculture, Iowa State Teachers College.
- REIF, GARY D. (1967)**.....Dairy
 B.S., Kansas State University, 1962; M.S., University of Nebraska, 1964.
 Experience: Research assistant, University of Nebraska; research and teaching assistantship, director of dairy and food products analysis laboratory, Iowa State University.
- REMUND, CLIVE O. (1946)**.....Agricultural Engineering
 B.S., Utah State Agricultural College, 1931.
 Experience: Teacher, Utah high schools; agricultural instructor and critic teacher, California high schools.
- REUER, JOHN P. (1967)**.....Architecture
 B. Arch., School of Design, Raleigh, North Carolina, 1963; Ph.D., Freie Universität, Germany, 1968.
 Experience: Assistant, Frei Otto, Germany; planning, University of North Carolina, draftsman, Harris and Pyne; technician, The Borden Company.

Faculty and Staff

REYNOLDS, ROBERT G. (1963).....Audio-Visual
B.P.A., Art Center School, Los Angeles, 1962; graduate study, California State Polytechnic College.

Experience: Artist, Creative Arts Studio, San Luis Obispo; free-lance illustrator-painter, Los Angeles and San Luis Obispo.

REYNOLDS, R. WALLACE (1953).....Engineering Technology
B.S., California (Pa.) State Teachers College, 1940; M.S., Purdue University, 1946; additional graduate study, University of Pittsburgh, University of Southern California.

Experience: Assistant educational adviser, Civilian Conservation Corps; weight engineer, Douglas Aircraft Company; ordnance engineer, Naval Ordnance Laboratory; instructor, Purdue University; head, engineering drawing, Washington and Jefferson College; assistant professor, University of Santa Clara; instructor, West Coast University, University of California at Los Angeles, part-time; engineering designer, Hughes Aircraft Company; consulting work in tool design and machine design.

RHOADS, HOWARD (1956).....Crops
B.S., Montana State College, 1951; M.S., 1952.

Experience: Fieldman, Great Western Sugar Co., Billings, Montana; instructor and assistant, Montana State College.

RICE, JAMES E. (1963).....Printing Technology and Management
B.S., Kansas State College, 1956; M.A., Fresno State College, 1966.

Experience: Assistant circulation manager, Coffeyville, Kansas, Daily Journal and Pittsburg, Kansas, Headlight-Sun; personnel specialist, U.S. Army; industrial arts instructor and director of student affairs, Delano High School.

RICE, WALTER E. (1965).....Business Administration
B.A., San Francisco State College, 1960; M.A., 1963.

Experience: Assistant floor manager, Roos/Atkins; student teacher, College of San Mateo; tutor, San Francisco.

RICH, GLENN W. (1953).....Foreign Student Adviser
B.S., California State Polytechnic College, 1953; M.A., 1961.

Experience: Journeyman carpenter, U.S. Coast Guard; instructor, California State Polytechnic College.

RICHARDS, CARLOS C. (1946).....Engineering Technology
B.A., Santa Barbara State College, 1942.

Experience: O. C. Field Gasoline Corporation; U.S. Navy.

RICHARDSON, JOY O. (1948).....Mechanical Engineering
B.S., University of Nebraska, 1940; M. of Engr., Yale University, 1942.

Experience: Instructor, Yale University, New Haven Junior College, New Haven, Connecticut; instructor, Orland High School, Orland, California; machine designer, Rockbestos Products Corporation; engineer, Marlin Firearms Company; Bristol Aeronautical Corporation, New Haven, Connecticut; engineer, Johns Manville Corporation, Tilton, New Hampshire; vice president and treasurer, Richardson Industries, Incorporated, East Haven, Connecticut. Registered professional engineer, California.

RICKARD, HERMAN E. (1959-68) (1969).....Dairy
B.S., Ohio State University, 1950; M.S., 1954; Ph.D., 1958.

Experience: Assistant Herdsman, research assistant, in charge of federal dairy breeding program, Ohio State University. Dairy Department, California State Polytechnic College, San Luis Obispo; Extension Dairy Specialist, Ohio State University.

Faculty and Staff

- RIDER, ROL W., JR. (1960)** Business Administration
 B.A., University of California, 1941; M.A., 1967.
 Experience: U.S. Naval Aviation (Reserve); Flight operations and airport management, Pan American Airways; National Sales Manager, Royal Rinse, Inc.; Divisional Product-Advertising Manager, Carnation Co., Inc.; Account Executive, N. W. Ayer & Son, Inc.; Account Supervisor, Young & Rubicam, Inc.; Management and Marketing Consultant.
- RITSCHARD, RONALD L. (1965)** Biological Sciences
 B.S., California State Polytechnic College, 1961; M.S., Oregon State University, 1964; Ph.D., 1966.
 Experience: Teaching and research assistant, Oregon State University; U.S. Marine Corps.
- RITTENHOUSE, EUGENE A. (1949)** Placement Officer
 B.S., University of California, Los Angeles, 1947; M.B.A., University of California, Berkeley, 1948; additional graduate study, University of California, Berkeley.
 Experience: Bookkeeper, J. J. Elmore Company, Brawley; broker's clerk, Dean Witter & Co., Los Angeles; purchasing, War Department, USAAF, Trinidad, B.W.I.; U.S. Navy; instructor, social sciences; administrative assistant for personnel, office of the president, California State Polytechnic College.
- ROACH, DAVID M. (1966)** Physics
 B.S., South Dakota School of Mines and Technology, 1961; M.S., 1963.
 Experience: Graduate assistant, instructor, South Dakota School of Mines and Technology; instructor, Wisconsin State University, Northrop Institute of Technology; engineer, Leach Corporation.
- ROBERTS, ALICE E. (1963)** Education
 B.S., Milwaukee State Teachers College, 1940; M.S., University of Wisconsin, 1962.
 Experience: Elementary school teacher, West Bend, Wisconsin; participant in Wisconsin Education Improvement Program; leader in team teaching and intern program.
- ROBERTS, BRUCE H. (1968)** Business Administration
 B.A., University of California, Berkeley, 1965; M.A., San Francisco State, 1967.
 Experience: U.S. Army; security trader, Blyth and Company, San Francisco; clerk, University of California, Berkeley; student teacher, Merritt College; research assistant, graduate assistant, lecturer, San Francisco State.
- RODIN, ROBERT J. (1953)** Biological Sciences
 A.B., University of California, 1943; Ph.D., 1951.
 Experience: Assistant botanist, University of California Herbarium; ranger naturalist, Yosemite National Park; administrative clerk, U.S. Marine Corps; expedition botanist, University of California African Expedition; teaching assistant, University of California; lecturer for extension division, University of California; professor of biology, Forman Christian College, Lahore, Pakistan; visiting assistant professor, University of California, Santa Barbara; lecturer, National Science Foundation Summer Science Program; visiting assistant professor and National Science Foundation fellow, Cornell University, New York.
- ROEST, ARYAN I. (1955)** Biological Sciences
 B.S., University of Virginia, 1945; B.S., Oregon State College, 1948; M.S., 1949; Ph.D., 1954.
 Experience: Officer, U.S. Navy; teaching and research assistant, Oregon State College; assistant professor, Central Oregon College; forester, Oregon State Board of Forestry; lecturer, Extension Division, University of California; visiting assistant professor, University of California, Santa Barbara; lecturer, National Science Foundation Summer Science Program.

Faculty and Staff

ROGALLA, JOHN A. (1959).....Agricultural Management
B.S., California State Polytechnic College, 1956; M.S., Cornell University, 1958;
Ph.D., Cornell University, 1968.

Experience: Teaching and research assistant, Department of Agricultural Economics, Cornell University; farm management consultant; material control analyst, Ryan Aeronautical Company; U.S. Air Force.

ROGERS, LEO E. (1954).....Engineering Technology
B.S., California State Polytechnic College, 1950.

Experience: Instructor, San Luis Obispo High School; engineering aid, Division of Highways, San Luis Obispo.

ROGNESS, KURT E. (1968).....Architecture
B.Arch., University of Minnesota, 1967; M.Arch., MIT, 1968.

Experience: Student designer, James Stageberg and Zejedlik & Harmala; assistant planner, University of Minnesota; designer, Grande & Peacock; instructor, Boston Architectural Center.

ROHNER, J. WELDON (1964).....Business Administration
B.A., Arizona State College, 1934; graduate study, University of Utah, Arizona State College.

Experience: Teaching fellow, University of Utah; accountant, Rogers and Bailey; training supervisor, Standard Oil of New Jersey; special agent, Federal Bureau of Investigation.

ROLLINGS, DAVID R. (1968).....English
A.B., University of Louisville, 1948; M.A., University of Michigan, 1949.

Experience: Assistant professor, Wisconsin State University, University of Puerto Rico, East Kentucky State College, Wisconsin State College.

ROSEN, ARTHUR Z. (1953).....Physics
A.B., University of California, 1941; Ph.D., 1952.

Experience: Physicist, University of California Radiation Laboratory; U.S. Navy; teaching and research assistant, University of California; lecturer, University of California, Santa Barbara College.

ROSKE, MILDRED E. (1967).....Home Economics
B.A., University of California, 1955; M.A., 1958.

Experience: Interior designer, Sherman Oaks; teaching assistant, instructor, University of California; teacher, adult education, Los Angeles City Schools; instructor, Rochester Institute of Technology; teacher, Oxnard Evening School.

ROSSI, ARNOLD T., Maj. (1967).....Military Science
B.S., University of San Francisco, 1959. Graduate; The U.S. Army Artillery and Missile School, 1960, 1964; U.S. Army Air Defense School, 1964; parachute training, U.S. Army Infantry School, 1966.

Experience: Detachment commander, special weapons officer and training officer, Southern European Task Force; brigade staff officer, 35th Artillery Brigade; battery commander, 1st Region ARADCOM; battery commander, operations officer and liaison officer, 1st Cavalry Division, Vietnam.

RUSSELL, CHARLES R. (1968).....Associate Dean, School of Engineering
B.S., Washington State College, 1936; M.S., California Institute of Technology, 1946; Ph.D., University of Wisconsin, 1941.

Experience: Section head, General Motors Corp., U.S. Atomic Energy Commission; program administrator, Navy Bureau of Ordnance; engineer, Proctor and Gamble, Dow Chemical. Registered professional engineer, California, Michigan, Virginia, and District of Columbia.

RUSSELL, JOHN G. (1968).....Music
A.B., Fresno State College, 1959; M.A., Chico State College, 1968.

Experience: Instructor, Fresno State College; teacher, Laton Union High School, Chico Senior High School; assistant professor, Chico State College.

Faculty and Staff

- SAAM, PATRICIA (1966)** Home Economics
 B.S., College of St. Catherine, St. Paul, Minnesota, 1950; graduate study, University of Minnesota, California State Polytechnic College.
 Experience: Research-pediatrics dietitian, University of Minnesota; head dietitian, Paso Robles War Memorial Hospital, Sierra Vista Hospital; dietitian, dining hall, and part-time lecturer, California State Polytechnic College.
- SABTO, JACOB (1968)** Electronic Engineering
 B.E., Cairo University, 1948; E.E., Columbia University, 1959.
 Experience: Member technical staff, Bell Telephone Laboratories; engineer.
- SALO, GLENN W. (1955)** Agricultural Engineering
 B.S., Montana State College, 1950; M.S., University of Idaho, 1955.
 Experience: Shops officer, U.S. Air Force; instructor and assistant agricultural engineer, University of Idaho; Research Fellow, University of Idaho.
- SAMPSON, DEWITT F. (1961)** Head, Food Processing Department
 B.S., Iowa State University, 1927; Certificate Advanced Management Program, Harvard Business School, 1950.
 Experience: Research chemist, American Can Company, Maywood, Illinois; district manager of research, Portland, Oregon, Seattle, Washington, San Francisco; general manager of technical service.
- SANDERSON, JAMES D. (1967)** Physical Education and Athletics
 A.B., Fresno State College, 1962.
 Experience: Teacher and coach, Tulare Western High School, Tulare, and Sierra High School, Tollhouse.
- SANKOFF, LEO (1946)** Poultry Industry
 B.S., California State Polytechnic College, 1942; M.A., 1956.
 Experience: Agricultural instructor, Fillmore High School.
- SCALES, HARRY H. (1958)** Education
 B.A., Arizona State College, 1934; M.A., Stanford University, 1939; Ed.D., 1950.
 Experience: Teacher and counselor, Santa Barbara Junior College; associate professor and consultant to industry and schools, Michigan State University; aerial navigation training, U.S. Navy; teacher and guidance director, Redlands High School; director of research, Arizona State Department of Education; teacher, Superior and Safford, Arizona, public schools.
- SCHEFFER, PAUL E. (1964)** Industrial Engineering
 B.M.E., University of Minnesota, 1947; M.S., University of Southern California, 1959.
 Experience: Engineer, Crane Company, U. S. Rubber Company, Appraisal Service Company; instructor, University of Minnesota.
- SCHNEIDER, CATHERINE A. (1959) (1963)** Library
 B.A., The College of St. Catherine, 1959.
 Experience: Librarian, California State Polytechnic College; U.S. Army Special Services, Frankfurt Post, Germany.
- SCHRODE, L. IRENE (1965)** Graduate Nurse
 R.N., Knapp College of Nursing, Santa Barbara, 1932.
 Experience: Office and general duty nursing, San Luis Obispo, Arroyo Grande, Grover City, Fresno, Los Angeles Children's Hospital.
- SCHROEDER, WALTER P. (1957)** Head, Education Department
 B.S., Michigan State University, 1940; M.A., 1947; Ph.D., 1953.
 Experience: Three years technical and management work in agriculture, business and industry; teacher, supervising teacher, and administrator in junior and senior high schools and unified districts, assistant professor, vocational education and education, Michigan State University; assistant placement director, Michigan State University.

Faculty and Staff

SCHWARTZ, KENNETH E. (1952).....Director, School of Architecture
B. Arch., University of Southern California, 1952; additional graduate study,
Pennsylvania State, Rensselaer Polytechnic Institute.

Experience: Draftsman, Engineering Division, Douglas Aircraft Company, El Segundo; architectural draftsman, A. G. Bailey, Architect, Los Angeles; draftsman and designer, H. W. Underhill, Architect, Los Angeles; designer, Allison and Rible, Architects, Los Angeles; San Luis Obispo Planning Commission. Registered architect, California.

SCOTT, CHESTER H. (1952).....Mathematical Sciences
B.A., Municipal University of Wichita, 1938; electronics diploma, U.S. Navy, 1945; M.S., Montana State College, 1950; additional graduate study, Stanford University.

Experience: Instructor, Sheridan High School, Wyoming; instructor, mathematics and navigation, Civilian Pilot Training School; counselor, Y.M.C.A.; instructor, mathematics, electronics, U.S. Navy; assistant professor, mathematics; Montana School of Mines; statewide counselor, University of Montana.

SCOTT, JACK F. (1967).....Agricultural Management
B.S., California State Polytechnic College, 1961; M.A., 1967.

Experience: Director of Vocational Agriculture, Galt Joint Union High School, Galt.

SCRUGGS, B. L. (1967).....Social Sciences
A.B., Washburn University, 1960; graduate study, University of Kansas.

Experience: United States Naval Reserve; captain, United States Army; research analyst, Legislative Economy and Efficiency Commission; research associate, League of Kansas Municipalities; training coordinator, Governmental Research Center, instructor, Washburn University.

SEABERG, DUANE O. (1965).....Agricultural Management
B.S., California State Polytechnic College, 1960; M.A., 1963.

Experience: Farming; instructor, Ferndale Union High School.

SEEBER, GLENN E. (1954).....Welding and Metallurgical Engineering
A.B., 1949; M.A., 1950, Chico State College.

Experience: Instructor in biology and welding, Lassen Union High School and Junior College; welder and foreman, Interstate Steel Co., Chico; welder, Anderson's Welding Shop, Chico; welder and foreman, Pollock Shipbuilding Corp., Stockton; locomotive fireman, Western Pacific Railroad.

SERVATIUS, OWEN L. (1947).....Head, Business Administration Department
B.S., California State Polytechnic College, 1959; M.A., 1964.

Experience: Brokers' clerk, Baker-Fentress & Co., Chicago, Illinois; U.S. Navy; supervising clerk, California State Polytechnic College.

SHAFFER, PAULINE (1961).....Home Economics
B.S., Juniata College, 1953.

Experience: Southern Counties Gas Company, Ventura; dietitian, California State Polytechnic College.

SHAW, MARY E. (1963).....Placement Supervisor
B.S., Texas Women's University, 1941.

Experience: Service representative, Pacific Telephone, San Luis Obispo; social worker, San Luis Obispo County Welfare Department; receptionist, intermediate clerk, placement interviewer, California State Polytechnic College.

SHAW, WAYNE F. (1966).....Information Director, Associated Students, Inc.
B.S., University of Iowa, 1951.

Experience: News editor, Gazette-Tribune, Sibley, Iowa; assistant sports editor, Daily Courier, Ottumwa, Iowa; sports editor, Times-News, Twin Falls, Idaho and News-Republican, Boone, Iowa; commercial reporter, Journal, Sioux City, Iowa; sports information director, South Dakota State University.

Faculty and Staff

- SHEIKHOLESAMI, HABIB (1967)**.....English
 B.S., Fresno State College, 1959; A.B., 1960; M.A., California State Polytechnic College, 1961; M.A., University of California at Los Angeles, 1966.
 Experience: English tutor, project "Upward Bound," University of California; instructor, Vietnamese Leadership/Scholarship Program, California State Polytechnic College.
- SHERMAN, ROGER L. (1961)**.....Business Administration
 A.B., Ohio University, 1949; M.S., 1950.
 Experience: Personnel representative, United Airlines; personnel supervisor, Boeing Airplane Company; employment and training manager, Hiller Aircraft Corporation; personnel manager, Dalmo Victor; personnel manager, Hazel Atlas Glass Company; personnel representative, Lockheed Aircraft Corporation; assistant professor of business, Texas A. & M.; extension instructor, University of California at Los Angeles and University of Washington; instructor in business management, Dar es Salaam Technical College, U.S. AID program, Tanzania.
- SHIRK, CARL D. (1968)**.....Medical Officer
 B.S., University of California, Berkeley; M.D., University of California Medical Center, San Francisco, 1961.
 Experience: Internship, San Diego County Hospital; residency, Stanislaus County Hospital; general practice, Oakdale, California.
- SHIRLEY, DELBERT W. (1963)**.....Agricultural Education
 B.S., Oregon State University, 1959; M.Ed., 1963; Ph.D., Michigan State University, 1968.
 Experience: Vocational agriculture instructor, Siletz High School, Siletz, Oregon; graduate assistant, Oregon State University.
- SILVA, GEORGE L., Lt. Col. (1967)**.....Military Science
 B.S., University of San Francisco, 1965. Graduate: Artillery School, 1954, 1956; Air Defense School, 1962; Defense Language Institute (Thai), 1966.
 Experience: Assistant operations officer, Los Angeles Air Defense; Air Defense detachment commander, U.S. Army Caribbean; artillery battery commander, 8th U.S. Army; personnel officer, 23rd Artillery Group; assistant U.S. Army attaché, Laos.
- SILVER, GORDON A. (1964)**.....Physics
 B.S., University of California, Los Angeles, 1959; M.S., 1961; additional study, University of California, Berkeley.
 Experience: Instructor, American Television Labs, Los Angeles Valley College; research engineer, Electrosonic Systems, Inc.; associate investigator, Children's Hospital, Los Angeles, California.
- SIMMONS, JAMES E. (1966)**.....Associate Dean, School of Applied Arts
 B.A., University of California, Santa Barbara, 1959; M.A., University of Wisconsin, 1960; Ph.D., 1966.
 Experience: Teaching assistant, University of Wisconsin; instructor, Wisconsin State University.
- SIMMONS, ORIEN W. (1961)**.....Welding and Metallurgical Engineering
 B.S.E., University of Michigan, 1935; M.S.E., 1948.
 Experience: Metallurgist, Carnegie-Illinois Steel Company; Packard Motor Car Company; instructor, Rose Polytechnic Institute; officer U.S. Navy; research engineer, Battelle Memorial Institute; senior research engineer, Frankford Arsenal; Rem Cru Titanium Company and Crucible Steel Company; Climax Molybdenum Company; registered professional engineer, Ohio.

Faculty and Staff

SMITH, DOUGLAS W., Maj., U.S.A. (1966).....Military Science
B.S., Michigan State University, 1960. Graduate: U.S. Army Armor School, 1961, 1965.

Experience: Company commander, 2nd Infantry Division; battalion advisor, Vietnamese Army; company commander, battalion operations officer, brigade operations officer, 1st Armored Division.

SMITH, ELIZABETH M. (1968).....Library
B.A., University of California, Los Angeles, 1929; Graduate, Library School of the Los Angeles Public Library, 1930.

Experience: Librarian, head librarian, Tropic Branch, Glendale Public Library.

SMITH, GLORIA (1968).....Counselor
A.B., Howard University, Washington, D.C., 1948; M.A., 1950; additional graduate study, University of Redlands.

Experience: Teacher, Riverside; English department head, Santa Maria Joint Unified High School District.

SMITH, HOWARD F. (1968).....Business Administration
A.B., Wayne State University, 1940; M.B.A., Harvard University, 1942; M.A., American University, 1952; Ph.D., 1963.

Experience: Economist, War Production Board; economic advisor, supreme commander for Allied Powers, Tokyo and Okinawa; international economist, Department of State; foreign service officer, Thailand and Ceylon; member of Presidential Study Mission to Korea; deputy director, U.S. Aid Mission, Congo; coordinator, U.S. Aid to Africa, A.I.D.; member, U.S. delegations to Economic Commission for Asia and Far East and Economic Commission for Africa conferences; director, Ghana Aid Program, officer, U.S. Army.

SMITH, J. MURRAY (1960).....Speech
B.A., University of Denver, 1940; M.A., 1947.

Experience: Instructor in English and speech, Denver University, Michigan State University and Wichita University; technical director, Denver Civic Theater; president, The Knitter Company (mfg.), Denver; staff director, Pasadena Playhouse; officer, U.S. Marine Corps.

SMITH, M. EUGENE (1946).....Head, Social Sciences Department
A.B., University of California, 1934; M.A., 1937; Ed.D., University of Oregon, 1958; additional graduate study, University of California.

Experience: Instructor and coach, Piedmont High School, Piedmont; graduate assistant, Universities of California and Oregon; officer, U.S. Army.

SMITH, NELSON L., III (1962).....Industrial Technology
B.S., Lowell Technological Institute, 1960; M.S., 1962.

Experience: Senior systems analyst, quality control engineer, Raytheon Company, Lowell, Massachusetts.

SMITH, WARREN T. (1952).....Chief of Party, Thailand Project
B.S., University of California, 1943; M.S., University of California, Davis, 1953.

Experience: Forester, United States Forest Service; U.S. National Park Service; stores, U.S. Navy (civilian); director of vocational agriculture and critic teacher, Madera Union High School; Dean, School of Agriculture.

SNODGRASS, OLIVER T. (1967).....Mathematical Sciences
B.S., Dakota Wesleyan University, 1924; M.S., University of Iowa, 1927; Ph.D., University of Missouri, 1937.

Experience: Principal, Bison High School, Wetonka Public Schools; instructor, Purdue University, Montana School of Mines, University of Missouri; professor, Yankton College, Western New Mexico University.

Faculty and Staff

- SOBALA, DANIEL (1968)**.....Aeronautical Engineering
B.S., Massachusetts Institute of Technology, 1947; M.S., 1952; Engineer, Stanford University, 1962.
Experience: Engineer, Metallurgical Engineers; associate professor, University of Massachusetts; assistant to vice president, Aviquipo, Inc.
- SORENSEN, L. ROBERT (1966)**.....Education
B.A., Pomona College, 1948; M.A., Claremont Graduate School, 1951; Ph.D., 1966.
Experience: Assistant to dean of students, Pomona College; lecturer, assistant director Industrial Relations Center, administrative assistant Jet Propulsion Lab, and associate director of development, California Institute of Technology; assistant in development, assistant dean, Claremont Graduate School.
- SPARLING, SHIRLEY R. (1963)**.....Biological Sciences
B.S., Iowa State College, 1950; M.S., 1951; Ph.D., University of California, 1956; additional graduate study, University of Michigan, Stanford University.
Experience: Instructor, Central College; lecturer and instructor, University of British Columbia; instructor and assistant professor, University of California at Santa Barbara; University of Oregon Institute of Marine Biology.
- SPENCER, RUTH G. (1967)**.....Library
B.A., Milwaukee-Downer College, 1938; B.L.S., University Library of Chicago, 1945; additional graduate study, University of Wisconsin.
Experience: Cataloger and reference librarian, Milwaukee Public Library; librarian, U.S. Public Health Service, Cincinnati; cataloger, Northrop Aircraft; reference librarian, Los Angeles Public Library.
- STALLARD, MARY L. (1965)**.....Physical Education
B.A., Fresno State College, 1957; M.S., University of Washington, 1965.
Experience: Instructor, Hamilton Junior High, Fresno; teaching assistant, University of Washington.
- STANSFIELD, WILLIAM D. (1963)**.....Biological Sciences
B.S., California State Polytechnic College, 1953; M.A., 1959; M.S., University of California, Davis, 1962; Ph.D., 1963.
Experience: Cadet teacher, Chaffey Union High; line officer, U.S. Naval Reserve; vocational agriculture teacher, Fortuna Union High School; teaching assistant and research assistant, University of California.
- STECHMAN, JOHN V. (1960)**.....Animal Husbandry
B.S., University of California, Davis, 1957; M.S., 1960.
Experience: U.S. Forest Service; U.S.D.A., Agricultural Research Service; laboratory assistant, University of California; biological assistant, U.S. Army.
- STEELE, F. RAYMOND, JR. (1968)**.....Food Processing
B.A., California State Polytechnic College, 1956; M.S., Cornell University, 1967; Ph.D., 1968.
Experience: Teaching assistant, University of Southern California; division manager, Sears Roebuck and Co.; brewer, Pabst Brewing; instructor, California State Polytechnic College; participant, Academic Year Institute, radiation biology, and research assistant, Department of Food Science, Cornell University; naval aviator, U.S.N.R.
- STEFANAC, JOSEPH B. (1958)**.....Mathematical Sciences
B.S., U.S. Naval Academy, 1926; M.S., Purdue University, 1958.
Experience: Captain, U.S. Navy (retired); marine engineering design, Bureau of Ships, Navy Department; engineering and command duties, U.S. Navy ships; mathematics instructor, Purdue University; participant National Science Foundation Institute, Stanford University, 1960.

Faculty and Staff

- STEUCK, FRED H. (1947)**.....Electronic Engineering
B.S., Iowa State College, 1937.
Experience: Engineer, Nebraska Power Co.; manager, O'Brien Co.; Rural Electric Co-op., Iowa; instructor, Iowa State College; officer, U.S. Navy; registered professional engineer, California.
- STOFFEL, EDWARD O. (1957)**.....Mechanical Engineering
B.M.E., University of Santa Clara, 1950; M.E., University of Santa Clara, 1955; M.S.M.E., Oregon State University, 1968.
Experience: Engineer, Autonetics, Aerojet-General, Northrup Aircraft; Robertshaw-Fulton Controls, Norris-Thermador Corp.; chemist, U.S. Industrial Chemicals; registered professional engineer, California.
- STONER, HOWARD F. (1960)**.....Mechanical Engineering
B.S., U.S. Naval Academy, 1932; M.S., Massachusetts Institute of Technology, 1941.
Experience: U.S. Navy, operations officer for U.S. submarines; supervisor of ship-building, Electric Boat Co.; repair and construction superintendent, Mare Island Shipyard; production officer, Long Beach Naval Shipyard.
- STOKEY, ELLEN T. (1961)**.....Home Economics
B.S., University of Illinois, 1943; M.A., 1950; additional graduate study, Stanford University.
Experience: Elementary teacher, Illinois; vocational home economics teacher, Illinois; supervising teacher, University of Illinois; teacher trainer, University of Illinois; special service, U.S. Army Air Force; regional supervisor, Bureau of Home-making Education, California State Department of Education.
- STRASSER, J. EDWARD (1960)**.....Industrial Technology
B.S., California State Polytechnic College, 1958; M.B.A., Golden Gate College, 1967.
Experience: Construction mechanic, Pacific Electric Company, Anchorage, Alaska; machinist, MEFCO Mfg., Glendale; draftsman, I.D.S., Inc., Glendale; tool and die maker, Arrowsmith Tool & Die Corp., Los Angeles; sales engineer, O'Brien Machinery, Inc., Los Angeles; control systems analyst, the Boeing Company, Seattle.
- STRAUSS, L. HARRY (1961)**.....College Librarian
B.S., George Williams College, 1935; M.A., Graduate Library School, University of Chicago, 1942; additional graduate study, University of Michigan.
Experience: Librarian, George Williams College; Chicago College of Osteopathy; Northwestern Michigan Junior College; instructor in audio-visual education, University of Oklahoma; audio-visual consultant, National Council of the Y.M.C.A.; executive secretary, Commission on Motion Pictures in Adult Education; superintendent of schools, Rapid City and Cedarville, Michigan.
- STREICHERT, GRETCHEN (1958)**.....Home Economics
B.S., Oregon State College, 1936; M.S., 1951.
Experience: Teacher, high schools; home adviser, University of California Agricultural Extension; nursery school supervisor and instructor, Oregon State College; instructor, Modesto Junior College; personnel field counselor, Oregon Shipbuilding Corporation; teacher-counselor, Oregon State School for Girls.
- STUART, JOHN S. (1964)**.....Architecture
B. Arch., Texas Technological College, 1950; additional graduate study, Pennsylvania State University, MIT.
Experience: Private practice, Schmidt & Stuart; designer and supervisor, Atcheson & Atkinson, Architects. Registered architect and registered engineer, Texas.

- STUBBS, DANIEL F. (1963) (1968)**.....Mathematical Sciences
 B.S., Purdue University, 1960; M.S., Rensselaer Polytechnic Institute, 1962; additional graduate study, Purdue University, University of California, Berkeley, Rensselaer Polytechnic Institute.
 Experience: Teaching assistant, Purdue University; engineer, Knolls Atomic Power Laboratory; instructor, California State Polytechnic College, San Luis Obispo.
- SULLIVAN, GERALD J. (1968)**.....English
 B.A., University of Wichita, 1957; M.A., University of Oklahoma, 1959; Ph.D., 1964.
 Experience: Instructor, University of Wisconsin, University of Arizona; teaching assistant, University of Oklahoma; assistant professor, University of North Texas State.
- SWANSON, CLIFTON E. (1967)**.....Music
 B.A., Pomona College, 1963; M.M., University of Texas, 1965; additional graduate study, University of California.
 Experience: Teaching assistant, University of Texas, University of California; visiting assistant professor, Portland State College; member, Group for Contemporary Music, Portland.
- SZIGETHY, NICHOLAS (1961)**.....Library
 Ph.D., Erzebet University, Pecs, Hungary, 1940; M.L.S., Columbia University Library School, 1958.
 Experience: Columbia University School of Business Library; cataloger, Cornell University Library; cataloger, University of Nevada Library.
- TALBOTT, LAURENCE F. (1966)**.....Industrial Technology
 A.B., San Diego State College, 1951; M.B.A., University of Southern California, 1965; additional graduate study, University of Southern California.
 Experience: Manager Test Quality Control, Rocketdyne; plant engineer, Space and Information Systems, Division North American Aviation, Inc.; chief facilities engineer, chief industrial engineer, plant engineer, Autonetics; electrical engineer, engineer, Convair, San Diego; C. F. Braun and Company, Alhambra; sales engineer, California Electric Works, San Diego. Registered professional engineer.
- TELLEW, FUAD H. (1960)**.....Business Administration
 B.S., College of Commerce and Economics, Baghdad, Iraq, 1950; M.A., University of Southern California, 1954; Ph.D., 1959.
 Experience: Accountant, Engineering Department, Iraqi State Railways; supervisor, Testing Bureau, University of Southern California; teaching assistant and lecturer, University of Southern California.
- THOMAS, JOHN W. (1968)**.....Biological Sciences
 B.A., Los Angeles State College, 1957; Ph.D., University of Southern California, Los Angeles, 1968.
 Experience: Chemist, Atkinson Laboratory; public health microbiologist, Los Angeles City Health Department; teacher, Durate Unified School District; research associate, University of Southern California.
- THOMSON, DAVID H. (1946)**.....Biological Sciences
 B.S., University of Arizona, 1944; M.A., Claremont Graduate School, 1948; additional graduate study, Oregon State College and University of Oregon.
 Experience: Laboratory instructor, Pomona College; ranger-naturalist, Sequoia National Park.
- THRASHER, FRANK P. (1963)**.....Crops
 B.S., Montana State College, 1951; M.S., 1963.
 Experience: Recruit instructor, U. S. Navy; farmer-owner, Bozeman, Montana; research agronomist, Agricultural Research Service, U.S. Department of Agriculture, Bozeman, Montana.

Faculty and Staff

- THURMOND, WILLIAM (1951)**.....Biological Sciences
A.B., University of California, 1948; M.A., 1950; Ph.D., 1957.
Experience: Instructor, San Mateo Junior College; associate in zoology, University of California; instructor, summer session, University of California, 1957-59; Director, National Science Foundation, Summer Science Training Program for secondary students, California State Polytechnic College.
- TICE, RUSSELL L. (1965)**.....Chemistry
B.S., Marshall University, 1960; Ph.D., University of California, Los Angeles, 1965.
Experience: Teaching and research assistant, University of California, Los Angeles; U.S. Navy.
- TOONE, HARMON (1952)**.....Head, Dairy Department
B.S., University of Idaho, 1940; M.A., California State Polytechnic College, 1956.
Experience: Director of vocational agriculture at Moreland, Ucon, and Firth high schools, Idaho; superintendent, Firth High School, Idaho; director of vocational agriculture, Riverdale High School; special supervisor, Bureau of Agricultural Education.
- TOWNSEND, NEAL R. (1965)**.....Mathematical Sciences
B.S., Wisconsin State College, 1953; M.A., San Diego State College, 1961; additional graduate study, Claremont Graduate School, University of Georgia, Purdue University.
Experience: Teacher, San Bernardino City Schools, Grossmont Union High School District; assistant professor, Wisconsin State University.
- TREACY, ROBERT E. (1967)**.....Social Sciences
B.A., Claremont Men's College, 1951; M.A., Claremont Graduate School, 1959; additional graduate study, University of Wisconsin.
Experience: Secretary-treasurer, division manager, proprietor retail stores; instructor, U.S.N. Recruit Training; head of reserve, Hornold Library; lecturer, California State College Long Beach.
- TREMBLY, DEAN (1961)**.....Counselor
A.B., Colorado College, 1933; M.A., 1946; Ed.D., University of Illinois, 1961.
Experience: Industrial personnel consultant, Human Engineering Laboratory, Fort Worth, Texas; testing and counseling, University of Illinois.
- TROUTNER, WILLIAM R. (1942)**.....Crops
Vocational Certificate, California State Polytechnic College, 1934; B.S., University of California, Davis, 1938.
Experience: Agriculture instructor, Pomona High School and Junior College; agriculture instructor and critic teacher, San Luis Obispo Senior High School.
- TRUEX, JOSEPH W. (1954)**.....Printing Technology and Management
B.S., California State Polytechnic College, 1952; M.S., South Dakota State University, 1966.
Experience: Floorman, San Luis Obispo Telegram-Tribune. Printer: Santa Maria Advertiser; Williams Press, Flushing, New York; H. W. Wilson Company, New York City, U. S. Navy.
- TURNER, PEARL (1951)**.....Library
A.B., San Jose State, 1937; M.S., University of Southern California, 1949; M.L.S., Texas Women's University, 1951; additional graduate study, University of Washington.
Experience: Teacher in elementary schools, Visalia, Los Angeles, Riverside; officer, U. S. Navy.
- UMBECK, JOHN R. (1968)**.....Business Administration
B.A., Occidental College, 1967; M.A., University of California, Los Angeles, 1968.
Experience: Salesman manager, Westbend Company; salesman, Sparkletts Water; cost analyst, Bank of America.

Faculty and Staff

- VANONCINI, LES (1965)** Director, Alumni and Community Affairs
 B.S., California State Polytechnic College, 1946; M.A., 1953; additional graduate study, University of California, Davis, University of California, Berkeley, University of Southern California.
 Experience: Director vocational agriculture, Santa Maria High School and Junior College; director work education, Santa Barbara County Schools; director counseling and guidance, Santa Maria High School; director adult education and dean, evening division, Allan Hancock College.
- VAN WYNGAARDEN, WILLEM L. (1965)** Physics
 B.S., McMaster University, 1961; M.S., University of Manitoba, 1964; additional graduate study, University of Manitoba.
 Experience: Instructor, Methodist College; bank clerk, Bank of Montreal.
- VOELTZ, HERMAN C. (1965)** Social Sciences
 B.A., University of Chicago, 1943; M.A., 1949; Ph.D., University of Oregon, 1960.
 Experience: Instructor, 83 Div I and E School, Bad Ischl, Austria; instructor and associate professor, Division of Continuing Education, University of Oregon; assistant professor, Oregon State University; associate professor, Western New Mexico University; U.S. Army.
- VON WERLHOF, JAY C. (1967)** Social Sciences
 B.A., University of California Berkeley, 1950; M.A., 1952; additional graduate study, University of Southern California, Los Angeles.
 Experience: Instructor, librarian, California School Fine Arts; instructor, College Sequoias; archaeologist, University of California, Berkeley, Los Angeles; teacher, librarian, Plumas Unified School District, Coast Joint Union; teacher, Siskiyou School District; historical guide, San Simeon State Historical Monument; instructor, Grossmont College; lecturer, Chico State College.
- VORHIES, RALPH M. (1946)** Crops
 B.S., University of Missouri, 1938; M.A., 1941; Ed.D., 1964.
 Experience: Agriculture instructor at Belton and Couch High Schools, Missouri; instructor, Southeast State Teachers College, Cape Girardeau, Missouri; horticulture adviser, USAID Guatemala; officer, U.S. Navy.
- VOSBURGH, MARIAN C. (1968)** Graduate Nurse
 R.N., Joaquin General Hospital, Stockton, California.
 Experience: Hanford Community Hospital, San Luis Obispo General Hospital, Sierra Vista Hospital.
- VOSS, LARRY R. (1968)** Director of Personnel Relations
 B.A., Sacramento State College, 1956; graduate study, Sacramento State College and California State College at Los Angeles.
 Experience: Placement supervisor, Sacramento State College; assistant personnel officer, California State Department of Education, Sacramento; senior personnel analyst, Chancellor's Office, Trustees of the California State Colleges, Los Angeles; assistant director, U.S. Office of Education project: "Improvement of Personnel Administration in State Education Agencies", Los Angeles.
- VRANA, RALPH S. (1966)** Physics
 B.A., Columbia College, 1949; M.Ed., New York University, 1958; M.N.S., Arizona State University, 1963; additional graduate study, University of Wyoming, Marshall University, Yeshiva University, Arizona State University, University of Colorado.
 Experience: Teacher, Boulder School, Rufus Consolidated School, Scarsdale Schools; graduate assistant, New York University; instructor, New Lincoln School, Gililand Junior High School.

Faculty and Staff

WAHL, WILLIAM B. (1966).....English
B.A., San Francisco State College, 1953; M.A., 1954; additional graduate study, Stanford University.

Experience: Assistant instructor, San Francisco State College; student teacher, Balboa High School; teacher, Sequoia High School; instructor, College of San Mateo.

WALKER, HOWARD D. (1957).....Chemistry
B.A., New York University, 1947; M.S., 1948; Ph.D., U.C.L.A., 1955.

Experience: U.S. Public Health Service, postdoctorate fellow, American Meat Institute Foundation, University of Chicago; group leader, Veterans Hospital, Downey, Illinois; instructor, Northwestern University.

WALKER, ISAAC N. (1967).....English
B.S., Northwestern University, 1953; M.A., University of Texas, 1955; Ph.D., 1965.

Experience: Teaching assistant, special instructor, University of Texas; instructor, Southwest Texas State College; instructor, Del Mar College, Corpus Christi; assistant professor, North Texas State University.

WALKER, WALTER A. (1963).....Counselor
A.B., New School for Social Research, 1950; graduate study, New York University.

Experience: Supervising psychologist, Rockland County New York Center for Mental Health; psychotherapist, Rockland Consultation Center; certified psychologist, New York.

WALLACE, MALCOLM K., Maj. (1968).....Military Science
B.S., West Virginia State College, 1959. Graduate: The Infantry School; Airborne and Ranger Schools; Department of Defense Military Assistance Institute.

Experience: Company commander, 3rd Inf. Div., Europe; battalion operations and training officer, 1st Armored Div.; training officer, Army Advisory Section, Iran; battalion operations officer, brigade adjutant, 101st Airborne Division, Vietnam.

WANAT, STEPHEN J. (1968).....Architecture
B.A., Princeton University, 1962; B. Arch., Harvard Graduate School, 1964; M. Arch. and MCP, University of Pennsylvania, 1966.

Experience: Assistant professor, University of Oregon; designer, Otto Reichert and Reed, Torres, Beauchamp & Marvel; draftsman, John S. Bolles.

WANG, SIDNEY SHIUH-TUNG (1968).....Library
B.A., Taiwan Normal University, 1956; M.L.S., Graduate School of Library and Information Sciences, University of Pittsburgh, 1966; additional graduate study, Southern Illinois University, Rutgers University.

Experience: Assistant librarian, St. Mary's College, Maryland.

WARD, CLARENCE H. (1966).....Physical Education
B.A., California State Polytechnic College, 1965; M.A., 1966.

Experience: Recreation intern, correctional officer, California Men's Colony; summer swimming instructor, California State Polytechnic College.

WARD, WESLEY S. (1954).....Architecture
B. of Arch., University of Southern California, 1953; additional graduate study, Spain.

Experience: Engineering assistant, Pacific Telephone and Telegraph Company; officer, U.S. Air Force; surveyor, City of Santa Ana; design draftsman, Benedict Beckler and Kochler, Architects and Engineers; construction supervisor, Everett E. Parks, Architect; registered architect, California.

WARTEN, RALPH M. (1968).....Mathematical Sciences
B.S., Brooklyn College, 1957; M.S., Purdue University, 1959; Ph.D., 1961.

Experience: Research and teaching assistant, Purdue University; instructor, advisory mathematician, I.B.M. Corporation, Federal Systems Division; mathematician, I.B.M. Corporation, Scientific Center.

Faculty and Staff

- WATSON, HAROLD J. (1964)** **Chemistry**
A.B., Princeton University, 1944; A.M., University of Illinois, 1948; Ph.D., 1950.
Experience: Assistant, University of Illinois; chemist, Texaco, Inc.; group leader, Dan River Mills, Inc., Chemical Consultant, Danville, Va.
- WEATHERBY, JOSEPH N. JR. (1968)** **Social Sciences**
B.A., Baylor University, 1958; B.F.T., American Institute for Foreign Trade, 1961; M.A., Baylor University, 1962; Ph.D., University of Utah, 1968.
Experience: International operations, Ford Motor Company; assistant professor, Bay de Noc College.
- WEBER, BARBARA P. (1966)** **Home Economics**
B.S., University of Nevada, 1951; M.A., California State Polytechnic College, 1968, additional graduate study, UCLA Extension, University of Nevada, California State Polytechnic College.
Experience: Instructor, Allan Hancock College, Evening Division.
- WEBSTER, JAMES P., JR. (1965)** **Agricultural Engineering**
B.S., California State Polytechnic College, 1953.
Experience: U.S. Army; engineering aid, junior civil engineer, and assistant highway engineer, California Division of Highways; field survey chief and project engineer, Garing, Taylor, and Associates, Arroyo Grande.
- WEST, HERMAN (1964)** **Mechanical Engineering**
B.S., Tufts University, 1934; M.S., Rensselaer Polytechnic Institute, 1962; additional graduate study, Rensselaer Polytechnic Institute.
Experience: Educational advisor, Civilian Conservation Corp; instructor, Biddeford High School, Hartford University; design analyst, Pratt Whitney Aircraft; research engineer, North American Aviation; president and treasurer, West Brothers Electrical Appliances.
- WEST, HOWARD (1959)** **Acting Director, International Education**
B.A., Pepperdine College, 1956.
Experience: Apprentice reporter, Los Angeles Examiner; journalism instructor and acting director of public relations, Pepperdine College; editor, America's Builders; publications consultant, Southland Press; assistant to President.
- WEST, JOHN W. (1968)** **Associate Dean, School of Agriculture**
B.S.A., University of Tennessee, 1947; M.S., 1948; Ph.D., Purdue University, 1951.
Experience: U.S. Army; assistant director of research, Security Mills, Knoxville, Tennessee; associate professor of Poultry Science, Mississippi State University; professor and head, Department of Poultry Science, Oklahoma State University.
- WESTESEN, GERALD L. (1965)** **Agricultural Engineering**
B.S., University of California, Davis, 1958; M.S., 1963.
Experience: Junior land and water use analyst, California State Department of Water Resources; engineer and superintendent, Clear Lake Water Company, Woodland; officer, U.S.A.R.
- WHALEY, GLENN V. (1963)** **Library**
B.A., Carroll College, 1949; M.L.S., University of Wisconsin, 1953; M.A., Drake University, 1965.
Experience: Reference librarian, Drake University; librarian, Milwaukee Public Library.
- WHALLS, MARVIN J. (1968)** **Soil Science**
B.S., Michigan State University, 1941; M.S., 1957; additional graduate study, University of Michigan.
Experience: Fishery biologist, Hunt Creek Trout Research Station and research fellow, Institute for Fisheries Research, Michigan; associate fishery biologist, California.

Faculty and Staff

WHARTON, WILLIAM M., JR. (1968)..... Social Sciences
B.S., Loyola University, 1956; M.A., University of San Francisco, 1961; additional graduate study, University of California, Berkeley, University of South Africa.

Experience: Lecturer: Comboni College, Khartoum, Sudan; assistant professor, University of San Francisco.

WHEELER, ROBERT R. (1961)..... Animal Husbandry
B.S., Colorado State University, 1952; M.S., 1955, Ph.D., Oregon State University, 1962.

Experience: Irrigated farming; ranching; graduate assistant and graduate fellow in animal nutrition, Oregon State University; Junior animal husbandman, Oregon Agricultural Experiment Station.

WHIPPLE, OMER K. (1956)..... Chemistry
A.B., Dartmouth College, 1936; M.A., Columbia University, 1938.

Experience: Biochemical research chemist, Long Island College of Medicine; instructor in chemistry, Norwich University; research chemist, Vermont Bureau of Industrial Research; professor of quantitative analysis, University of Tulsa; chemical consultant, Tulsa, Oklahoma.

WHITAKER, LESLIE A. (1967)..... Chemistry
B.S., University of Denver, 1949; M.A., 1956; Ph.D., University of the Pacific, 1967.

Experience: Instructor, Littleton High School, Scottsbluff College, Cortey College, College of the Desert; teaching assistant, University of the Pacific.

WHITE, DERRELL B. (1964)..... Biological Sciences
B.A., State University of Iowa, 1952; M.S., 1958; Ph.D., 1961.

Experience: Assistant professor, Eastern Illinois University.

WHITE, MARY LOU (1961)..... Coordinator, Women's Physical Education
B.S., Oregon State University, 1946; M.S., Washington State University, 1953.

Experience: St. Helens, Oregon, High School instructor; physical education instructor, Clark College, Vancouver, Washington.

WHITING, FRANCIS F. (1946)..... Engineering Technology
B.S., Stout Institute, 1931; M.A., University of Minnesota, 1938.

Experience: Teacher: Eau Claire, Wisconsin; Minneapolis, Minnesota. Instructor, Kent State University; assistant professor, University of Minnesota; chairman, Manufacturing Processes Department; officer, U.S. Navy.

WHITSON, MILO E. (1947)..... Head, Mathematical Sciences Department
Ph.B., Washburn College, 1937; M.A., George Peabody College for Teachers, 1940; Ed.D., University of Southern California, 1949.

Experience: Teacher and administrator, Kansas; officer, U.S. Navy; lecturer, mathematics, University of Southern California.

WIGHT, HEWITT G. (1952)..... Chemistry
B.S., University of Utah, 1943; Ph.D., University of California, 1955.

Experience: Teaching assistant, University of Utah, St. Martin's College, and the University of California; officer, U.S. Army.

WILD, FREDERICK G. (1964)..... Mathematical Sciences
B.S., U.S. Coast Guard Academy, 1932; M.A.T., Duke University, 1964.

Experience: Command of air stations at Salem, Massachusetts and Port Angeles, Washington; chief of Coast Guard Intelligence.

Faculty and Staff

- WILEY, J. BARRON (1956)**..... Education
B.S., University of Denver, 1940; M.B.A., 1948; Ed.D., Indiana University, 1955.
Experience: Accounting and business administration, various firms; officer, U.S. Air Force; head, department of business education, Colorado Woman's College; assistant professor of air science, Indiana University.
- WILEY, RICHARD C. (1946)**.....
Head, Welding and Metallurgical Engineering Department
Special engineering courses, Stanford University; industrial arts training, San Jose State College and University of California.
Experience: Master mechanic and welder, Utah Construction Company; welding instructor, Sacramento Junior College; Palo Alto, San Francisco, and San Jose school systems; senior welding engineer, Joshua Hendy Iron Works; field engineer, Bechtel Corporation; welding metallurgy consultant, Westinghouse Corporation; X-ray Engineering International; Linde Company, New York; registered professional engineer, California.
- WILK, EDWARD A. (1966)**..... Assistant Acquisitions
B.A., Western Michigan University, 1965; M.S.L., 1966.
Experience: I.B.M. operator, Allstate Insurance Company; salesman, Arts International, Detroit, Michigan.
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Experience: Architect in private practice; consultant architect to Robert Kliegman, A.I.A.; project architect to senior designer, Victor Gruen Association; designer, P. J. Ellerbroek, A.I.A., Westcott & Mapes, A.I.A.; assistant professor, University of Kansas; associate professor, University of Utah. Registered architect, California, Ohio, Utah.
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B.A., University of Colorado, 1963; Ph.D., University of California at Los Angeles, 1966.
Experience: Research assistant, University of California; chemist, National Bureau of Standards, Boulder, Colorado.
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Faculty and Staff

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B.A., University of North Dakota, 1930; M.A., University of Denver, 1940; additional graduate study, University of Denver, 1948-1958.
Experience: Teacher, high schools, North and South Dakota; principal and director of elementary education, Canon City, Colorado; counselor, University of Denver; director of curriculum, Stanislaus County Schools, Modesto; superintendent of schools, Fall River Mills; assistant professor, San Diego State College; associate professor, chairman of the division of education and psychology, director of teacher education, Westmont College.
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B.S., Kansas State University, 1943; M.S., Wisconsin University, 1947; Ph.D., Missouri University, 1950.
Experience: Field representative, American Jersey Cattle Club; professor, North Dakota State University; director of research, Dannen Mills, Inc.; vice president, Feed Division, Farmland Industries, Inc.; dairy farmer and manager; U.S. Navy.
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B.S., University of California, 1932; graduate study, Fresno State College, University of California at Los Angeles.
Experience: Director of agriculture, Excelsior Union High School, Norwalk; instructor of agriculture and head, swine department, California Polytechnic; regional supervisor, agricultural education, State Department of Education, California; dean, Voorhis Unit, California State Polytechnic College; Executive Dean, San Luis Obispo.
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B.A., Western State College, 1962; M.A., 1964.
Experience: Teacher, Nucla Grade School, Colorado; Shenandoah Junior High, Miami-Dade Junior College; Canyon del Oro Junior High, Tucson; graduate assistant, instructor, University of Arizona.
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B.S.E.E., University of North Dakota, 1960; M.S.E.E., 1963.
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B.S., Montana State College, 1931.
Experience: Director of vocational agriculture and critic teacher, Montana and California high schools; teacher trainer of agriculture education.
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B.S., City College of New York, 1931; M.A., Columbia University, 1936; M.S., Oregon State College, 1951; Ph.D., 1963.
Experience: Teaching fellow in mathematics, Oregon State College; instructor, Multnomah College; radar officer, U.S. Army; National Science Foundation summer staff, Oregon State University.
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B.S., Stanford University, 1947; M.B.A., 1949.
Experience: Security analyst, Crocker First National Bank of San Francisco; financial analyst, Fibreboard Products, Inc., and Fibreboard Paper Products Corporation; extension instructor, University of California.
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B.A., Michigan State Normal College, 1931; A.M.L.S., University of Michigan, 1964.
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Faculty and Staff

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Experience: Teacher and vice principal, Lemoore Elementary Schools; U.S. Navy; assistant professor, acting chairman, Mathematics Department, University of Santa Clara; instructor, mathematics, California State Polytechnic College.
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Experience: Teacher, Pan American Business University; language instructor, U.S. Army, Augusta Military Academy, Sanz School of Languages, King School; purser and food inspector, Pan American Airways; translator of Portuguese, French, Spanish and Italian for U.S. Army Engineers; administrative assistant and auditor for the U.S. War Department.
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Experience: Research assistant engineer, Texas A & M University; instructor, agricultural engineering, Texas Technological College; instructor, agricultural mechanics, Sam Houston State Teachers College.

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