California State Polytechnic College
San Luis Obispo

Catalog Issue
BULLETIN
1968-1969

Price: $1.00 plus tax

Complimentary Copy
**Attention, Prospective Students**

**A GUIDE TO PLANNING FOR COLLEGE**

Below are listed basic questions which you should ask as you plan for your college education. Page references indicate where in this publication you can find the answers as they pertain to California State Polytechnic College.

In what fields of instruction does the college offer degrees?

Does the college offer nondegree occupational curricula? Page 55.

Can I meet the requirements for admission? Page 43.

May a student transfer from another college? Page 45.

What fees are charged? Page 57.

Where can I obtain board and room? Page 27.

What scholarships are available to freshmen? Page 28.

Does the college have an ROTC unit? Page 270.

What services does the college maintain for students?
- Counseling and testing, page 26; advising, page 26; Health, page 26; Assistance in finding part-time employment, page 28; Loan funds, page 36; Placement at graduation, page 27.

How do I apply for admission?

1. Write Associate Dean (Admissions) for an application form, fill it out and return it.

2. Take SAT or ACT test and arrange to have results sent to the Admissions Office. Your high school will generally have information and registration forms for these tests, or you may write to: SAT, College Entrance Examination Board, Box 1025, Berkeley, Calif., 94701; ACT, American College Testing Program, P.O. Box 21-4127, Sacramento, Calif., 95821.

3. Arrange with your high school to have your seven-semester transcript sent to the Admissions Office as soon as possible after you have completed the first semester of your senior year.

For instructions on where to write for information, see inside of back cover.
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## CALIFORNIA STATE POLYTECHNIC COLLEGE
### SAN LUIS OBISPO

### ACADEMIC CALENDAR—1968–69

#### SUMMER QUARTER, 1968

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<th>Date</th>
<th>Day</th>
<th>Event</th>
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<td>June 7</td>
<td>Friday</td>
<td>Last day to complete application for admission to summer quarter</td>
</tr>
<tr>
<td>June 17</td>
<td>Monday</td>
<td>Registration of all students</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Beginning of college year</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Beginning of summer quarter</td>
</tr>
<tr>
<td>June 18</td>
<td>Tuesday</td>
<td>Classes begin for all students</td>
</tr>
<tr>
<td>June 25</td>
<td>Tuesday</td>
<td>Last day to enroll for summer quarter</td>
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<td></td>
<td></td>
<td>Last day to add courses</td>
</tr>
<tr>
<td>July 2</td>
<td>Tuesday</td>
<td>Last day to withdraw from classes without penalty</td>
</tr>
<tr>
<td>July 4</td>
<td>Thursday</td>
<td>Independence Day—academic holiday</td>
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<tr>
<td>August 27–30</td>
<td>Tuesday–</td>
<td>Final Examinations</td>
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<td>August 30</td>
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<td>End of summer quarter</td>
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#### FALL QUARTER

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<td>August 17</td>
<td>Saturday</td>
<td>Last day to complete application for admission to fall quarter</td>
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<td>September 16</td>
<td>Monday</td>
<td>Beginning of fall quarter (faculty only)</td>
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<td>September 19–20</td>
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<td>Registration of all students</td>
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<tr>
<td>September 23</td>
<td>Monday</td>
<td>Classes begin for all students</td>
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<tr>
<td>September 30</td>
<td>Monday</td>
<td>Last day to enroll for fall quarter</td>
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<td></td>
<td></td>
<td>Last day to add courses</td>
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<tr>
<td>October 7</td>
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<td>Last day to withdraw from classes without penalty</td>
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<td>November 11</td>
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<td>Veteran's Day—academic holiday</td>
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<td>Thanksgiving—academic holiday</td>
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<td>Final examination period</td>
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<td>End of fall quarter</td>
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<td>December 13–</td>
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<td>Christmas—academic holiday</td>
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<td>January 1</td>
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# ACADEMIC CALENDAR—1968-69—Continued

## WINTER QUARTER

- **December 12**
  - Thursday
  - Last day to complete application for admission to winter quarter

- **January 2–3**
  - Thursday–Friday
  - Registration of all students
  - Beginning of winter quarter

- **January 6**
  - Monday
  - Classes begin for all students

- **January 13**
  - Monday
  - Last day to enroll for winter quarter
  - Last day to add courses

- **January 20**
  - Monday
  - Last day to withdraw from classes without penalty

- **March 13–18**
  - Thursday–Tuesday
  - Final examination period

- **March 18**
  - Tuesday
  - End of winter quarter

- **March 19–23**
  - Wednesday–Sunday
  - Academic holiday

## SPRING QUARTER

- **March 7**
  - Friday
  - Last day to complete application for admission to spring quarter

- **March 24–25**
  - Monday–Tuesday
  - Registration of all students
  - Beginning of spring quarter

- **March 26**
  - Wednesday
  - Classes begin for all students

- **April 4**
  - Friday
  - Good Friday—academic holiday

- **April 7**
  - Monday
  - Last day to enroll for spring quarter
  - Last day to add classes

- **April 11**
  - Friday
  - Last day to withdraw from classes without penalty

- **April 18**
  - Friday
  - Last day to apply for June commencement

- **April 26**
  - Saturday
  - Last day to file for master's examination

- **June 3–6**
  - Tuesday–Friday
  - Final examination period

- **June 7**
  - Saturday
  - Commencement
  - End of spring quarter
  - End of college year (faculty only)

- **June 8–15**
  - Sunday–Sunday
  - Academic holiday

## TENTATIVE SUMMER QUARTER, 1969

- **June 6**
  - Friday
  - Last day to complete application for admission to summer quarter

- **June 16**
  - Monday
  - Registration of all students
  - Beginning of college year
  - Beginning of summer quarter

- **June 17**
  - Tuesday
  - Classes begin for all students

- **June 24**
  - Tuesday
  - Last day to enroll for summer quarter
  - Last day to add courses

- **July 1**
  - Tuesday
  - Last day to withdraw from classes without penalty

- **July 4**
  - Friday
  - Independence Day—academic holiday

- **August 26–29**
  - Tuesday–Friday
  - Final examination period

- **August 29**
  - Friday
  - End of summer quarter

- **August 30–September 13**
  - Saturday–Saturday
  - Academic holiday
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ADMINISTRATION
ADMINISTRATION
TRUSTEES OF THE CALIFORNIA STATE COLLEGES

EX OFFICIO TRUSTEES

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

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.

Louis H. Heilbron, A.B., LL.B., LL.D. (1969) ............... 44 Montgomery St.,
San Francisco 94104
Paul Spencer, B.A. (1969) ......................................... 1323 La Terracita Dr., San Dimas 91773
Theodore Meriam, A.B. (1971) ................................... P.O. Box 370, Chico 95927
San Jose 95113
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 St., 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
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

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Governor Ronald Reagan
President
Theodore Meriam
Chairman
Chancellor Glenn S. Dumke
Secretary-Treasurer

OFFICE OF THE CHANCELLOR
OF
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) ................................. John Summerskill, 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 College at 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 Polytechnic College,
Kellogg-Voorhis (1949) .............................................. Robert C. Kramer, President
Pomona, California 91766
California State College at Long Beach (1949) ............. Carl W. McIntosh, President
6101 East 7th Street, Long Beach, California 90804
California State College at Fullerton (1957) ................. William B. Langsdorf, President
800 North State College Boulevard, Fullerton, California 92631
California State College at Hayward (1957) ................. Ellis E. McCune, Interim President
25800 Hillary Street, Hayward, California 94542
San Fernando Valley State College (1958) .................... Ralph Prator, 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 at San Bernardino (1960) ....... John M. Pfau, President
5500 State College Parkway, San Bernardino, California 92407
California State College in Kern County (1967) .......... Paul F. Romberg, President
615 California Avenue, Bakersfield, California 93304
OFFICERS OF THE COLLEGE

President .......................................................... Robert E. Kennedy
Assistant to the President ........................................ Chester G. Young

Dean, School of Agriculture ...................................... J. Cordner Gibson, Acting
Dean, School of Engineering ..................................... Archie Higdon
Associate Dean, Engineering ..................................... Charles R. Russell
Dean, School of Applied Arts .................................... Carl C. Cummins
Dean, School of Applied Sciences ............................... Clyde P. Fisher

Dean, School of Architecture .................................... George J. Hasslein

Administrative Vice President ................................. Harold O. Wilson, Acting
Associate Dean, Facilities Planning ............................. Douglas Gerard
Director, Information Services ................................. Lachlan P. MacDonald
Director, Alumni and Community Affairs ..................... Les Vanoncini
Director, Personnel Relations ................................... Larry R. Voss

Academic Vice President ...................................... Dale W. Andrews
Associate Dean, Academic Planning ............................. Donald W. Hensel
Associate Dean, Curriculum and Instruction .................... David W. Cook
Associate Dean, Educational Services .......................... Donald M. Coats
Associate Dean, Special Programs .............................. George C. Beatie
Associate Dean, Graduate Studies .............................. Arthur G. Butzbach
Director, Institutional Studies ................................. Lowell H. Dunigan
Director, International Education .............................. Howard West, Acting

College Librarian ................................................ L. Harry Strauss

Dean of Students ................................................. Everett M. Chandler
Associate Dean, Admissions and Records ....................... C. P. Winner
Registrar .......................................................... F. Jerald Holley
Associate Dean, Women .......................................... Lorraine H. Howard
Associate Dean, Counseling and Testing ....................... George Mulder
Associate Dean, Activities ...................................... John D. Lawson
Director, Health Services ....................................... Billy W. Mounts
Director, Placement ............................................. Eugene Rittenhouse
Financial Aids Officer ........................................... Mary Eyler
Foreign Student Counselor ..................................... Glenn W. Rich

Director, Business Affairs ..................................... Donald S. Nelson
Associate Director, Budgeting and Business Affairs .......... James R. Landreth

Foundation Manager ............................................ Gene E. Brendlin

[II]
# ENROLLMENT AT CALIFORNIA STATE POLYTECHNIC COLLEGE
SAN LUIS OBISPO, FALL QUARTER 1967–68

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<td>295</td>
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<td>97</td>
<td>97</td>
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<tr>
<td>Mechanized Ag.</td>
<td>120</td>
<td>120</td>
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</tr>
<tr>
<td>Animal Husbandry</td>
<td>440</td>
<td>314</td>
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</tr>
<tr>
<td>Crops</td>
<td>117</td>
<td>116</td>
<td>1</td>
</tr>
<tr>
<td>Fruit Production</td>
<td>29</td>
<td>29</td>
<td>0</td>
</tr>
<tr>
<td>Dairy</td>
<td>100</td>
<td>93</td>
<td>7</td>
</tr>
<tr>
<td>Farm Mgmt.</td>
<td>137</td>
<td>134</td>
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<tr>
<td>Food Processing</td>
<td>55</td>
<td>49</td>
<td>6</td>
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<tr>
<td>Orn. Hort.</td>
<td>134</td>
<td>111</td>
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<tr>
<td>Poultry Ind.</td>
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<td>48</td>
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<tr>
<td>Soil Science</td>
<td>53</td>
<td>52</td>
<td>1</td>
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<tr>
<td><strong>Totals</strong></td>
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<td>Aeronautical</td>
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<td>257</td>
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<td>Architectural</td>
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<td>Industrial</td>
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<td>109</td>
<td>3</td>
</tr>
<tr>
<td>Mechanical</td>
<td>363</td>
<td>362</td>
<td>1</td>
</tr>
<tr>
<td>Metallurgical</td>
<td>48</td>
<td>48</td>
<td>0</td>
</tr>
<tr>
<td><strong>Totals</strong></td>
<td>2,478</td>
<td>2,434</td>
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<tr>
<td>Business Admin.</td>
<td>615</td>
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<td>English</td>
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<td>38</td>
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<td>Physical Ed.</td>
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<td>118</td>
<td>124</td>
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<td>Printing</td>
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<tr>
<td>Journalism</td>
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<td>31</td>
<td>50</td>
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<tr>
<td><strong>Totals</strong></td>
<td>2,279</td>
<td>1,017</td>
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<td><strong>School of Applied Sciences</strong></td>
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<tr>
<td>Biological Sciences</td>
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<td>Physics</td>
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<tr>
<td>Chemistry</td>
<td>70</td>
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<td>Biochemistry</td>
<td>42</td>
<td>31</td>
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<tr>
<td>Social Sciences</td>
<td>603</td>
<td>181</td>
<td>422</td>
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<td><strong>Totals</strong></td>
<td>1,456</td>
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<td>Graduates (Education)</td>
<td>486</td>
<td>276</td>
<td>210</td>
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<td><strong>College Totals</strong></td>
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<td>5,961</td>
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[12]
GENERAL INFORMATION
## Schools and Departments

<table>
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<tr>
<th>School of Agriculture</th>
<th>Curricula with Options/Concentrations</th>
<th>Degrees</th>
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<td><strong>School of Agriculture</strong></td>
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<tr>
<td>Agricultural Business Management Department</td>
<td>Agricultural Business Management</td>
<td>B.S.</td>
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<td>Agricultural Education Department</td>
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<td>Agricultural Engineering Department</td>
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<td>B.S.</td>
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<tr>
<td></td>
<td>Mechanized Agriculture</td>
<td>B.S.</td>
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<tr>
<td>Animal Husbandry Department</td>
<td>Animal Husbandry Production-Management, Science-Teaching</td>
<td>B.S.</td>
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<td>Crops Department</td>
<td>Crops Production</td>
<td>B.S.</td>
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<td>Fruit Production</td>
<td>B.S.</td>
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<td>Dairy Department</td>
<td>Dairy Husbandry, Manufacturing</td>
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<td>Farm Management Department</td>
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<td>Food Processing Department</td>
<td>Food Processing Operations, Management, Meats</td>
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<tr>
<td>Ornemental Horticulture Department</td>
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<tr>
<td>Poultry Industry Department</td>
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<td>B.S.</td>
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<tr>
<td>Soil Science Department</td>
<td>Soil Science Natural Resources Management</td>
<td>B.S.</td>
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<tr>
<td>Veterinary Science Department</td>
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<tr>
<td><strong>School of Engineering</strong></td>
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<tr>
<td>Aeronautical Engineering Department</td>
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<td>B.S.</td>
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<td>Environmental Engineering Department</td>
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<td>Industrial Technology Industrial Sales and Technology, Industrial Education</td>
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<td>Mechanical Engineering Department</td>
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<tr>
<td>Manufacturing Processes Department</td>
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<td>Metallurgical Engineering Department</td>
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General Information

SCHOOLS, DEPARTMENTS, PROGRAMS, AND DEGREES—Continued

Curricula with Options/Concentrations

Schools and Departments

School of Applied Arts

Business Administration

Department........................................Business Administration

Accounting, Finance and Property
Management, Industrial Relations,
Management, Marketing, Economics

Education Department................................Education

Agriculture, Education,
Physical Sciences, Social Sciences

English and Speech

Department........................................English

B.A., M.A.

Home Economics

Department..........................................Home Economics

B.S., M.S.

Home Economics Education,
Food Administration—Dietetics

Interdisciplinary

Child Development

B.S.

Journalism Department

Journalism

B.S.

Agricultural, Community, Business and
Industrial, Home Economics

Music Department

Physical Education

Department.........................................Physical Education

B.S., M.S.

Printing Technology and

Management Department............Printing Technology and Management

B.S.

School of Applied Sciences

Biological Sciences

Department........................................Biological Sciences

B.S., M.S

Botany, Bacteriology, Zoology,
Biology

Chemistry Department

Chemistry

B.S.

Biochemistry

B.S.

Mathematical Sciences

Department.....................................Mathematics

B.S., M.S., M.A.

Applied Mathematics, Mathematics
Teaching, Computer Sciences,
Statistics

Military Science

Department

Physics Department

Physics

B.S.

Social Sciences

Department........................................Social Sciences

B.S.

Social Services, Social Sciences,
Government Service

School of Architecture

Architecture

B.Arch.

Architectural Engineering

B.S.

City and Regional Planning

B.S.
GENERAL INFORMATION

THE CALIFORNIA STATE COLLEGES

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

Spanning the state from Humboldt County in the north to San Diego in the south, the 17 campuses of the California State Colleges (with another campus soon to be constructed) represent the largest system of public higher education in the Western Hemisphere and one of the largest in the world. Current enrollment exceeds 157,000 full and part-time students. The faculty and administrative staff numbers approximately 8,000.

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

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

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

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

Today, the California State Colleges are in particularly dynamic period of their development. Prior to World War II, there were seven State Colleges with a peak total enrollment of some 13,000. Since 1947, 11 new colleges have been established and sites have been selected for new colleges in Kern, Ventura, San Mateo and Contra Costa Counties. Enrollment in the system is expected to reach 225,000 by 1970.

CALIFORNIA STATE POLYTECHNIC COLLEGE, SAN LUIS OBISPO

Aims of the College

California State Polytechnic College provides occupationally centered education at the college level with emphasis on the applied fields of agriculture, engineering, business, and home economics, together with the closely related supporting fields of physical sciences, natural sciences and mathematics. A program of required general education courses and a strong co-curricular program combine with the college's specialized instruction to prepare graduates for citizenship, leadership, and constructive community living.

The basic purpose of the college is to prepare students to meet both present and future requirements of specific occupations in production, supervision, management, product design and development, sales, services, and similar areas. Instruction is specific and practical—it adds the "know-how" to the "know-why." Each
year of study is planned to include basic technical courses with related work in
the early years laying the foundation for more advanced study in the area of the
major. Requirements of the occupation, rather than of professional graduate schools,
determine the educational experiences offered to each student. Laboratory experi-
ences and field work with constant interplay between general principles and prac-
tical applications are emphasized. Many students obtain actual managerial experience
through the use of the project system of instruction which the college utilizes.

To make maximum use of the student's interest in his field of specialization as
an incentive to study, work in his chosen field is begun in the freshman year. This
concurrent or parallel arrangement of major and general education courses is in
contrast to the conventional college program which groups general education
courses and basic theory in the first two years while deferring the more specialized
work until the last two years. Through early contact with his major subject, the
student may be made aware of the value of the related sciences and may, therefore,
apply himself more diligently to their study.

The general education courses and the related courses which support the occupa-
tional instruction are offered in each of the four college years. This plan makes
it possible to schedule in the later college years those courses with content which
requires greater maturity and experience. Students thus have a better opportunity
to understand what they are studying and to obtain maximum values in general
education.

California State Polytechnic College accepts responsibility not only for the
occupational education of its students but also for helping them to obtain the best
possible career opportunities through its placement service.

History of California State Polytechnic College, San Luis Obispo

California State Polytechnic College was established in 1901 by the Legislature of
the State of California. The college was built just outside San Luis Obispo midway
between San Francisco and Los Angeles, at the foot of the Santa Lucia mountain
range, 12 miles from the Pacific Ocean, on a campus which has been gradually
augmented to its present 5,100 acres.

The institution opened as a state vocational high school and, in California, was
the forerunner of vocational education in agriculture and industry. In 1921 its Board
of Trustees was dissolved and the State Board of Education took over this school
which it controlled until its administration passed to the Trustees of the California
State Colleges July 1, 1961.

The level of instruction was raised in 1927 to that of a junior college. Cal Poly
changed to a two-year and three-year technical college in 1933. A degree transfer
program was added in 1936, and in 1940 the State Board of Education authorized
the college to grant the bachelor of science degree for completion of the four-
year curriculum.

The first baccalaureate exercises were held in 1942. The college was approved
on October 1, 1949, to grant the master of arts degree in education, and in 1967
to grant the master of science degree.

Originally coeducational, the college discontinued the enrollment of women in
1929. Enrollment of women as regular students was resumed in 1956.

ACCREDITATION

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

THE FOUNDATION

The college's unique project system of "learning by doing" and "earning while
learning" has been progressively developing since 1924. At that time, projects were
organized on a small scale and were financed by the Citizen's State Bank. Faculty
members and parents backed this arrangement for the protection of the bank.
Several years later, a faculty committee assumed the responsibility for operating the
housing facilities and a cafeteria. In 1940 a nonprofit corporation known as the California State Polytechnic College Foundation was organized. With faculty members 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

The affairs of the association are under the supervision of a Board of Directors, consisting of the national president, two national vice presidents, a national secretary-treasurer, a director of each of the 16 sections, the past national president of the association and two ex officio members appointed by the president of the college.

The California State Polytechnic College, San Luis Obispo is the official headquarters of the association and inquiries may be addressed there to obtain information relative to membership and other matters pertinent to the association.

The California State Polytechnic College Alumni Association is divided into two geographic regions with a vice president for each region. The two regions are further divided into 16 sections with a director of the board in charge of each section. The regions and sections are:

NORTHERN REGION

Section Counties
A Del Norte, Humboldt, Mendocino, Trinity
B Lassen, Modoc, Shasta, Siskiyou
C Lake, Marin, Napa, Sonoma
D Butte, Colusa, Glenn, Nevada, Plumas, Sierra, Sutter, Tehama, Yuba
E Amador, El Dorado, Placer, Sacramento, Solano, Yolo
F Alameda, Contra Costa, San Francisco, San Mateo
G Alpine, Calaveras, Mariposa, San Joaquin, Stanislaus, Tuolumne
H Monterey, San Benito, Santa Clara, Santa Cruz
I Fresno, Madera, Merced, Mono

SOUTHERN REGION

J Inyo, Kern, Kings, Tulare
K Hawaiian Islands, Northern Santa Barbara, Region-at-Large, San Luis Obispo
L Santa Barbara, Ventura
M Los Angeles, Orange
N Riverside, San Bernardino
O San Diego
P Imperial
SPECIAL INSTRUCTIONAL SERVICES

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, some offices of which are located on the San Luis Obispo campus.

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 1967-68 the cooperating universities are: University of Aix-Marseille, France; Free University of Berlin and University of Heidelberg, Germany; University of Florence, Italy; Waseda University, Tokyo, Japan; University of Granada and University of Madrid, Spain; University of Stockholm and University of Uppsala, Sweden; National University, Taiwan. Academic work successfully completed at the cooperating universities abroad may be applied toward the degree requirements of the College in accordance with 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;
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 1968-69 these costs are: France, Germany, Spain, $2,070; Italy, Japan, $2,170; Sweden, $2,370; Taiwan, $1,770. Payments may be scheduled throughout the year.

Programs in 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 1969-70 academic year should be made early in the Fall semester of 1968. 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.
General Information

BUILDINGS AND EQUIPMENT

CLASSROOM AND LABORATORY BUILDINGS

Administration
This new facility contains all the administrative service offices of the college.

Business Administration and Education
With the completion of the new Administration Building, the former facility has been re-modeled to provide additional instructional and service areas for the Education and Business Administration Departments. The lowest floor also contains facilities for audio-visual production and services and an art laboratory.

Aeronautical Engineering
An engine shop and laboratory; airframe shop, laboratory, and hangar; aeronautical laboratory are all adjacent to the college flight strip.

Agricultural Education
This building contains faculty offices and classrooms.

Agricultural Engineering
Seven well equipped shops include instructional facilities for farm mechanics, farm machinery, hydrology, farm power, and rural electricity. Drafting rooms, classrooms, and staff offices are provided in a separate building. Storage and repairs are provided for in the adjacent Farm Shop.

Alan A. Erhart Agriculture
This new building contains nine modern agriculture laboratories including three for crops, three animal husbandry, one dairy, one ornamental horticulture, and one farm management; an accounting laboratory; 15 general purpose classrooms and offices for agriculture and social sciences instructors.

Environmental Engineering
Laboratories for the Environmental Engineering Department; design and drafting room; lecture rooms; offices; project rooms and departmental equipment repair facilities. A wing of this building houses laboratories, shops, and offices for the Metallurgical Engineering Department.

Athletic Facilities
Constructed in 1959, 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 playfield area for intramural sports and physical education classes. There is also a women’s physical education building with ample space for minor sports and special women's physical education requirements. A heated indoor swimming pool is used both for physical education classes and for varsity water polo and swimming. The football stadium has permanent grandstand and bleachers seating 5,500 persons. There is also a spacious baseball field with permanent seating, and a track with a 220-yard straightaway.

Computer Science
A centralized campus-wide computer-data processing center, with 35 faculty offices; includes 12 lecture rooms, six drawing laboratories primarily for the School of Architecture.

Engineering East
This building includes laboratories for the Electronic and Electrical Engineering Departments; design and drafting rooms; materials laboratory; lecture rooms, offices, project rooms and departmental equipment repair rooms.
Engineering West
The largest building on the campus, this unit is a U-shaped multi-story structure housing the entire facilities for the School of Architecture, the Industrial Technology Department, and also containing instructional laboratories for the Aeronautical, Mechanical and Metallurgical Engineering Departments.

English
Constructed as an annex to the Erhart Agriculture building, this wing includes eleven lecture rooms, a speech laboratory, and offices for the English Department.

Food Processing
The college creamery, meat laboratory, canning and freezing laboratory for the college's Food Processing Department, and a new college produce store are all contained within this building.

Graphic Arts
The entire instructional facilities for the college's Industrial Engineering, Printing Technology and Management, and Journalism Departments are contained in this recently completed structure.

Home Management House
As a modern home facility for teacher training in home economics, this unit provides living-in space for eight girls and an instructor.

Library
Completed in 1962, a functionally designed addition more than doubles the size of the Walter F. Dexter Memorial Library. The enlarged facility offers 1650 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 in addition to the other regular features of an excellent modern college library. Bookstacks throughout the library are open to all readers, and professionally trained librarians are ready to give assistance to students and faculty in the use of library materials.

Music, Speech and Drama
In addition to a 500 seat Little Theater and its fully rigged stage, dressing, scene construction and storage rooms, this building has all the facilities necessary for the college's Music Department including sound engineered individual and group practice rooms.

Machine and Welding Shops
Two large, well-equipped and well-lighted shops with adjacent specialized laboratories comprise these facilities.

Mathematics and Home Economics
This building includes facilities for mathematics and specialized home economics laboratories; 14 general purpose classrooms, and offices for mathematics and home economics faculty.

Mechanical Engineering Laboratory
This unit houses part of the laboratories for the Mechanical Engineering Department, fully equipped with internal combustion engines, steam turbine, gas turbine, fuel test engine, and a wide variety of instrumentation, and is adjacent to college central steam heating plant which is also used for special experiments by the Mechanical Engineering Department.

Science
This building contains twelve general-purpose classrooms and 32 fully equipped laboratories. The laboratories provide facilities for instruction in soil science, veterinary science, botany, zoology, bacteriology, chemistry, and physics.

Science North
Contains nine laboratories primarily for Biological Sciences, five lecture rooms, faculty offices and instructional support rooms.
**General Information**

**AGRICULTURE UNITS**

**Beef Unit**
Two project steer feeding barns, capacity 150 steers; commercial project feeding barn, capacity 200 steers; three barns for breeding beef cattle; 2,000 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 200 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; five 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; 160 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.

**STUDENT SERVICES FACILITIES**

**On-campus Housing—Men**
A total of 1,581 single men students can be accommodated in on-campus housing units. Four new three-story residence halls, accommodate eight hundred men students. These four buildings are newly constructed, newly furnished, and large lounge rooms and recreation rooms are provided.

In addition to the new residence halls there are six two-story permanent type residence halls, eight single-story dormitories, and five student cottages located at various agricultural units.

**On-campus Housing—Women**
Trinity and Santa Lucia are two new, three-story residence halls to provide on-campus housing for 400 women students. These new halls are well located, attrac-
tive, newly furnished, and designed for comfortable, pleasant living. Each hall has a large lounge, a recreation room, sewing room, and are under trained adult supervision. In addition there are three two-story permanent residence halls available for women students.

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

Dining Hall
A new, modern dining hall which serves three meals daily, Monday through Friday, and late breakfast and early dinner on Saturdays and Sundays can accommodate 2,400 students per meal. In addition to the dining hall for regular meals, a snack bar is provided, seating 400 students.

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

College Union
A new College Union facility will be completed during 1969. It is to be the center of campus social, cultural, and recreational activities. It will include 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. This is Cal Poly's living room where both new and old friends will meet and where there will be informal exchange of ideas among students and between students and faculty.

SPECIAL INSTRUCTIONAL SERVICES

SUMMER QUARTER
The college offers a summer quarter for old and new students. Summer quarter offerings make it possible for a student to shorten the overall length of time necessary to complete a prescribed curriculum.
Admission requirements, fees and deposits, and other regulations are the same for the summer quarter as for the other three quarters of the school year.

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 on the San Luis Obispo campus with an attendance of 400-500 persons. Facilities, special speakers, exhibits, and other services are provided by the college.

RESERVE OFFICERS TRAINING CORPS
California State Polytechnic College maintains an elective General Military Science Unit, Senior Division, of the Army Reserve Officers' Training Corps (RO TC) for the purpose of preparing students to become officers in the Army of the United States. Under the General Military Science curriculum, a student is given general army training without specialization in any one branch. For those students who are selected and who pursue the advanced course (third and fourth academic years), a choice of branch will be made prior to commissioning based upon the needs of the service and the individual's desires, academic background and abilities.
The Department of Military Science serves the students of the entire college as well as contributing to the development of qualified officers for the Army of the United States. For additional information about ROTC see under MILITARY SCIENCE DEPARTMENT, School of Applied Sciences.

**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. Among the publications, two are outstanding. Mustang Daily, the official newspaper of the associated students of the San Luis Obispo campus, is published twice each week during the school year. 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; the Mustang Handbook; Poly Syllables, a student literary magazine.
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, aqua-cade, 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 PERSONNEL 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 student Health Center is an on-campus, out-patient clinic (pharmacy, laboratory, physio-therapy, and X-ray departments), including a 30-bed infirmary accredited by the Joint Commission on Accreditation made up of the American Medical Association, American Hospital Association, American College of Physicians, and American College of Surgeons. Major surgery is not done on campus, but 24-hour emergency service is available while school is in session. The full-time staff serves as "family physician" in the practice of preventive, diagnostic, and therapeutic medicine with emphasis on health education.

This campus medical program is, in general, student financed. Basic public health services are available to all regular students; clinic services are available at cost to all regular students, and at reduced rates to students participating in the prepaid student health program. All students are urged to participate in the prepaid student health program, which costs $7 per regular quarter or $18 per academic year. A supplemental insurance plan is also recommended; it covers the expense of major surgery and hospitalization, and emergencies while away from campus.

Each entering student should arrange for a physical examination and should arrange to have the examination report sent to the student Health Center by the
examining physician prior to registration. Appropriate physical examination report forms are available from the student Health Center.

Foreign Student Counseling

The Foreign Student Counselor provides orientation assistance and informal counseling services to all foreign students. Assistance is provided in making academic, personal, and environmental adjustments to the campus, the community, and the American way of life. Foreign students are encouraged to consult the Foreign Student Counselor when arriving on campus or in the community so that maximum service may be provided.

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. 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, which cover both room and board fees, 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 College 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 College Housing Office.

DINING HALL

The dining hall is a modern attractive facility which includes two dining rooms and a spacious snack bar. The dining rooms are capable of accommodating 2,400 students per meal and the snack bar seats 400. Dietetically planned meals are served cafeteria style in the dining rooms.

Students residing in the residence halls are required to purchase meal tickets. Students living off campus may purchase meal tickets for use in the dining halls or they may rely on the snack bar for food service. The meal ticket includes nineteen meals per week. These are breakfast, lunch and dinner five days a week and lunch and dinner on Saturday and Sunday. Meal tickets are not used in the snack bar.

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 must 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 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 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

General Information

Scholarships 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, Student Personnel Division.
General Information

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, 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.

Freshman Scholarships

AGRICULTURE

Agnese Davey Scholarship

One $300 award is provided for a woman student majoring in the field of ornamental horticulture.

California State Grange Scholarships

Two scholarships of $250 for entering freshmen students who will enroll to study animal husbandry, dairy husbandry, or field crops.

Challenge Creamery Scholarship

Two hundred dollars awarded to a Future Farmer student who excels in dairy production and who enrolls as a freshman in dairy manufacturing at California State Polytechnic College. Applicant is chosen from the entire state.

San Luis Obispo Cowbelles Scholarship

A $200 award for one to four years to a woman student specializing in the field of home economics or animal husbandry with an interest in beef promotion. The recipient must be a graduate of a San Luis Obispo county high school and a resident in the county for one year.

Th. R. and Valley M. Knudsen Foundation Scholarship

A $500 award for a student who enrolls in dairy manufacturing. Not restricted to entering freshmen, but where applicants are of equal merit preference is given to the entering freshman.

The E. C. Loomis and Sons Scholarship

One hundred dollars awarded to the outstanding graduate in the high school vocational agriculture department at San Luis Obispo, Arroyo Grande, Santa Maria, or Cambria.

Sears-Roebuck Foundation Agriculture Scholarship Awards

Six annual scholarships of $300 each awarded to entering men students who enroll as freshmen in one of the agriculture majors or agricultural journalism. The scholarship award to an applicant is determined on the basis of:

1. Financial need for assistance to continue his education.
2. Interest in agriculture and accomplishments as evidenced by his supervised home farm program.
3. Scholarship as shown on the transcript of high school credits which shall include a statement of the number in the graduating class and the applicant’s scholarship ranking in the class.
4. Citizenship and moral integrity, as certified by the high school principal, agricultural teacher, and others qualified to pass judgment on the applicant.

Application may be made through the local high school agricultural teacher who will have all the necessary information.

Leopold Edward Wrasse Scholarships

Scholarships in the amount of $500 each are available annually to freshmen and advanced students enrolled in agriculture. These scholarships are derived from the income of the Leopold Edward Wrasse Scholarship Fund established by the will of Leopold Edward Wrasse.
The qualifications required of applicants are: (1) they must be of good character, industrious, and in need of assistance; (2) they must demonstrate interest in a major agricultural field of study offered by the California State Polytechnic College and have sufficient academic preparation and other background to show promise of success; except that students from Caruthers Union High School may enroll for a major course of study offered in any of the divisions at the College: agriculture, engineering, applied arts, or applied sciences; (3) they must have taken an active part in community or school activities and have earned a sum equal to one-half of the amount of the scholarship award within the 12-month period prior to receiving an award; (4) the applicants will be selected in the following priority: (a) Caruthers Union High School; (b) any high school in Fresno County; (c) other California secondary schools or California State Polytechnic College.

ENGINEERING

U.S. Electrical Motors Division of the Emerson Electric Manufacturing Company Scholarship
An annual scholarship of $100 for a freshman majoring in Electrical Engineering.

Western Electronic Manufacturers' Association Scholarship
A $200 award to a freshman student entering the Electronic Engineering Department.

GENERAL

Lulu G. Bumphrey Scholarship
A $200 award to a male graduate from the Atascadero Union High School.

California State Employee's Association Scholarships
Four $100 scholarships are provided by CSEA, Chapter No. 97, for one freshman, one sophomore, one junior and one senior recipient. The freshman award was made for 1965-66 with one additional award being made each year thereafter until all awards are in effect. Preference will be given applicants one of whose parents is an active, retired, or deceased CSEA member. Holders of a CSEA scholarship will have preference on application for renewal if current grade standing is acceptable.

California State Firemen's Association Scholarship
The Ladies Auxiliary of the California State Firemen's Association provides one $300 award for an entering or continuing student with a B average or better, who is the child of a member in good standing of the Association.

ROTC Scholarships
The Army ROTC program offers both four-year and two-year scholarships to outstanding students who agree to enroll in ROTC and to serve on active duty as commissioned officers after graduation for a four-year period. Both types of scholarships provide for free tuition, textbooks and laboratory fees plus a retainer fee of $50.00 per month.

A prospective student interested in the four-year ROTC scholarships should consult his high school counselor and apply directly for application forms to the Commanding General, Sixth U.S. Army, ATTN: AMOPT-T, Presidio of San Francisco, California 94129.

Both four-year and two-year scholarships are available only to students who participate in the four-year ROTC program. Recipients must maintain acceptable academic standards and personal conduct, rank in the upper one-third of their ROTC class, and continually demonstrate leadership potential.

San Luis Obispo Cowbelles Scholarship
A $200 award for one to four years to a woman student specializing in the field of home economics or animal husbandry with an interest in beef promotion. The recipient must be a graduate of a San Luis Obispo county high school and a resident in the county for one year.
**General Information**

**Sears-Roebuck Foundation Home Economics Scholarship Awards**

Three annual scholarships of $300 each to be awarded to entering women students who enroll as freshmen in the major in home economics.

The scholarship award to an applicant is determined on the basis of:

1. Financial need for assistance to continue her education.
2. Interest in home economics as evidenced by her total program during the high school years.
3. Scholarship as shown on the transcript of high school credits which shall include a statement of the number in the graduating class and the applicant's scholarship ranking in the class.
4. Citizenship and moral integrity, as certified by the high school principal and others qualified to pass judgment on the applicant.

Application may be made through the local high school home economics teacher who will have all the necessary information.

**Soroptimist Scholarship**

One $400 award is made by Soroptimist International of San Luis Obispo to a woman graduate of San Luis Obispo High School or Mission High School who is planning to enter or who has entered California State Polytechnic College. Recipient must be a resident of the San Luis Obispo High School District. May continue one to two years if a B average and an interest in major and activities are maintained.

**Advanced Student Scholarships**

**AGRICULTURE**

**Agnese Davey Scholarship**

One $300 award is provided for a woman student majoring in the field of ornamental horticulture.

**L. L. Bennion Scholarship**

Mr. Paul Grafe of the Grafe-Callahan Construction Company makes available an annual $250 scholarship known as the L. L. Bennion scholarship. This scholarship is awarded to an outstanding junior student who is specializing in the field of animal husbandry.

**California Dairy Industries Association Scholarship**

A $600 award to a student specializing in the field of dairy industry.

**California Association of Nurserymen's Scholarship**

A $150 award to an outstanding sophomore student who is enrolled in the Ornamental Horticulture Department.

**California Association of Nurserymen, Central Chapter**

One $100 scholarship is provided for an advanced student in the Ornamental Horticulture Department.

**California Fertilizer Association**

Two annual scholarships of $100 each for advanced students to be awarded to a crops major or a soil science major.

**California Valley Scholarship**

A $500 award to a junior specializing in land economics.

**Group Seven California Bankers Association**

An annual scholarship of $500 to be awarded to a student specializing in the field of agriculture. The student’s permanent residence must be in San Luis Obispo, Santa Barbara, or Ventura County.

**Kimber Scholarship in Poultry Husbandry**

Kimber Farms, Inc., makes one annual $500 scholarship award to a student who is majoring in Poultry Industry and who has completed at least three quarters of outstanding work in this department.
Th. R. and Valley M. Knudsen Foundation Scholarship
A $500 award for a student who enrolls in dairy manufacturing. Not restricted to entering freshmen, but where applicants are of equal merit preference is given to the entering freshman.

Olson Brothers Poultry Scholarship
One $500 scholarship is awarded to a student who has completed at least three quarters specializing in the field of Poultry Industry and who is a resident of California.

The Poultrymen's Cooperative Association of Southern California Scholarship
A $200 award to an outstanding student who is majoring in poultry industry and who has completed at least three quarters of work in this department. The applicant must be a resident of one of the following counties: Fresno, Kings, Los Angeles, Orange, Riverside, San Bernardino, Santa Barbara, San Diego, San Luis Obispo, or Ventura.

Harry E. Rosedale Memorial Scholarship
A $100 scholarship for a student enrolled in ornamental horticulture at the San Luis Obispo campus. The student must have completed one year of work in ornamental horticulture and must have been employed in the ornamental horticulture field as indicated by employers' letters.

Santa Barbara County Horticulture Society Scholarship
One $100 scholarship is awarded to a student who is enrolled in the Ornamental Horticulture Department, usually upon recommendation of the society.

Sears-Roebuck Foundation Sophomore Scholarship
Sears-Roebuck Foundation, as a continuation of the freshman scholarship plan already described, awards a $300 sophomore scholarship to the most outstanding student of those receiving Sears-Roebuck agriculture awards as freshman students.

George A. Smith, Jr. Scholarship
A $200 award to an Animal Husbandry major specializing in beef or horses.

Wellington Davey Scholarship
One $300 award is provided for an advanced student enrolled in the Ornamental Horticulture Department.

Western Fairs Association
Two $500 scholarships awarded to students majoring in Agricultural Business Management displaying interest in Fair Management.

Leopold Edward Wrasse Scholarships
These scholarships described under “Freshman Scholarships” are also available to advanced students enrolled in an agricultural major.

ENGINEERING

Aero Alumni Scholarship
A $100 award available each year to a student who will be a junior or senior the following year majoring in Aeronautical Engineering.

American Society of Heating, Refrigerating and Air-Conditioning Engineers Scholarship
A $250 award starting with the 1961-62 college year and in alternate years thereafter to a senior student in the Engineering Division.

American Welding Society, San Diego Section, Scholarship
A $250 award to a junior or senior student specializing in welding or metallurgy.

American Welding Society Scholarship, Santa Clara Valley Section
Two $100 awards to students who have completed one year in their major, who have had a concentration of welding courses, and who have shown exceptional interest and aptitude in their field.
Hewlett-Packard-Alumni Scholarship

One scholarship for an undetermined amount is provided for a student majoring in electronic engineering. The recipient must have completed at least five quarters of college level work and attained at least a B average. Funds for this scholarship are determined by the amount raised by alumni employees and matched by Hewlett-Packard Company.

Hewlett-Packard/Neely Sales Division Scholarships

Two $250 awards to sophomore students majoring in the field of electronics, electrical engineering, or physics, in that order of preference.

Institute of Electrical and Electronic Engineers, Santa Barbara Section, Scholarship

One annual $175 scholarship for a student majoring in Electronic Engineering or Electrical Engineering.

Lillard Company Scholarship

One annual scholarship of $350 is awarded to a student specializing in the field of Air Conditioning.

North American Heating and Air Conditioning Wholesalers Association

One $350 scholarship is awarded each year to a student specializing in the fields of heating, air-conditioning and refrigeration.

Clarence Radius Memorial Scholarship

A $350 award to a talented student in Electronic Engineering who shows financial need.

Lorry Reid Scholarship

One annual $250 scholarship to be awarded to a senior student specializing in the field of Mechanical Engineering.

Solar, Division of International Harvester Company, Awards

Five annual $100 awards for engineering students who are entering their junior year, majoring in Mechanical Engineering, Industrial Engineering, or Welding & Metallurgy, and who are citizens of the United States with a minimum of three quarters of work completed in residence at the California State Polytechnic College. One $500 scholarship is made available for an engineering student who will enter the senior year and who has been a recipient of one of the $100 Solar Aircraft Company Scholarship awards as a junior student.

The Sutherland Hutton Metallurgy Scholarship

A $300 award to a student specializing in the field of Metallurgy.

U.S. Electrical Motors Division of Emerson Electric Manufacturing Company Scholarships

Three annual scholarships of $300: One for a sophomore, one for a junior, and one for a senior student, majoring in Electrical Engineering.

Western Electric Fund

A $400 award for an undergraduate student in the Engineering Division.

Western Electronic Manufacturers' Association

Two $250 awards to students who have successfully completed a minimum of three quarters of work in the Electronic Engineering Department.

Frederick Peter Young Scholarship

One annual $150 scholarship to be awarded winter quarter to a sophomore or junior student specializing in the field of Architecture.

GENERAL

California State Employees Association Scholarships

Four $100 scholarships are provided by CSEA, Chapter No. 97, for one freshman, one sophomore, one junior and one senior recipient. The freshman award was
made for 1965–66 with one additional award being made each year thereafter until all awards are in effect. Preference will be given applicants one of whose parents is an active, retired, or deceased CSEA member. Holders of a CSEA scholarship will have preference on application for renewal if current grade standing is acceptable.

California State Firemen's Association Scholarship
The Ladies Auxiliary of the California State Firemen's Association provides one $300 award to an entering or continuing student, with a B average or better, who is the child of a member in good standing of the Association.

John Healey Sigma Delta Chi Scholarship
A $100 scholarship to be awarded to a sophomore or junior class student with a major in Journalism.

John and Dorothy Manning Scholarship
One annual scholarship of $200 is awarded to a junior or senior student planning to teach in the field of elementary education.

Page Memorial Scholarship
A $500 award available through the California Newspaper Publishers Association to a junior majoring in printing. A condition under this scholarship is that the awardee desire to work for a member paper of this organization.

Parent-Teachers Scholarships
The California Congress of Parents and Teachers has made available two $500 scholarships to be awarded to junior, senior, or graduate students in elementary education and one $500 scholarship to be awarded to a junior, senior, or graduate student in secondary education who intends to teach in the public elementary schools or the public secondary schools of California upon graduation. The awards will be made on the basis of financial need and excellence of qualifications for the teaching profession.

Rotary Scholarship
The San Luis Obispo club of the Rotary International makes available one annual $400 scholarship. This scholarship is awarded to a student of outstanding ability in co-curricular activities. This student must maintain a better than average record and must have at least junior standing the fall quarter following the scholarship award.

ROTC Scholarships
The Army ROTC program offers both four-year and two-year scholarships to outstanding students who agree to enroll in ROTC and to serve on active duty as commissioned officers after graduation for a four-year period. Both types of scholarships provide for free tuition, text books and laboratory fees plus a retainer fee of $50.00 per month.

Students interested in the two-year ROTC scholarships, which are awarded only for junior and senior years, should apply for application to the Head, Military Science Department at this college by not later than April 1 of their sophomore year.

Both four-year and two-year scholarships are available only to students who participate in the four-year ROTC program. Recipients must maintain acceptable academic standards and personal conduct, rank in the upper one-third of their ROTC class, and continually demonstrate leadership potential.

Soroptimist Club of San Luis Obispo
One $400 scholarship is awarded to a woman graduate of San Luis Obispo Senior High school or San Luis Obispo Mission High School who is planning to enter or who has entered California State Polytechnic College. Recipient must be a resident of the San Luis Obispo High School District. May continue one to two years if a B average and an interest in major and activities are maintained.

Crown Zellerbach Foundation Scholarship
A $500 award to a junior or senior majoring in Printing.
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.

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.
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

The student chapter of the Agricultural Engineering Society of the college has established a loan fund to be used for either long- or short-term loans. Although preference is to be given to students majoring in agricultural engineering or mechanized agriculture, other students are not excluded from receiving loans from this fund.

Alpha Zeta Loan Fund

The student chapter of Alpha Zeta, the national agricultural scholastic honor society, has provided a loan fund for needy students with a preference given to students majoring in agriculture, but not excluding others when sufficient funds are available to meet the needs of agriculture students.

Alumni Association Loan Fund

The Alumni Association of Cal Poly has established a loan fund to provide financial assistance to deserving students. Both long- and short-term loans can be made from this fund.

American Society of Heating, Refrigerating and Air Conditioning Engineers Loan Fund

A fund made available by the Southern California Chapter of the Society to provide emergency financial aid to needy students majoring in the air conditioning and refrigeration curriculum.

Pete Bachino Memorial Loan Fund

This loan fund was established by family and friends in memory of Pete Bachino, a San Luis Obispo businessman who was a true friend of the college and its students. The fund is to provide both emergency financial aid and long-term educational assistance to needy students.

Baer-Beck Fund

The Baer-Beck Loan Fund has been established by Cal Poly faculty member Carl G. Beck. The purpose of this fund is to provide senior students with money to move from college to their place of employment in their first job out of Cal Poly.

Edgar E. Bilodeau Loan Fund

This fund, given by Mrs. Dorothy Bilodeau in memory of her husband, is primarily for engineering students, although other students are not excluded.

Jed S. Blake Memorial Loan Fund

This loan fund was established by Mrs. Jed S. Blake in memory of her husband.

California Association of Refrigeration Service Engineers Loan Fund

A loan fund established by the California Association of Refrigeration Service Engineers Society to provide emergency financial aid to students with preference given to students majoring in environmental engineering.

California Association of Soil Conservation Districts Loan Fund

A loan fund established to assist students majoring in Soil Science.

California Polytechnic Memorial Loan Fund

A loan fund has been established from the contributions made by numerous persons. It is designed to aid students who need immediate financial assistance.
General Information

The California State Polytechnic Women's Club Fund

The social club of women staff members and faculty wives at San Luis Obispo has established a student loan fund, increased each year by some type of public benefit. Loans are made to deserving students after one quarter of successful attendance.

W. B. Camp Revolving Scholarships in Agricultural Journalism

W. B. Camp of Bakersfield has provided $1,000 to be used for either short- or long-term loans for students enrolled in the field of agricultural journalism. Preference for these loans is given first-year students. However, other students are not excluded if sufficient funds exist.

W. B. Camp Educational Loan Fund

The Georgianna Camp Foundation of Bakersfield has established a $5,000 W. B. Camp Educational Loan Fund to be used for making short- or long-term loans to students enrolled in the field of agricultural journalism. Preference is given to applicants who have successfully completed at least two academic quarters in agricultural journalism and who have farm backgrounds.

Margaret Chase Memorial Loan Fund

The Margaret Chase Loan Fund is a memorial to a woman who contributed much to the development of the college as a member of the faculty and administration for 38 years.

Harlan Diedrichson Fund

This fund has been made available by the family, employer and friends of the late Harlan Diedrichson. The borrower must be of junior, senior, or graduate standing. Preference will be given to students in agriculture but it is the intent of the donor that loans may be made to other students of the college if funds are available.

Court Evergreen, Independent Order of Foresters Loan Fund

A special loan fund made available by the Local Court Evergreen of the Independent Order of Foresters to provide short-term assistance to needy foreign students both for help in registration and for emergency financial aid.

Ralph Hoover Memorial Loan Fund

A loan fund created by donations from friends and relatives of Ralph Hoover. This fund is for students enrolled in the horseshoeing program.

Horseshoeing and Animal Husbandry Loan Fund

A loan fund of $600 has been granted by the former Horse and Mule Association of America to students enrolled in the special horseshoeing program.

Jack and John Loan Fund

A loan fund has been established by “Jack” Bertram and John Lee of the College Cafeteria staff to be used to help students who exhibit a genuine interest in food administration and management.

Chris Jespersen Fund

A loan fund has been established by the faculty of the college in memory of Senator Chris Jespersen. This fund is to provide loans to needy students.

Kema Fund

This fund has been made available by Miss Anita Hathway. Its purpose is to make loans available to young women of United States citizenship who are enrolled at the California State Polytechnic College in order that they may continue with their education. In the selection of the awardee, importance will be placed on the following types of attributes: senior, junior or sophomore standing, 2.5 cumulative GPA, and high integrity.

Lee Gird Levering Memorial Loan Fund

The family and friends of Lee Gird Levering, a student killed in the Korean War, have established a memorial loan fund in his memory. The purpose of this fund
is to make sums available to deserving students at California State Polytechnic College. Although preference is given to students majoring in sheep husbandry, animal husbandry, or in agriculture, other students are not excluded from receiving loans from this fund.

Lynn T. Lobaugh Memorial Loan Fund

The many friends of Mr. and Mrs. Harold Lobaugh established this memorial loan fund in the memory of Lynn T. Lobaugh, a member of the Cal Poly varsity football team who was killed along with 16 other Cal Poly students in the October 29, 1960, airplane crash at Toledo, Ohio. The purpose of this fund is to make loans available to deserving students at California State Polytechnic College. Although preference is given to students residing in Huntington Park, Southgate, Lynwood, and Downey and to members of Cal Poly athletic teams, or majors in social science, other students are not excluded from receiving loans from this fund.

1960 Football Team Memorial Fund

The Cal Poly Student Memorial Fund, Inc. has made this fund available for the purpose of making small, short-term and larger loans to deserving young men and women enrolled in the college in order that they may continue their education.

The Rotary Club Fund

The San Luis Obispo Rotary Club has established a student loan fund open to any deserving student after one quarter of successful attendance.

Sears Roebuck Foundation Loan Fund for Foreign Students

This loan fund was established by the Sears Roebuck Foundation to assist foreign students at registration who may have difficulty obtaining funds from their homes due to a variety of reasons including international banking problems. Loans will be issued in amounts up to $100.

George Sehlmeyer Memorial Fund

This fund has been made available by the family and friends of the late George Sehlmeyer. Its purpose is to make loans available to deserving young men and women enrolled at the California State Polytechnic College in order that they may continue their education.

Laura E. Settle Loan Fund

A loan fund has been established by the California Retired Teachers Association in memory of Laura E. Settle who was instrumental in founding this organization.

Student Accommodation Loan Fund

The California State Polytechnic Women’s Club and the Associated Students have set up a fund from which students may secure small, short-term loans.

Telegram Tribune Loan Fund

A loan fund has been established by the Telegram Tribune, San Luis Obispo daily newspaper, to make short-term loans to deserving students in the fields of journalism and printing technology and management.

Todd Farm Bureau Emergency Loan Grant

A fund provided by the Todd Farm Bureau to assist needy students of agriculture whose home is in Sonoma County.

Wilder Memorial Loan Fund

The Alumni Association sponsors the Wilder Memorial Loan Fund in memory of Dr. G. W. Wilder, from which small, short-term loans are made to deserving students.

The Wrasse Fund

The Leopold Edward Wrasse Loan Fund was established for the benefit of deserving boys desirous of an education and needing financial assistance.
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 freshman year may borrow from a bank up to $1,000 a year at 6 percent simple interest with repayment beginning after graduation or separation from college.

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 Cowbelles, 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
- Norman Sharpe Fund
- Lester Whitney Memorial Fund
- The California State Polytechnic Women's Club Fund

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 GUARANTEED LOAN PROGRAM

Federal and state-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 (6%) while the student is in school and one-half (3%) 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.
FINANCIAL AWARDS

John Badgley and John Ross Award
One award of $100 to the Freshman Architecture student who has excelled in scholarship with emphasis placed on work in his major.

Carl Beck Scholarship Awards
Two $50 awards presented by the Farm Management Club to needy farm management students who have demonstrated outstanding scholarship and have participated in student activities.

California State Polytechnic College Women's Club
Four awards of $50 each to be given with a certificate of merit to the outstanding woman student of each class. Criteria for selection include both academic and activities excellence.

Emer Tribe Award
The Emer Tribe Award has been formalized for Farm Management students. This award is presented by four graduates of this department. It is awarded to a senior student with a minimum grade-point average of 2.2. The awardee should have high leadership qualities and a record of service to the department and the College.

Falk and Booth Scholastic Award
An award of $150 to a Senior Architecture major who has excelled in scholarship with emphasis on major work.

Dr. Albert Gazin Award
An award of $100 to a Sophomore Architecture major who has excelled in scholarship with emphasis on major work.

Graham Paint Store Award
An award of $50 to the student who has demonstrated excellence in the Theory of Design Class.

Lew Litzie Award
An award of $100 to a Junior Architecture major who has excelled in scholarship with emphasis on major work.

The Julian A. McPhee Award
The Julian A. McPhee Award is made each year to one student at California State Polytechnic College, San Luis Obispo. Recipients are members of the junior, senior, or fifth year class who have attended the College for at least six quarters as full-time students. They are selected by the scholarship committee. Recipients must have a grade point average of 2.8 or better, a demonstrated interest in the College, and a record of co-curricular participation.

Poly Phase Award
Awards of $15, $20, and $25 along with certificates of merit are presented by the Poly Phase Club to Freshmen, Sophomore, and Junior Electrical Engineering majors who have demonstrated a balance in academic and co-curricular excellence.

Santa Barbara Chapter—A.I.A. Award
An award of $100 presented by the Santa Barbara Chapter of the American Institute of Architects to the Senior Architecture student who in the opinion of his peers has done most to inspire student and professional relations.
GENERAL REGULATIONS
GENERAL REGULATIONS

ADMISSIONS

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 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 as amended by the Board of Trustees of the California State Colleges on January 21, 1965. A prospective applicant who is unsure of his status under these requirements is encouraged to consult with a school or college counselor or 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."
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 the last three years and does not include physical education or military science. The table below does not cover every case, but gives several examples of the test score needed with a given grade point average to be eligible for admission. The minimum eligibility index is SAT-3072 or ACT-741.

<table>
<thead>
<tr>
<th>Grade Point Average</th>
<th>Minimum SAT Score</th>
<th>Minimum ACT Score</th>
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<td>Not eligible</td>
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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 for 1967-68. 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 should complete and submit the results of the College Entrance Examination Board Scholastic Aptitude Test (SAT).

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 college work attempted and he was in good standing at the last college attended.

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.

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.

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.

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—usually a transcript certifying graduation from an accredited college or university.

All students must complete the matriculation process.

**REGISTRATION PROCEDURE**

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 issued prior to the start of the academic year. 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.
General Regulations

CHANGE OF 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 San Luis Obispo campus, 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.

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. 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. 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.

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.
California State Polytechnic College

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 a serious offense, 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 22½ 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 13½ 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.
It is the responsibility of the student either to pick up his grade slip at the Records Office or make arrangements for it to be mailed to him from the Records Office.

**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.

**GRADING SYSTEM**

The following grading system is in effect:

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

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."

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 those undergraduate 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."

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.

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.

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 is determined on the basis of the total units for which the student is enrolled including courses audited.

CREDIT FOR MILITARY SERVICE

1. 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.

2. In addition to the nine quarter units under 1, 13⅔ 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 22⅔ quarter units. Credit is not given for completion of the six-month Reserve Training Programs or for college level General Educational Development Tests.

3. 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.

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.
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.

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.

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, 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 vio-
lence 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.

**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
- 10- 99—Special program courses
- 100-199—Freshman courses
- 200-299—Sophomore courses
- 300-399—Junior courses
- 400-499—Senior courses
- 500-599—Graduate 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.

**DEGREES**

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 vocational education. A complete listing of degree programs appears preceding the section on GENERAL INFORMATION. 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 "Preparation for Elementary and Secondary School Teaching."

**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 departments.

It is permissible for a student to be granted two bachelor of science degrees 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.

BACHELOR OF SCIENCE DEGREE

GENERAL REQUIREMENTS FOR GRADUATION

All candidates for the bachelor of science 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 from the School of Engineering must present a minimum of 204 to 210 quarter units of credit for graduation. Candidates from the School of Agriculture (except agricultural engineering which requires 210 quarter units) and from the School of Applied Arts and School of Applied Sciences must present a minimum of 198 quarter units of credit for graduation. 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.

* REQUIRED GENERAL EDUCATION

All candidates for the bachelor of science degree shall have completed the following general education requirements:

Social Sciences (Minimum 15 Units—Maximum 21 Units) †
- 9 units from Pol Sci 301; Hist 304, 305
- 3 units from Ec 201, 211
- 3-9 units from Ec 212, 213, 304, 313, IR 311, 312; Hist 101, 102, 103, 112; Geog 308, 315; Bus 301; Soc 105, 206; Soc Sc 101; Ant 201; Pol Sc 401

Natural Sciences (Minimum 15 units—Maximum 24 units) †
- 3-21 units of Life Science from Bio 101, 102, 103, 110, 127, 128, 129, 303; Bact 221; Bot 121, 122; Zoo 122, 131, 132, 337; Ent 126
- 3-21 units of Physical Sciences from PSc 101, 102, 103, 209, 216; Phys 121, 122, 123, 131, 132, 133, 211; Chem 321, 322, 323, 324, 325, 326

Mathematics (Minimum 3 units—Maximum 10 units) †
- 3-10 units from Math 100, 102, 103, 113, 114, 117, 121, 122, 141, 142, 200, 210, 211, 215

Literature, Philosophy, and Arts (Minimum 9 units—Maximum 13 units) †
- 2-13 units from Eng 207, 208, 210, 211, 212, 213, 307, 308, 309, 311, 312, 313
- 0-9 units from Phil 201, 202, 204
- 0-4 units from courses in Fine and Practical Arts

* The Trustees of the California State Colleges have adopted new general education regulations which will become effective September 1, 1969.
† The minimum number of units specified must be taken in each category in order to meet the general education requirement. The maximum number of units in each category is the most that may be used to meet the general education requirement; but is not intended to limit the number of units of the listed courses required or elected beyond the 68 units.
Health and Physical Education (Minimum 5 units—Maximum 5 units) †
2 units from PE 107
3 units from PE 141, 241

Psychology (Minimum 3 units—Maximum 6 units) †
3 units from Psy 202
0-3 units from Psy 301

Oral and Written Expression (Minimum 8 units—Maximum 12 units) †
6 units from Eng 104, 105
2-6 units from Eng 106, 218, 219; Sp 201, 202

Additional Units in General Education (To Make 68 Units)
Additional units in general education chosen from the above listed courses to make a total of at least 68 units, but not exceeding the maximum in any one category.

TWO-YEAR TECHNICAL CURRICULA

REQUIREMENTS FOR GRADUATION

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.

THE MASTER'S DEGREE

The College offers graduate programs leading to the master's degree in several areas. A complete display of degree programs is shown under GENERAL INFORMATION (Pages 14-15). 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.

PREPARATION FOR ELEMENTARY AND SECONDARY SCHOOL TEACHING

CREDENTIALS OFFERED

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, Technical Arts (Industrial Arts), Mathematics, Physical Education (for men and women), Physics, and Social Sciences.

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

† The minimum number of units specified must be taken in each category in order to meet the general education requirement. The maximum number of units in each category is the most that may be used to meet the general education requirement; but is not intended to limit the number of units of the listed courses required or elected beyond the 68 units.
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.

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.
## FEES AND EXPENSES

### STATE FEES

<table>
<thead>
<tr>
<th>Description</th>
<th>Fee</th>
</tr>
</thead>
<tbody>
<tr>
<td>Materials and service fee (quarter)</td>
<td>$15.00</td>
</tr>
<tr>
<td>Each student enrolled for six units or less</td>
<td></td>
</tr>
<tr>
<td>Each student enrolled for over six units</td>
<td>$29.00</td>
</tr>
<tr>
<td>Nonresident tuition—U.S. ($960 annual maximum):</td>
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</tr>
<tr>
<td>Each student enrolled for 15 units or more (per quarter)</td>
<td>$240.00</td>
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<tr>
<td>Each student enrolled for less than 15 units (per quarter per unit or fraction of unit)</td>
<td>$16.00</td>
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<tr>
<td>Nonresident tuition—Foreign ($340 annual maximum):</td>
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<tr>
<td>Each student enrolled for 14½ units or more (per quarter)</td>
<td>$85.00</td>
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<tr>
<td>Each student enrolled for less than 14½ units (per quarter per unit or fraction of unit)</td>
<td>$5.75</td>
</tr>
</tbody>
</table>

### Late registration fee
- Fee: $5.00

### Transcript of record (no charge for first copy)
- Fee: $1.00

### Course credit by special examination fee (per unit)
- Fee: $1.00

### Extension course fee (per quarter unit):
- Lecture and discussion courses: $11.00
- Activity courses: $14.25
- Laboratory courses: $22.00

### Conference, Short Course or Institute, per person
- Fee: See schedule in library

### Application fee (not refundable)
- Fee: $10.00

### Change of program fee
- Fee: $1.00

### Failure to meet administratively required appointment or time limit
- Fee: $2.00

### Library fees
- Fee: See schedule in library

### Check returned for any cause
- Fee: $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.

### OTHER FEES *

#### Associated student card fee
- Each student enrolled for over six units
  - Summer quarter: $4.75
  - Fall quarter: $10.00
  - Winter and spring quarters, each: $5.00
- Each student enrolled for six units or less
  - Summer quarter: $3.00
  - 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

#### Post office fee (all students, per quarter)
- Fee: $0.50

#### Optional medical fee (per quarter)
- Fee: $7.00

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*Proportionate fees apply during summer session.

*Not state fees, subject to change.
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

Room and board
Contract rate, fall, winter, and spring quarters ................................... $990.00
Contract rate, winter and spring quarters ............................................ 660.00
Fall quarter contract only ............................................................... 350.00
Winter quarter contract only ........................................................... 340.00
Spring or summer quarter contract only ............................................. 330.00
Housing security deposit (payable prior to occupancy) .......................... 20.00

Note: 1. Room and board 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.

Note: 2. Students are required to furnish blankets, bed spreads, and study lamps.

Note: 3. The board plan includes three meals each day, Monday through Friday, late breakfast and early dinner on Saturdays and Sundays. The dining halls are closed on college holidays.

Typical student expenses

Following is an estimate of typical expenses per quarter for students living in campus residence halls. 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 winter and spring quarter registration.*

Associated student card (fall quarter, $9.50, winter and spring quarters, $4.75 each) ................................................................. $10.00
College union fee (fall quarter, $6.00, winter and spring quarters, $5.00 each) ................................................................. 6.00
Post office fee (per quarter) ......................................................... .50
Medical fee—optional (per quarter) ............................................... 7.00
Materials and service fee (per quarter) ........................................... 29.00
Room and board (19 meals per week) ............................................. 330.00
Books and supplies (estimated) .................................................. 50.00 †
Weekend meals (estimated $10 per month) ..................................... 30.00
Laundry (estimated $10 per month) ............................................... 30.00

Estimated total per quarter (approximately 3 months) .......................... $492.50

* 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 students should be prepared to pay up to $100 in their first quarter.
THE SCHOOL OF AGRICULTURE
<table>
<thead>
<tr>
<th>Recommended J.C. Preparation in Terms of Cal Poly Courses</th>
<th>Approximate units</th>
<th>CAL POLY AGRICULTURE MAJORS REQUIRING VARIOUS COURSES</th>
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<tr>
<td>Biological Sciences</td>
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<tr>
<td>Bio 110, Applied Biology</td>
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<td>Bot 121, General Botany</td>
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<td>Ent 120, Entomology</td>
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<td>Life Science</td>
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<td>Physical Sciences</td>
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<td>Phys 121-2-3, Physics</td>
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<tr>
<td>Chem 324-5-6, Inorganic &amp; Organic</td>
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<td>Chem 324-5, Inorganic</td>
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<td>Mathematics</td>
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<td>Math 100-200, Basic Math</td>
<td>6</td>
<td>4</td>
</tr>
<tr>
<td>Math 105-3, Ag. Math. or 113-14</td>
<td>6</td>
<td>4</td>
</tr>
<tr>
<td>Math 115-14, Algebra &amp; Trig</td>
<td>6</td>
<td>4</td>
</tr>
<tr>
<td>Math 117-141, Analy. Geo. &amp; Calc</td>
<td>9</td>
<td>6</td>
</tr>
<tr>
<td>Agriculture &amp; Supporting Courses</td>
<td></td>
<td></td>
</tr>
<tr>
<td>AE 121-2, Ag. Mechanics</td>
<td>4</td>
<td>3</td>
</tr>
<tr>
<td>AE 142, Ag. Power &amp; Machinery</td>
<td>4</td>
<td>3</td>
</tr>
<tr>
<td>SS 121, Soils</td>
<td>4</td>
<td>3</td>
</tr>
<tr>
<td>Ec 201 or 211, Economics</td>
<td>3</td>
<td>2</td>
</tr>
<tr>
<td>Actg 131-2, Basic Accounting</td>
<td>6</td>
<td>4</td>
</tr>
<tr>
<td>Ag Major or Related Courses</td>
<td>18</td>
<td>12</td>
</tr>
<tr>
<td>Subtotals (Semester Units)</td>
<td>--</td>
<td>--</td>
</tr>
<tr>
<td>General Education Courses</td>
<td>--</td>
<td>--</td>
</tr>
<tr>
<td>Maximum Transfer Units</td>
<td>105</td>
<td>70</td>
</tr>
</tbody>
</table>

1 The prospective transfer student should consult the curriculum requirements specified in the Cal Poly 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, Acting 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, mechanized agriculture, animal husbandry, crops production, fruit production, dairy, farm management, food processing, ornamental horticulture, poultry industry, soil sciences, and natural resources management.

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.
The following chart illustrates the typical distribution of required units in the four areas indicating emphasis and balance through the four years. The entire program totals 198 quarter units including elective units which vary depending upon the student's major. Electives in the freshman and sophomore years are frequently chosen from agricultural courses.

<table>
<thead>
<tr>
<th></th>
<th>Freshman</th>
<th>Sophomore</th>
<th>Junior</th>
<th>Senior</th>
</tr>
</thead>
<tbody>
<tr>
<td>Major agriculture</td>
<td>11</td>
<td>12</td>
<td>10</td>
<td>13</td>
</tr>
<tr>
<td>Related agriculture</td>
<td>7</td>
<td>8</td>
<td>7</td>
<td>5</td>
</tr>
<tr>
<td>Science and mathematics</td>
<td>12</td>
<td>10</td>
<td>12</td>
<td>3</td>
</tr>
<tr>
<td>Humanistic-social</td>
<td>9</td>
<td>9</td>
<td>6</td>
<td>11</td>
</tr>
</tbody>
</table>

**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**

<table>
<thead>
<tr>
<th>Course</th>
<th>F</th>
<th>W</th>
<th>S</th>
</tr>
</thead>
<tbody>
<tr>
<td>Feeds and Feeding (AH 101)</td>
<td>4</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Market Beef Production (AH 121)</td>
<td>4</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Elements of Swine Production (AH 122)</td>
<td></td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>Elements of Sheep Production (AH 123)</td>
<td></td>
<td></td>
<td>4</td>
</tr>
<tr>
<td>Agricultural Mechanics (AE 121, 122)</td>
<td></td>
<td></td>
<td>22</td>
</tr>
<tr>
<td>*Applied English Composition (Eng 100)</td>
<td>3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Agricultural Math (Math 102)</td>
<td>3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Physical Education (PE 141)</td>
<td>½</td>
<td>½</td>
<td>½</td>
</tr>
<tr>
<td>*Agricultural Biology (Bio 100)</td>
<td></td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Soils (SS 121)</td>
<td></td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>Electives</td>
<td>5</td>
<td>4</td>
<td>6</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>16½</td>
<td>16½</td>
<td>16½</td>
</tr>
</tbody>
</table>

*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.
Sophomore

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

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 pure-bred 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.

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.
The Agricultural Business Management curriculum is designed to prepare students for the many farm related agricultural businesses and government agencies serving the farmer. Other employment fields include agriculture teaching.

In contrast to the self-sufficient farm owner of 100 years ago, the modern farmer is primarily a specialist who confines his operations largely to producing crops and livestock. He depends upon farm related businesses for increasing amounts of fertilizer, insecticides, machinery and equipment, commercial feeds, capital and other production supplies. At the same time, he relies more heavily on off-farm businesses for processing and merchandising his products. He uses more commercial and public agency advisory and informational services.

As a result of such trends, farm related business functions involving agricultural products provide excellent career opportunities for those who are trained in the business principles and procedures necessary for organizing, managing and representing the expanding farm related businesses and industries.

While the Agricultural Business Management curriculum is based upon a firm foundation in production agriculture, the program brings together in clear perspective both the agricultural and business training required for success in farm related business careers.

Students majoring in Agricultural Business Management have the opportunity of selecting electives to obtain a broad background in agriculture or technical skills in specialized agricultural fields according to their interests and needs.

The curriculum emphasizes the "learn by doing" method pioneered at the college level by Cal Poly with students taking part in many learning activities involved in the production, processing and merchandising of crops and livestock from Cal Poly's 3,000 acre ranch campus.

CURRICULUM IN AGRICULTURAL BUSINESS MANAGEMENT

<table>
<thead>
<tr>
<th>Freshman</th>
<th>F</th>
<th>W</th>
<th>S</th>
</tr>
</thead>
<tbody>
<tr>
<td>Introduction to Agricultural Business Mgt. (ABM 101)</td>
<td>3</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Agricultural Marketing Programs in California (ABM 102)</td>
<td>3</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Agricultural Business Organization (ABM 103)</td>
<td>3</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Agricultural Mathematics (Math 102, 103 or 113, 114)</td>
<td>2</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>Agricultural Mechanics (AE 121, 122)</td>
<td>3</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>Freshman Composition (Eng 104, 105, 106)</td>
<td>½</td>
<td>½</td>
<td>½</td>
</tr>
<tr>
<td>Physical Education (PE 141)</td>
<td>2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Health Education (PE 107)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>*Life Science</td>
<td>3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>**Electives</td>
<td>5</td>
<td>5</td>
<td>5</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>16½</td>
<td>16½</td>
<td>16½</td>
</tr>
</tbody>
</table>

* See General Education list.

** 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.
Agriculture 67

Sophomore

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
Basic Accounting (Actg 131, 132) ....................................... 3
Economics (Ec 201 or 211) .................................................. 3
Agricultural Marketing (FM 304) ......................................... 3
* Literature ........................................................................... 3
  Public Speaking (Sp 201) .................................................. 2
  Report Writing (Eng 301) .................................................. 3
  Sports Education (PE 241) .................................................. ½ ½ ½
* Life Science ........................................................................ 4
  Elementary Probability and Statistics (Stat 211) ............... 3
  Statistical Methods (Stat 212) ........................................... 3
** Electives ........................................................................... 2 3 3

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) 4
  General Psychology (Psy 202) .............................................. 3
  Advanced Public Speaking (Sp 202) ................................... 2
  General Inorganic Chemistry (Chem 324, 325) .................. 4
  Organic Chemistry (Chem 326) .......................................... 4
  American Government (Pol Sc 301) ................................ 3
** Electives ........................................................................... 3 3 6

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
  Undergraduate Seminar (ABM 463) ................................ 2
* Literature or Philosophy ...................................................... 2
  Business Law Survey (Bus 301) ....................................... 3
  Growth of American Democracy (Hist 304) ...................... 3
  U.S. in World Affairs (Hist 305) ..................................... 3
** Electives ........................................................................... 5 6 8

16½ 16½ 16½

DESCRIPTIONS OF COURSES IN 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 commer-
cial agricultural industries. 3 lectures.

* See General Education list.
** At least 36 units shall be chosen with the approval of the adviser from other fields of Agri-
culture. Twelve of the 36 units must be in a single agriculture major.
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)
Agricultural business investment, financial and credit requirements as determined by production of farms and farming area served. Emphasis on financial principles, procedures and problems in establishing and managing the agricultural business and serving farm and farm related businesses. 3 lectures.

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. 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 201

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 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 201, Math 212

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 132, 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 301 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 201

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 203, 323, Ec 201
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 permission 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 581  Graduate Seminar in Agricultural Business Management (1-3)
Current trends and characteristics of agricultural business and industry as related to the teaching of Vocational Agriculture. Vo-Ag graduate opportunities, place and problems in becoming established in farm related businesses. 1 to 3 lecture-discussions.
AGRICULTURAL EDUCATION DEPARTMENT

Department Head, H. H. Burlingham
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 THE MASTER’S DEGREE in this catalog.

DESCRIPTIONS OF COURSES IN 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 Ed 525 Student Teaching in Agricultural Education (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.
A student in this department may choose one of two majors.

1. 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.

2. 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 the entire 2,850-acre 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.
## CURRICULUM IN AGRICULTURAL ENGINEERING

### Freshman

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<th>Course</th>
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<tr>
<td>Introduction to Agricultural Engineering (AE 100)</td>
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<tr>
<td>Agricultural Mechanics (AE 128)</td>
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<td>Agricultural Power and Machinery Management (AE 142)</td>
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<tr>
<td>Analytic Geometry and Calculus (Math 141, 142, 143)</td>
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<td>Freshman Composition (Eng 104, 105)</td>
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<td>Engineering Drafting (ME 151, 152, 153)</td>
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<td>Manufacturing Processes (MP 151, 141, 142)</td>
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<td>Manufacturing Processes (WM 141, 142)</td>
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<td>Plant Production</td>
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<td>Soils (SS 121)</td>
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<td>Health Education (PE 107)</td>
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<td>Applied Biology (Bio 110)</td>
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<td>Physical Education (PE 141)</td>
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### Sophomore

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<tr>
<td>Agricultural Power Transmission (AE 234)</td>
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<td>Agricultural Power (AE 235)</td>
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<tr>
<td>Principles of Irrigation (AE 236)</td>
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<td>Engineering Surveying (AE 237, 238)</td>
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<tr>
<td>Analytic Geometry and Calculus (Math 241)</td>
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<td>Differential Equations (Math 242)</td>
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<td>General Physics (Phys 131, 132, 133)</td>
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<td>Engineering Mechanics (ME 211, 212)</td>
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<td>Public Speaking (Sp 201)</td>
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<td>Animal Production</td>
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<td>*Literature</td>
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<td>Economics (Ec 201 or 211)</td>
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<td>Sports Education (PE 241)</td>
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<td>Soil Conservation (SS 202)</td>
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<td>Technical Writing (Eng 219)</td>
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<td>Hydraulics (AE 312)</td>
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<td>Dynamic Measurement (AE 338)</td>
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<tr>
<td>Principles of Agricultural Machinery (AE 322)</td>
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<td>Principles of Agricultural Electrification (AE 324)</td>
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<td>Agricultural Electric Power and Controls (AE 325)</td>
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<td>Agricultural Building Planning (AE 332)</td>
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<td>Engineering Properties of Agricultural Materials (AE 333)</td>
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<tr>
<td>Strength of Materials (ME 202, 203)</td>
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<td>General Inorganic Chemistry (Chem 324, 325)</td>
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* To be selected from the General Education list.
† 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.
### Agriculture

#### Senior

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<tr>
<th>Course</th>
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<tr>
<td>Agricultural Structures Design (AE 433)</td>
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<td>Senior Project (AE 461, 462)</td>
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<td>Undergraduate Seminar (AE 463)</td>
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<td>American Government (Pol Sc 301)</td>
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<td>Growth of American Democracy (Hist 304)</td>
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<td>U.S. in World Affairs (Hist 305)</td>
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<td>General Psychology (Psy 202)</td>
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<td>* Social Science Elective</td>
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#### CURRICULUM IN MECHANIZED AGRICULTURE

**Freshman**

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<tr>
<td>Agricultural Mechanics (AE 128)</td>
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<tr>
<td>Agricultural Power and Machinery Management (AE 142)</td>
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<tr>
<td>Agricultural Mathematics (Math 113)</td>
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<td>College Algebra for Agriculture (Math 114)</td>
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<td>Trigonometry for Agriculture (Math 115)</td>
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<td>Freshman Composition (Eng 104, 105)</td>
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<td>Manufacturing Processes (WM 141, 142)</td>
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<tr>
<td>Fundamentals of Metallic Arc Welding (WM 155)</td>
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<td>Plant production</td>
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<td>Soils (SS 121)</td>
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<td>Animal production</td>
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<td>Physical Education (PE 141)</td>
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**Sophomore**

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<tr>
<td>Agricultural Building Construction (AE 231)</td>
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<td>Agricultural Power Transmission (AE 234)</td>
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<td>Agricultural Power (AE 235)</td>
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<tr>
<td>Engineering Surveying (AE 237, 238)</td>
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<td>College Physics (Phys 121, 122, 123)</td>
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<td>General Botany (Bot 121)</td>
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<tr>
<td>** Literature or philosophy</td>
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<tr>
<td>Public Speaking (Sp 201)</td>
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<td>Soil Conservation (SS 202)</td>
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<tr>
<td>Fundamentals of Metallic Arc Welding (WM 156)</td>
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<td>Elements of Welded Structures (WM 254)</td>
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<td>Sports Education (PE 241)</td>
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*To be selected from the General Education list.

**See general education list. Include at least one course in literature.

† 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.
### DESCRIPTIONS OF COURSES IN 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 woodworking; 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. Prerequisite: AE 133 or ME 151 concurrent

**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

* 15 units of electives must be selected from courses in the School of Agriculture.

** See general education list. Include at least one course in literature.
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 235 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.
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

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. Indentification, 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 325, Phys 123 or 133, or consent of instructor

AE 336 Agricultural Power (3)

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 235 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 235 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; ME 153 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

AE 421  Agricultural Machine Design (3)
Design and construction of specialized farm equipment. 1 lecture, 2 laboratories. Prerequisite: ME 153, MP 142, WM 142, ME 212, ME 203

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 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, ME 203

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 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.
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.

### CURRICULAR CONCENTRATIONS

**Production-Management**

The production-management concentration strengthens the major curriculum in the field of livestock management.

**Science-Teaching**

The science-teaching curricular concentration emphasizes additional science, mathematics and/or education courses for those interested in agricultural education and other graduate study.

### CURRICULUM IN ANIMAL HUSBANDRY

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<th>Freshman</th>
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* Math 102, 103 may be substituted for Math 113 with approval of adviser.
** Minimum of 18 units must be chosen with approval of adviser in one of the concentration areas of Production-Management or Science-Teaching.
### Sophomore

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<td>Anatomy and Physiology (VS 123)</td>
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<td>Livestock Hygiene and Sanitation (VS 202)</td>
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<td>Genetics (Bio 303)</td>
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<td>Economics (Ec 201 or 211)</td>
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<td>Farm Records (FM 321)</td>
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<td>Reproductive Physiology (AH 401)</td>
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<td>Animal Nutrition (AH 402)</td>
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<tr>
<td>***Literature, Philosophy, Arts</td>
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<td>U. S. World Affairs (Hist 305)</td>
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### DESCRIPTIONS OF COURSES IN 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.

*To be selected from the General Education list.

**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.
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

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 326

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
Agriculture 85

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 Advanced 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.
Crops Students Checking Broccoli for Insect and Disease Damage Symptoms
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 crops 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.
### CURRICULUM IN CROPS PRODUCTION

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<td>Freshman</td>
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<td>Concepts of Crop Production (CP 131)</td>
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<td>Combine Harvest Crops (CP 132)</td>
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<td>Growth of American Democracy (Hist 304)</td>
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<td>†Social Sciences Elective</td>
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</table>

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

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

† To be selected from the General Education list.
### Agriculture

#### Senior

<table>
<thead>
<tr>
<th>Course</th>
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<tr>
<td>Plant Breeding (CP 304)</td>
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<td>Senior Project (CP 461, 462)</td>
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<td>Undergraduate Seminar (CP 463)</td>
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<td>Genetics (Bio 303)</td>
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<td>++ Management Elective</td>
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<td>** Principles of Pest Control (CP 311)</td>
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<td>California Fruit Growing (FP 230)</td>
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| Total | 16 | 16 | 15 |

### CURRICULUM IN FRUIT PRODUCTION

#### Freshman

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<th>Course</th>
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<td>* Agricultural Mathematics (Math 102, 103, 114)</td>
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<td>Agricultural Mechanics (AE 121)</td>
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<td>General Botany (Bot 121, 122)</td>
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<td>General Entomology (Ent 126)</td>
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<td>Agricultural Power and Machinery Management (AE 142)</td>
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| Total | 16½ | 16½ | 17½ |

#### Sophomore

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<td>Fruit Plant Propagation (FP 232)</td>
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<td>Soils (SS 121)</td>
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<td>Public Speaking (Sp 201)</td>
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<td>Agricultural Surveying (AE 131)</td>
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| Total | 16½ | 17½ | 16½ |

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* Math 113 may be substituted for Math 102 & 103 with adviser approval.  
* See General Education list. Include at least one course in literature.  
++ 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 300-500 series course in ABM or FM.
### Junior

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<th>Course</th>
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<td>Fruit Production (FP 331 or 332)</td>
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<td>General Bacteriology (Bact 221)</td>
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<td>Principles of Pest Control (CP 311)</td>
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<td>Agricultural Code of California (CP 303)</td>
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<td>Biochemistry (Chem 328)</td>
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<td>Fertilizers (SS 221)</td>
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<td>Farm Records (FM 321)</td>
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### Senior

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<tr>
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<td>Orchard Management (FP 436)</td>
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<td>General Field Crops (CP 230)</td>
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<td>American Government (Pol Sc 301)</td>
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<td>Growth of American Democracy (Hist 304)</td>
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### Descriptions of Courses in 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

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* To be selected from any 300-500 series courses in ABM or FM.
** To be selected from General Education list.
†† See General Education list. Include at least one course in literature.
Agriculture

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: Sophomore standing

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 324

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.

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.

DESCRIPTIONS OF COURSES IN 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

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 sched-
ules, field sampling, maturity tests, and forecasting crop maturity. 3 lectures, 1 labo-
ratory. 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

DESCRIPTIONS OF COURSES IN FRUIT PRODUCTION

FP 123  Beekeeping (3)
Practical studies and exercises in the handling of honey bees with special refer-
ence 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 lec-
tures, 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 cul-
ture. 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. Prerequi-
site: 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.
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**

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<tr>
<td>Elements of Dairying (DH 121)</td>
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<td>Dairy Feeds and Feeding (DH 101)</td>
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<td>Feeding Dairy Cattle (DH 102)</td>
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<td>Market Milk (DM 133)</td>
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* To be selected from General Education list.
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<tr>
<td>DH 142 Dairy Cattle Judging</td>
<td>DH 222 Commercial Dairy Herd Management</td>
<td>DH 301 Advanced Dairy Cattle Feeding</td>
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<td>DH 222</td>
<td>SS 121 Soils</td>
<td>DH 323 History of Dairy Breeds and Pedigrees</td>
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<td>VS 123 Anatomy and Physiology</td>
<td>VS 202 Livestock Hygiene and Sanitation</td>
<td>Bio 303 Genetics</td>
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<td>FM 321 Farm Records</td>
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MANUFACTURING OPTION (ADD COURSES BELOW TO BASIC CURRICULUM)

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<tr>
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<tbody>
<tr>
<td>DH 132 Ice Cream Making</td>
<td>DM 232 Cheese Making</td>
<td>DM 331 Condensed and Dry Milk</td>
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<td>DM 236 Butter Making</td>
<td>FM 304 Agricultural Marketing</td>
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<td></td>
<td>Bact 322 Dairy Bacteriology</td>
<td>IR 311 Industrial Management</td>
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<td>DM 431 Dairy Plant Management</td>
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<td>Actg 221 Principles of Accounting</td>
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<td>Actg 222 Principles of Accounting</td>
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</table>

* To be selected from General Education list. Include at least one course in literature.
** To be selected from General Education list.
† To be selected from 300-400 series courses in ABM or FM.
DESCRIPTIONS OF COURSES IN 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.

DESCRIPTIONS OF COURSES IN 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 buttermaking. 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. Mojonnier 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.
The main purpose of this curriculum is to prepare 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 may also plan to engage in allied work such as farm credit and farm appraisal or in the teaching of agriculture.

A large number of agricultural production courses is provided as a basis for sound management preparation. Business training received in the farm management department is supplemented by instruction from other departments in accounting, statistics, law, and business organization.

Interwoven throughout the curriculum are general education courses in English, mathematics, history, economics, and political science which provide the basis for better citizenship and understanding of society.

### CURRICULUM IN FARM MANAGEMENT

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<th>Freshman</th>
<th>F</th>
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<tr>
<td>Introduction to Farm Management (FM 104, 105, 106)</td>
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<td>Agricultural Mechanics (NE 121, 122)</td>
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<td>Agricultural Marketing (FM 304)</td>
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<td>Agricultural Resources (FM 305)</td>
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<td>Farm Records (FM 321)</td>
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<td>Soils (SS 121)</td>
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<td>Soils Management (SS 122)</td>
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<tr>
<td>Principles of Economics (Ec 211, 212)</td>
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<td>† Literature, Philosophy</td>
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<td>Sports Education (PE 241)</td>
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<td><strong>Total</strong></td>
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*At least 40 units shall be chosen with the approval of the adviser from other fields of agriculture.*

† See General Education list. Include at least one course in literature.

** See General Education list.
### Junior Courses

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<td>Principles of Farm Management (FM 322)</td>
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<td>Types of Farm Operation in California (FM 325)</td>
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<td>Farm Appraisal (FM 326)</td>
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<td>Agricultural Price Analysis (FM 333)</td>
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<td>Crop Management Problems (FM 421)</td>
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<td>General Psychology (Psy 202)</td>
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<td>General Inorganic Chemistry (Chem 324, 325)</td>
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<td>Elementary Probability and Statistics (Stat 211)</td>
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<td>Statistical Methods (Stat 212)</td>
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<td>Business Law Survey (Bus 301)</td>
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### Senior Courses

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<tr>
<td>Agricultural Prices and Policy (FM 403)</td>
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<tr>
<td>Linear Programming in Agriculture (FM 405)</td>
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<tr>
<td>Farm Management Problems (FM 424, or FM 425, or FM 426)</td>
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<td>Large Farm Accounting (FM 431)</td>
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<td>Senior Project (FM 461, 462)</td>
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<td>Undergraduate Seminar (FM 463)</td>
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<td>American Government (Pol Sc 301)</td>
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<td>Growth of American Democracy (Hist 304)</td>
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<td>U.S. in World Affairs (Hist 305)</td>
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### Total Units

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<tr>
<td>17</td>
<td>17</td>
<td>16</td>
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### Descriptions of Courses in 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 only by technical students.

**FM 102 Farm Records and Farm Management Practices (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 only by technical students. Not open to degree students for degree credit.

**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 only 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.

*At least 40 units shall be chosen with the approval of the adviser from other fields of agriculture.*
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)
Principles of marketing agricultural products, market functions, channels, market institutions, introduction to co-operative marketing, cost of marketing, marketing problems by commodities, marketing policy, government regulation. 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 310 Farm Credit (3)
Finance principles for farmers, farm credit needs, types of credit, credit sources, requirements, farm finance planning, discussion with credit representatives. 3 lectures. Prerequisite: Actg 131 or FM 321

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: FM 322

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: FM 322

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

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 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.
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

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<th>Course</th>
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<tr>
<td>Survey of Food Industry (FI 101)</td>
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<td>Food Processing Machinery (FI 122)</td>
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<td>Elements of Food Processing (FI 123)</td>
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<td>Freshman Composition (Eng 104, 105)</td>
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<td>Introduction to Literature (Eng 207)</td>
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<td>Basic Mathematics for General Education (Math 100, 200)</td>
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<td>Finite Mathematics for Business (Math 210)</td>
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Total: 17½ F, 16½ W, 15½ S
Making Apple Juice in the Food Processing Laboratory
### Agricultural Studies

#### Sophomore

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<tr>
<td>Processed Food Inspection (Fl 233)</td>
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<tr>
<td>Introductory Physics (Phys 104)</td>
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<td>Refrigeration in Agriculture (EnvE 238, 239)</td>
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<tr>
<td>General Bacteriology (Bact 221)</td>
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<td>General Inorganic Chemistry (Chem 324, 325)</td>
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<td>Organic Chemistry (Chem 326)</td>
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<td>Public Speaking (Sp 201)</td>
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#### Junior

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<td>Food Plant Quality Control (Fl 321)</td>
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<td>Statistical Quality Control (Fl 332)</td>
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<td>Packaging (Fl 432)</td>
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<td>Sanitation and Waste Disposal (Fl 232)</td>
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<td>Food Microbiology (Bact 421)</td>
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<td>General Psychology (Psy 202)</td>
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<td>Growth of American Democracy (Hist 304)</td>
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#### Senior

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<td>Undergraduate Seminar (Fl 463)</td>
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<td>U. S. in World Affairs (Hist 305)</td>
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<td>Report Writing (Eng 218)</td>
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#### MANAGEMENT OPTION (ADD COURSES BELOW TO BASIC CURRICULUM)

<table>
<thead>
<tr>
<th>Freshman</th>
<th>Junior</th>
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<tbody>
<tr>
<td>** FP 230 Calif. Fruit Growing (4)</td>
<td>Actg 223 Cost Accounting and Analysis (4)</td>
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<td>** VC 230 General Vegetable Crops (4)</td>
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<td>** DM 230 General Dairy Manufacturing (4)</td>
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<td>ABM 203 Ag Business Credit and Finance (3)</td>
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<td>Mktg 204 Marketing Principles (4)</td>
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<tr>
<td>Bus 201 Principles of Management (3)</td>
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<tr>
<td>FI 421, 422 Advanced Food Processing (6)</td>
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</table>

*To be selected from the General Education list.

**Bot 121 may be substituted for FP 230 or for VC 230.
MEATS OPTION (ADD COURSES BELOW TO BASIC CURRICULUM)

Freshman
AH 121 Market Beef Production  (4)
AH 122 Elements of Swine Production  (4)
FI 210 Meats  (3)

Junior
FI 338 Sausage, Smoked and Canned Meats  (3)
IR 311 Industrial Management  (3)
VS 123 Anatomy & Physiology  (3)

Sophomore
Zoo 131-2 General Zoology  (8)
FI 212 Meat Classification and Grading  (2)

Senior
FI 431 Meat Technology  (4)

DESCRIPTIONS OF COURSES IN 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 Processing  (3)
Principles of food preservation including canning, freezing, dehydration and fermentation. 2 lectures, 1 laboratory.

FI 209 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.

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 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 333 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 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 209, 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 432 Packaging (4)
Study of packaging materials, packages and packaging methods applicable to a variety of processed foods. 3 lectures, 1 laboratory.

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.
The objective of this department is to prepare students for employment in the nursery, landscape and florist industries. This includes both the production and sales and service areas of these major fields. The training stresses production of nursery plants, flower production, the design and management of nurseries and greenhouses, landscape design, landscape planting, and landscape supervision.

Graduates of the Ornamental Horticulture Department qualify for managerial positions in nursery and florist establishments as well as supervisory positions in parks and grounds. Many of the graduates enter the field of teaching. Some of the most popular areas of employment include plant propagation, nursery sales, greenhouse management, landscape design, and field advising for fertilizer and insecticide companies.

The facilities of the department include a student-operated commercial nursery in which students carry on a project program involving wholesale and retail sales, 8,000 square feet of glasshouses, 3,000 square feet of lathhouses, a clothhouse, coldframes, and extensive field growing areas. Large, modern, well-equipped laboratories adjoin the greenhouse range. The entire 100 acres of landscaped campus area serves as an outdoor laboratory. The campus is planted with many interesting and unusual trees and shrubs from all over the world. The campus also contains a large number of native California trees and shrubs.

Equipment includes the latest models of power equipment necessary in nurseries, greenhouses, parks and grounds, and landscaping. An extensive list of periodicals covering the field of ornamental horticulture is subscribed to and available to students. Through the staff, affiliation in several national horticultural organizations is maintained.

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 ORNAMENTAL HORTICULTURE

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<tr>
<th>Freshman</th>
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<td>Nursery Practice (OH 121)</td>
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<td>Ornamental Shrubs (OH 122)</td>
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<td>Landscape Drafting (OH 124)</td>
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<td>Orientation to Ornamental Horticulture (OH 100)</td>
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<td>Principles of Landscape Design (OH 223)</td>
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<td>Soils (SS 121)</td>
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### Descriptions of Courses in 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.

**OH 122 Ornamental Shrubs (4)**

Shrubs and vines used in California. Identification, habits of growth, cultural requirements, and landscape use. 3 lectures, 1 laboratory.

* 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.
§§§ See General Education list. Include at least one course in literature.
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<tr>
<th>Course Code</th>
<th>Course Title</th>
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<tr>
<td>OH 123</td>
<td>Floriculture (4)</td>
<td>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</td>
</tr>
<tr>
<td>OH 124</td>
<td>Landscape Drafting (2)</td>
<td>Drafting techniques and standards progressing from tracings to light construction working drawings. 1 lecture, 1 laboratory.</td>
</tr>
<tr>
<td>OH 125</td>
<td>Flower Arrangement (4)</td>
<td>A study of the principles of flower arrangement and corsage making. 2 lectures, 2 laboratories.</td>
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<tr>
<td>OH 126</td>
<td>Herbaceous Landscape Plants (4)</td>
<td>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</td>
</tr>
<tr>
<td>OH 145</td>
<td>Bonsai Culture (2)</td>
<td>Study of the philosophy, history, training, culture, production, and care of the Japanese Bonsai. 1 lecture, 1 activity.</td>
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<tr>
<td>OH 221</td>
<td>Ornamental Trees (4)</td>
<td>Broadleaf trees grown and used in California. Identification, habits of growth, cultural requirements, and landscape use. 3 lectures, 1 laboratory.</td>
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<tr>
<td>OH 223</td>
<td>Principles of Landscape Design (4)</td>
<td>Basic principles of design related to landscape problems. 2 lectures, 2 laboratories. Prerequisite: OH 124</td>
</tr>
<tr>
<td>OH 225</td>
<td>Flower Judging (3)</td>
<td>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</td>
</tr>
<tr>
<td>OH 227</td>
<td>Flower Shop Management (4)</td>
<td>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</td>
</tr>
<tr>
<td>OH 228</td>
<td>Advanced Flower Arrangement (4)</td>
<td>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</td>
</tr>
<tr>
<td>OH 230</td>
<td>Ornamental Gardening (3)</td>
<td>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.</td>
</tr>
<tr>
<td>OH 233</td>
<td>Plant Propagation (4)</td>
<td>Principles of asexual propagation. Budding, cutting, layering, division, and separation. 3 lectures, 1 laboratory. Prerequisite: OH 123</td>
</tr>
<tr>
<td>OH 321</td>
<td>Suburban Home Planning (4)</td>
<td>Principles of landscape design for residential properties. Designing of several small home properties. 2 lectures, 2 laboratories. Prerequisite: OH 122, 124, 221</td>
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<tr>
<td>OH 322</td>
<td>Landscape Design (4)</td>
<td>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 223</td>
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</table>
Agriculture

OH 323  Greenhouse Management (3)
Scheduling greenhouse crops and planning crop rotations. Economics of the florist business. 3 lectures. Prerequisite: OH 334

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 in the college.

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 rooring, 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 cooperative buying. 3 lectures, 1 laboratory. Prerequisite: Ec 201 or 211, Actg 131, junior or senior standing.

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-ornamental horticulture 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.
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.

In addition to typical ranch production opportunities for employment, graduates may find many openings in marketing organizations, processing plants, feed and supply services, hatcheries, governmental agencies or agricultural teaching.

The college plant has facilities for more than 6,000 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

<table>
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<td>Replacement Programs &amp; Broiler Production (PI 122)</td>
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<td>Poultry Feeding &amp; Nutrition (PI 123)</td>
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<td>Agricultural Mechanics (AE 121, 122)</td>
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<td>Poultry Plant Design &amp; Equipment (PI 233)</td>
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<td>Principles of Farm Management (FM 322)</td>
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<td>** Literature, Philosophy</td>
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<td>American Government (Pol Sc 301)</td>
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<td>Growth of American Democracy (Hist 304)</td>
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<td>Advanced Poultry Enterprise Supervision (PI 402)</td>
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<td>Turkey Industry (PI 421)</td>
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<td>Biochemistry (Chem 328)</td>
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<td>$ To be selected from Bus 301, 310, IR 118, 311, 312.</td>
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DESCRIPTIONS OF COURSES IN 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 vaccinating 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)
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.
A student in this department may choose one of two majors.

1. 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.

2. 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

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<td>Soil Management (SS 122)</td>
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<td>Soil Materials (SS 123)</td>
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<td>Crop Production (CP 121 or 122 or 230 or VC 230)</td>
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<td>Animal Production (AH 230 or DH 230 or FI 230)</td>
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<td>Agricultural Mechanics (AE 121 or 122 or 141)</td>
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<td>Health Education (PE 107)</td>
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§ 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.
## Sophomore

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<td>Soil Physics (SS 432)</td>
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<td>Senior Project (SS 461, 462)</td>
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<td>Undergraduate Seminar (SS 463)</td>
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<td>** Management Elective</td>
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* Of the total elective units a minimum of 15 shall be chosen with the approval of the adviser.

** To be selected from General Education list.

*** 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.
# Agriculture

## CURRICULUM IN NATURAL RESOURCES MANAGEMENT

### Freshman

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<td>Forest Resources (NRM 102)</td>
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<td>General Botany (Bot 121, 123)</td>
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<td>College Physics (Phys 121)</td>
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<td>Agricultural Mathematics (Math 103)</td>
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<tr>
<td>College Algebra for Agriculture (Math 114)</td>
<td></td>
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<tr>
<td>Agricultural Mechanics (AE 128)</td>
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<tr>
<td>Photogrammetry (AE 145)</td>
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<tr>
<td>Landscape Drafting (OH 124)</td>
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<tr>
<td>Freshman Composition (Eng 104, 105)</td>
<td></td>
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<tr>
<td>Public Speaking (Sp 201)</td>
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<tr>
<td>Safety and First Aid (PE 121)</td>
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<tr>
<td>Physical Education (PE 141)</td>
<td>½</td>
<td>½</td>
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</tr>
</tbody>
</table>

| Total                                                                 | 15½ | 15½ | 15½ |

### Sophomore

<table>
<thead>
<tr>
<th>Course</th>
<th>F</th>
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</thead>
<tbody>
<tr>
<td>Resource Survey (NRM 223)</td>
<td>3</td>
<td></td>
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</tr>
<tr>
<td>Resource Planning (NRM 224)</td>
<td></td>
<td>3</td>
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<tr>
<td>General Zoology (Zoo 131, 132)</td>
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</tr>
<tr>
<td>College Physics (Phys 122, 123)</td>
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</tr>
<tr>
<td>General Ecology (Bio 325)</td>
<td></td>
<td></td>
<td>3</td>
</tr>
<tr>
<td>Agricultural Surveying (AE 131)</td>
<td></td>
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<tr>
<td>Trigonometry for Agriculture (Math 115)</td>
<td></td>
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<tr>
<td>Introduction to Literature (Eng 207)</td>
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<tr>
<td>Cultural Anthropology (Ant 201)</td>
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</tr>
<tr>
<td>General Psychology (Psy 202)</td>
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<tr>
<td>Sports Education (PE 241)</td>
<td>½</td>
<td>½</td>
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</table>

| #Electives and courses to complete major                              | 4  | 4  | 4  |

| Total                                                                 | 16½ | 17½ | 17½ |

### Junior

<table>
<thead>
<tr>
<th>Course</th>
<th>F</th>
<th>W</th>
<th>S</th>
</tr>
</thead>
<tbody>
<tr>
<td>Site Ecology (NRM 323)</td>
<td>3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Environmental Interpretation (NRM 326)</td>
<td></td>
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<tr>
<td>Business Law Survey (Bus 301)</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>Elementary Probability and Statistics (Stat 211)</td>
<td></td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>General Inorganic Chemistry (Chem 324)</td>
<td></td>
<td></td>
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<tr>
<td>Economics (Ec 201 or 211)</td>
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<td>3</td>
</tr>
<tr>
<td>Technical Writing (Eng 219)</td>
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<tr>
<td>Introduction to Philosophy (Phil 201)</td>
<td></td>
<td></td>
<td>3</td>
</tr>
<tr>
<td>History of California (Hist 112)</td>
<td></td>
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</tr>
<tr>
<td>American Government (Pol Sc 301)</td>
<td></td>
<td></td>
<td>3</td>
</tr>
<tr>
<td>Growth of American Democracy (Hist 304)</td>
<td></td>
<td></td>
<td>3</td>
</tr>
<tr>
<td>The U. S. in World Affairs (Hist 305)</td>
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</tr>
<tr>
<td>Health Education (PE 107)</td>
<td></td>
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</tbody>
</table>

| #Electives and courses to complete major                              | 4  | 3  | 5  |

| Total                                                                 | 17  | 17  | 17  |

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

Senior:

<table>
<thead>
<tr>
<th>Course</th>
<th>F</th>
<th>W</th>
<th>S</th>
</tr>
</thead>
<tbody>
<tr>
<td>Site Development and Maintenance (NRM 429)</td>
<td>4</td>
<td></td>
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<tr>
<td>Recreation Resource Management (NRM 438)</td>
<td></td>
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</tr>
<tr>
<td>Senior Project (NRM 461, 462)</td>
<td>2</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>Undergraduate Seminar (NRM 463)</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>Soil Conservation (SS 202)</td>
<td></td>
<td>3</td>
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<tr>
<td>Hydrology (AE 315)</td>
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<tr>
<td>Landscape Plants (OH 430)</td>
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<tr>
<td>Plant Ecology (Bot 326)</td>
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<tr>
<td>Political and Economic Geography (Geog 315)</td>
<td></td>
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<tr>
<td>Business and Human Relations (IR 415)</td>
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<tr>
<td>Geology (PSc 209)</td>
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<tr>
<td>#Electives and courses to complete major</td>
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<tr>
<td></td>
<td>16</td>
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</tbody>
</table>

# DESCRIPTIONS OF COURSES IN 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 233  Tropical Soils (3)
Nature and properties of tropical soils, their origin, morphology, classification, fertility, utilization, and conservation. 2 lectures, 1 laboratory. Prerequisite: SS 121

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.

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

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 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

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 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 woodland. 2 lectures, 1 laboratory.

DESCRIPTIONS OF COURSES IN 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
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,
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.

DESCRIPTIONS OF COURSES IN 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
THE SCHOOL OF ENGINEERING
## Chart of Recommended Junior College Preparation for Engineering Major Curricula

California State Polytechnic College, San Luis Obispo

<table>
<thead>
<tr>
<th>Recommended J.C. Preparation in Terms of Cal Poly Courses</th>
<th>Approx. units</th>
<th>CAL POLY ENGINEERING MAJORS REQUIRING VARIOUS COURSES</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Qtr.</td>
<td>Sem.</td>
</tr>
<tr>
<td><strong>Mathematics</strong></td>
<td></td>
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<tr>
<td>Math 141, Analytic Geometry &amp; Calculus</td>
<td>4</td>
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<tr>
<td>Math 142, Analytic Geometry &amp; Calculus</td>
<td>4</td>
<td>3</td>
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<tr>
<td>Math 143, Analytic Geometry &amp; Calculus</td>
<td>4</td>
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</tr>
<tr>
<td>Math 241, Analytic Geometry &amp; Calculus</td>
<td>4</td>
<td>3</td>
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<tr>
<td><strong>Physics</strong></td>
<td></td>
<td></td>
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<tr>
<td>Phys 131, General Physics for Engineers</td>
<td>4</td>
<td>3</td>
</tr>
<tr>
<td>Phys 132, General Physics for Engineers</td>
<td>4</td>
<td>3</td>
</tr>
<tr>
<td>Phys 133, General Physics for Engineers</td>
<td>4</td>
<td>3</td>
</tr>
<tr>
<td>Phys 211, Optics and Atomic Physics</td>
<td>4</td>
<td>3</td>
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<tr>
<td><strong>Chemistry</strong></td>
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<tr>
<td>Chem 321, General Chemistry</td>
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<tr>
<td>Chem 322, General Chemistry</td>
<td>4</td>
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<tr>
<td><strong>Engineering and Supporting Courses</strong></td>
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<tr>
<td>Engineering Drafting</td>
<td>3</td>
<td>2</td>
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<tr>
<td>Manufacturing Processes (Machine Shop, Welding, etc.)</td>
<td>6</td>
<td>4</td>
</tr>
<tr>
<td>Strength of Materials</td>
<td>6</td>
<td>4</td>
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<tr>
<td>Engineering Statics</td>
<td>3</td>
<td>2</td>
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<tr>
<td>Electronics (with lab)</td>
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<td>3</td>
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<tr>
<td><strong>Subtotals (Semester Units)</strong></td>
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<td><strong>General Education Courses</strong></td>
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<tr>
<td><strong>Maximum Transfer Units</strong></td>
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</tbody>
</table>

1. The prospective transfer student should consult the curriculum requirements specified in the Cal Poly Catalog for his particular major, including possible options or concentrations.
2. Recommended courses include English, American History, American Government, Economics, Biology, Psychology, Speech, Literature, Physical Education and Health, etc.
A DEFINITION

Engineering consists of understanding real situations related to technical systems and components, analyzing and synthesizing them, and applying usable solutions to the real situations.

Faced with a real situation, the engineer first appraises it and understands it. He may have to make a series of measurements and do extensive reading and consultation before he has all of the necessary facts at hand essential to the understanding. He then proceeds with his analysis and synthesis relying on knowledge gained by education and experience. He thus develops a usable solution and applies it to the real situation. He does this consistently and for a variety of problems.

The principal concept in engineering is the constant interplay between theory and application.

The word engineering covers a broad spectrum of activity ranging from fundamental research to semi-routine operations. Each of the areas in the spectrum demands particular disciplines and aptitudes characteristic of that area. On the one extreme, it is difficult to distinguish the engineer from the research scientist. On the other extreme, the engineer has certain things in common with the highly skilled technician. Between the two extremes there is a broad middle region in which the engineer can readily be identified as such. In this region of the spectrum, the engineer works in design, manufacturing, and marketing. He deals with physical systems and components. He relies on a combination of theory, judgment, and experience to solve problems in design and application.

THE CAL POLY PROGRAM

The engineering program at Cal Poly is designed to match the above definition, and to serve the middle region of the engineering spectrum. The framework of the program may be expressed graphically:

Practical Experiences

Science and Mathematics

General Education

Engineering

Co-curricular Activities

Technical Engineering Competence

Humanities Competence

Professional Competence

The fundamental framework is the same although the details vary for the different engineering majors.

1. All freshmen have required courses in the shop and laboratory where they learn to use tools, instruments, and machines characteristic of their major. Initial emphasis is on skills, techniques, and descriptive material which provide background for more advanced courses.

2. The student begins his chosen curriculum course work early in his freshman year. Emphasis on the selected curriculum continues throughout the entire four-year program together with the related work in mathematics, science, and general education.

3. Fundamentals and basic principles are taught in terms of typical problems encountered in industry.

4. Students learn to cope professionally with current engineering problems and are prepared to learn to cope with the problems of the future.

Students completing the full four-year program are awarded the degree of Bachelor of Science in Engineering. The College Placement Office, in close cooperation with all departments, assists the graduate in finding suitable and appropriate employment.
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 Institute of Aeronautics and Astronautics.

### CURRICULUM IN AERONAUTICAL ENGINEERING

<table>
<thead>
<tr>
<th>Course</th>
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<tbody>
<tr>
<td>Power Plants (Aero 124)</td>
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<tr>
<td>Materials and Fabrication (Aero 125)</td>
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<tr>
<td>Aeronautical Laboratory (Aero 126)</td>
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<tr>
<td>* Manufacturing Processes</td>
<td>1</td>
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<tr>
<td>Elements of Electronics (EL 101)</td>
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<td>Electronics Laboratory (EL 141)</td>
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<tr>
<td>Engineering Drafting (ME 151, 152, 153)</td>
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<tr>
<td>Analytic Geometry and Calculus (Math 141, 142, 143)</td>
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<td>General Physics (Phys 131, 132)</td>
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<tr>
<td>Freshman Composition (Eng 104, 105)</td>
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<tr>
<td>Applied Biology (Bio 110)</td>
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<td>Health Education (PE 107)</td>
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<tr>
<td>Physical Education (PE 141)</td>
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</table>

*One of the following sequences: a) WM 141, 142, 251, 252; b) MP 141, 142, 153, 154; c) MP 141, 142, EnveE 141, EE 141.*
### Engineering

#### Sophomore

<table>
<thead>
<tr>
<th>Course Description</th>
<th>F</th>
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<tbody>
<tr>
<td>Engineering Problems—Digital Computers (Aero 250)</td>
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<tr>
<td>Engineering Problems—Analog Computers (Aero 252)</td>
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<td>Strength of Materials (Aero 205, 206)</td>
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<tr>
<td>Strength of Materials Laboratory (Aero 229)</td>
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<tr>
<td>Introductory Circuit Analysis (EL 213)</td>
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<tr>
<td>Circuits Laboratory (EL 253)</td>
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<tr>
<td>General Physics (Phys 133)</td>
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<td></td>
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<tr>
<td>Engineering Mechanics (ME 211, 212)</td>
<td></td>
<td>3</td>
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</tr>
<tr>
<td>Analytic Geometry and Calculus (Math 241)</td>
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</tr>
<tr>
<td>Differential Equations (Math 242)</td>
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<tr>
<td>Advanced Engineering Mathematics (Math 318)</td>
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</tr>
<tr>
<td>General Chemistry (Chem 321, 322)</td>
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<tr>
<td>Public Speaking (Sp 201)</td>
<td></td>
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#### Junior

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<td>Aerothermodynamics (Aero 301, 302, 303)</td>
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<td>Aerodynamics (Aero 306)</td>
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<td>Electromechanics (EL 311)</td>
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<td>Growth of American Democracy (Hist 304)</td>
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#### Senior

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<td>Aero Design (Aero 444, 445, 446)</td>
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<td>Mechanical Vibrations (Aero 410)</td>
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### Descriptions of Courses in 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 124 Power Plants (3)**


† To be selected from the General Education list with adviser approval.
‡ 9 units to be selected from the following groups: Aero 411, 412, 413; 401, 402, 403; 408, 409, 414, 415, 416, 417, 419.
Aero 125  Materials and Fabrication (3)
Chemical and physical characteristics of materials used in aircraft and missile construction. Identification of materials and nomenclature of parts. Basic manufacturing processes used in the performance of standard tests to determine the behavior under load of materials and fabricated sections. 2 lectures, 1 laboratory

Aero 126  Aeronautical Laboratory (3)
Introduction to the graphical and analytical solution of aeronautical engineering problems. Tabulation of engineering data, slide rule computations. Methods and procedures used in testing aircraft and missile components. Familiarization with various types of instruments used for testing purposes. The student writes formal engineering reports on his laboratory work. 1 lecture, 2 laboratories. Concurrent: Math 141

Aero 205  Strength of Materials (3)
Tensile, compressive, and shear stresses in components and structures. Stress-strain relation. Centric, torsional, and flexural loadings. Relationship of shear, moment, slope and deflection. Bending stresses in simple beams. Thermal stresses. 3 lectures. Prerequisite: ME 211

Aero 206  Strength of Materials (3)
Beam deflections. Statically indeterminate, restrained, continuous and curved beams. Column analysis. Failure under combined and fluctuating stresses. Shear flow in thin-walled members subjected to bending. 3 lectures. Prerequisite: Aero 205

Aero 207  Strength of Materials (6)
Combines content of Aero 205, 206. Primarily for transfer students. 6 lectures. Prerequisite: ME 211

Aero 229  Strength of Materials Laboratory (1)

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 250  Engineering Problems—Digital Computers (1)
Solution of selected engineering problems by means of digital computers. 1 laboratory. Prerequisite: Math 141

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 206

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)

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 325

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
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.
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

<table>
<thead>
<tr>
<th>Freshman</th>
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<tr>
<td>Electric Circuits (EE 132, 133)</td>
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<td>Orientation (EE 151)</td>
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* Student without high school drafting will take ME 121; otherwise ME 151.
† To be selected from the General Education List.
‡ To be selected from EnvE 141, IE 141, WM 141, 142, MP 141, 142.
### Sophomore

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<td>Energy Conversion (EE 223)</td>
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<td>Engineering Problems—Digital Computers (EE 250)</td>
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<td>Analytic Geometry and Calculus (Math 241)</td>
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<td>Advanced Engineering Mathematics (Math 318)</td>
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<td>General Physics (Phys 132)</td>
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### Junior

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<td>Wave Propagation and Power Transmission (EE 321)</td>
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<td>Network Synthesis (EE 322)</td>
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<td>Linear Analysis with Analog Computer (EE 323)</td>
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<td>Electromagnetic Machines (EE 331, 332)</td>
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<td>Electronics (EE 334, 335, 336)</td>
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<td>Engineering Mechanics (ME 212)</td>
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<td>Senior Project (EE 461, 462)</td>
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<td>Undergraduate Seminar (EE 463)</td>
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<td>Fluid Mechanics (ME 341)</td>
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### DESCRIBITIONS OF COURSES IN ELECTRICAL ENGINEERING

**EE 104 Electric Circuits (6)**

Covers lecture material in EE 132, 133. For transfer students who have completed at least one year of calculus. 6 lectures.

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§ To be selected from EnvE 141, IE 141, WM 141, 142, MP 141, 142.

** To be selected from the General Education List with adviser approval.

*6 units from Electrical Engineering Design EE 421, 422 or Plant Electric Design EE 425, 426; 3 units from EE 402, 407 or special project approved by adviser and department head.
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 (4) (4)
Definitions, units, experimental laws applied to circuits. Mathematical and laboratory techniques of analysis. 3 lectures, 1 laboratory.

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 204 Engineering Electromagnetics (6)
Covers lecture material in EE 221, 222. For transfer students. 6 lectures. Prerequisite: EE 104

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, 222 Engineering Electromagnetics (4)(4)
Electric and magnetic fields. Maxwell's equations. Introduction to traveling waves and radiation. 3 lectures, 1 laboratory. Prerequisite: A basic circuit course and one year of calculus.

EE 223 Energy Conversion (4)
Magnetically coupled circuits. Torque and power. Rotating machines. 3 lectures, 1 laboratory. Prerequisite: EE 222

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 244 Electric Laboratory (2)
Covers material in EE 221 and 222. For transfer students. 2 laboratories.

EE 250 Engineering Problems—Digital Computers (1)
Solution of selected engineering problems by means of digital computers. 1 laboratory. Prerequisite: Math 142
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. Concurrent: EE 207, 208

EE 253 Engineering Problems Solutions (1)

EE 254 Electrical Engineering Laboratory (2)
Combines content of EE 251, 252. Primarily for transfer students. 2 laboratories. Concurrent: EE 209

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. 3 lectures. Prerequisite: EL 202

EE 321 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 A.C. network analyzer. 3 lectures, 1 laboratory. Prerequisite: EE 222

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.

EE 324 Electrical Systems Design (3)

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: Permission 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 223

EE 334, 335, 336 Electronics (4)(4)(4)
Theory of electronic devices. Active networks. 3 lectures, 1 laboratory. Prerequisite: EE 222

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 permission of instructor.
EE 407 Power Systems Engineering (3)
Equivalent circuits. Sequence impedances. Symmetrical components. Faults and sudden loads. 3 lectures.

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 permission of instructor.

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: Permission of the instructor.

EE 428 Dynamic Instrumentation (3)
Electrical measurement of non-electrical phenomena. Transducers. Transmission systems. Recorders. Theory and operation. 2 lectures, 1 laboratory. Prerequisite: Permission 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: Permission of the instructor.

EE 442 Control Systems Laboratory (1)
Individual study of advanced control systems. 1 laboratory. Prerequisite: permission 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.

EE 466 Ethics in Engineering (2)
Introduction to business and legal aspects of engineering. Ethics as applied to the practice of engineering. 2 seminars.
A Senior Project in Electronic Engineering
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.

During the sophomore and junior years the student will follow two areas of study in an unbroken sequence of six quarters. These are the core of the program and deal (1) with basic circuit theory using modern methods of analysis by pole-zero patterns in the complex frequency plane and linear transform theory, and (2) with the physics and circuitry of linear and non-linear 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.

One of the highlights of the senior year is the Senior Project activity where the student translates his own ideas into practice, exercising his own judgment and skill in creating something of value. This experience calls for judgment and compromise, and helps to close the gap between principle and practice.

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.
# CURRICULUM IN ELECTRONIC ENGINEERING

## Freshman

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<thead>
<tr>
<th>Course</th>
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<tr>
<td>Introductory Electronics (EL 111, 112)</td>
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<tr>
<td>Experimental Electronics (EL 151, 152)</td>
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<tr>
<td>Electronic Instruments (EL 113)</td>
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<td>Electronic Instruments Laboratory (EL 153)</td>
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<td>Engineering Drawing (ME 151, 152)</td>
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<td>* Manufacturing Processes</td>
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<td>Introductory Circuits Laboratory (EL 241, 242)</td>
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<td>Physical Electronics (EL 207)</td>
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<td>Electron Devices (EL 219)</td>
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<td>Electron Devices Laboratory (EL 259)</td>
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<td>Graphics in Electronics (EL 146)</td>
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<td>Engineering Problems—Digital Computers (EL 250)</td>
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<td>Advanced Engineering Mathematics (Math 318)</td>
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<td>Introduction to Optics and Atomic Physics (Phys 211)</td>
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<td>Engineering Mechanics (ME 211, 212)</td>
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<td>General Psychology (Psy 202)</td>
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<td>Sports Education (PE 241)</td>
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<td>Linear Systems Analysis (EL 301, 302)</td>
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<td>Networks Laboratory (EL 341, 342)</td>
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<td>Analog Computer Laboratory (EL 343)</td>
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<td>Electronic Circuits (EL 314, 315, 316)</td>
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<td>Electronic Circuits Laboratory (EL 344, 345, 346)</td>
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<td>Reliability Engineering (EL 309)</td>
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<td>Electric Machines (EE 313)</td>
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<td>Thermodynamics (ME 308)</td>
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<td>Engineering Materials (ME 314)</td>
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<td>General Chemistry (Chem 321, 322)</td>
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* Chosen from IE 141, EnvE 141, MP 141, 142, WM 141, WM 142.
† To be selected from the General Education list with adviser approval.
### DESCRIPTIONS OF COURSES IN 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.

**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, Phys 131

**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

* Department Head approval necessary for 8 of these units to be selected from EL 402, 406, 411, 412, 414, 421, 423, and other advanced courses in the student's professional specialization.

† To be selected from the General Education list with adviser approval.
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)
Logically ordered introduction of the basic physical concepts underlying the study of electronics. Emphasis on electrical and magnetic field theory and the controlled motion of charged particles. 3 lectures, 1 two-hour activity. Prerequisite: Phys 132, Math 143

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, EL 102, EL 142. Concurrent: Math 242

EL 219 Electron Devices (5)
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. 5 lectures. Prerequisite: EL 207, Phys 211

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.

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 250 Engineering Problems—Digital Computers (1)
Solution of selected engineering problems by means of digital computers. 1 laboratory. Prerequisite: Math 142

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 259 Electron Devices Laboratory (2)
Fundamental experiments in investigating the physical and electrical properties of semiconductor and electron tube devices. Emphasis on collecting, correlating, graphing, and evaluating laboratory data. 2 laboratories. Concurrent: EL 219

EL 301, 302 Linear System Analysis (3) (3)

EL 309 Reliability Engineering (2)
Application of reliability mathematics and principles to electronic design with emphasis on electronic equipment using microminiature element groups. 2 lectures. Prerequisite: EL 314
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. Concurrent: 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 241

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 219, 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, scalers, linear time bases and multivibrators. Piece-wise 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

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 324 Digital Computer Techniques (3)
Course designed for mathematics, science and engineering majors other than electronic and electrical. Fundamental principles of digital computers, field of application in science and engineering. Programming. 2 lectures, 1 two-hour activity period. Prerequisite: Consent of instructor

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 theorems. 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)
Digital arithmetic techniques. Switching algebra, logical design, simplification and realization of combinational circuits. Design of transistor logic circuits, digital sub-systems such as counters, adders and registers. 3 lectures. Prerequisite: EL 316

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 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 412 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 special emphasis on non-linear techniques including function multiplication and generation, output devices. 2 lectures, 1 two-hour activity. Prerequisite: EL 343
EL 413  Control Systems Engineering (3)
Analysis and design and feedback control systems, root-locus and frequency response techniques. Systems performance criteria, methods of improving transient and steady-state response by use of compensating filter techniques. 3 lectures. Prerequisite: EL 302

EL 414  Control Systems Engineering (2)
Analysis and design of control systems using the electronic analog and digital computer approach. Non-linear problems, self-adaptive control systems and computer process control. 2 lectures. Prerequisite: EL 413

EL 421  Principles of Solid-State Microelectronics (3)

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.
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**

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<th>Course Description</th>
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<td>Environmental Graphics (EnvE 121, 122, 123)</td>
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<td>Elements of Electronics (EL 101, 102)</td>
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<td>Electronics Laboratory (EL 141, 142)</td>
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<td>Manufacturing Processes (EnvE 141, MP 141, 142)</td>
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<td>(IE 141, WM 141, 142)</td>
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<td>Analytic Geometry and Calculus (Math 141, 142, 143)</td>
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<td><strong>Life Science</strong></td>
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**To be selected from General Education list.
## Engineering

### Sophomore

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<td>Engineering Problems—Digital Computers (EnvE 250)</td>
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<td>Fluid Systems (EnvE 231, 232, 233)</td>
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<td>Electrical Engineering (EE 207, 208)</td>
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<td>Electrical Engineering Laboratory (EE 251, 252)</td>
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<tr>
<td>Electronic Engineering (EL 321)</td>
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<tr>
<td>Electronic Engineering Laboratory (EL 354)</td>
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<tr>
<td>Fluid Flow (ME 311)</td>
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<td>$§$ Electives and courses to complete major</td>
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### Senior

<table>
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<tr>
<th>Course Description</th>
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<tr>
<td>Advanced System Design (EnvE 441)</td>
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<tr>
<td>Senior Project (EnvE 461, 462)</td>
<td>2</td>
<td>2</td>
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<tr>
<td>Undergraduate Seminar (EnvE 463)</td>
<td>2</td>
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<tr>
<td>General Psychology (Psy 202)</td>
<td>3</td>
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<tr>
<td>American Government (Pol Sc 301)</td>
<td>3</td>
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<tr>
<td>Growth of American Democracy (Hist 304)</td>
<td>3</td>
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<tr>
<td>U.S. in World Affairs (Hist 305)</td>
<td>3</td>
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<tr>
<td>Survey of Economics (Ec 201)</td>
<td>3</td>
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<tr>
<td>Business Law Survey (Bus 301)</td>
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<td><strong>Literature or philosophy</strong></td>
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<tr>
<td>$§$ Electives and courses to complete major</td>
<td>7</td>
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</table>

### Descriptions of Courses in Environmental Engineering

**EnvE 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.

**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.

**To be selected from the General Education List.**

$§$ 26 of the elective units must be chosen with the approval of the adviser according to the field of concentration.
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 321, 322

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 agri-
  cultural 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 labora-
  tory, 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 250  Engineering Problems—Digital Computers (1)
  Solution of selected engineering problems by means of digital computers. 1
  laboratory. Prerequisite: Math 143.

EnvE 301  Thermodynamics (3)
  First law of thermodynamics. The second law of thermodynamics and entropy.
  Irreversibility and availability. 3 lectures. Prerequisite: EnvE 203, Phys 133

EnvE 302' Thermodynamics of Refrigeration (3)
  Thermodynamic relations, mixtures, combustion. Analysis of refrigeration. 3
  lectures. Prerequisite: EnvE 301, Chem 322

EnvE 303  Advanced Thermodynamics of Refrigeration (3)
  Refrigeration and power cycles, components and controls. 3 lectures. Prerequi-
  site: 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. Pre-
  requisite: 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 condi-
  tions. 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. Pre-
  requisite: Math 242
<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>EnvE 324</td>
<td>Introduction to Air Pollution (3)</td>
<td>Causes and effects of air pollution on the individual, the community and industry. Legal and public relations aspects. 3 lectures.</td>
</tr>
<tr>
<td>EnvE 325</td>
<td>Air Pollution Measurements (3)</td>
<td>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 323, EnvE 324</td>
</tr>
<tr>
<td>EnvE 331, 332, 333</td>
<td>Thermal and Fluids Laboratory (2)(2)(2)</td>
<td>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, 324</td>
</tr>
<tr>
<td>EnvE 341, 342, 343</td>
<td>System Design (2)(2)(2)</td>
<td>Individual and team project work in designing systems for heating and refrigerating applications. 2 laboratories. Prerequisite: EnvE 203. Concurrent EnvE 301, 307</td>
</tr>
<tr>
<td>EnvE 400</td>
<td>Special Problems for Advanced Undergraduates (1-2)</td>
<td>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.</td>
</tr>
<tr>
<td>EnvE 401</td>
<td>Advanced Mass and Energy Transfer (3)</td>
<td>Thermodynamic properties of moist air. Humidity measurements, direct contact transfer processes, heating and cooling by extended surfaces, solar radiation. 3 lectures. Prerequisite: EnvE 313</td>
</tr>
<tr>
<td>EnvE 402</td>
<td>Advanced Fluid Mechanics (3)</td>
<td>Fluid dynamics and fluid machinery. Centrifugal and axial fans, pumps and compressors. Turbines. Fluid flow in ducts. 3 lectures. Prerequisite: ME 311, EnvE 401</td>
</tr>
<tr>
<td>EnvE 411</td>
<td>Air Pollution Control (3)</td>
<td>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</td>
</tr>
<tr>
<td>EnvE 421</td>
<td>Advanced Air Pollution Control (2)</td>
<td>Theory, principles and practices related to the control of gaseous emissions. Process characteristics. Odor control. Mass transfer operations as applied to environmental control. 2 lectures. Prerequisite: EnvE 411</td>
</tr>
<tr>
<td>EnvE 422</td>
<td>Environmental Radiation Surveillance (2)</td>
<td>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</td>
</tr>
<tr>
<td>EnvE 423</td>
<td>Industrial Environments (2)</td>
<td>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</td>
</tr>
<tr>
<td>EnvE 441, 442, 443</td>
<td>Advanced System Design (3)(3)(3)</td>
<td>Individual and team project work in designing systems for air conditioning. 1 lecture, 2 laboratories. Prerequisite: EnvE 341, ME 311</td>
</tr>
<tr>
<td>EnvE 461, 462</td>
<td>Senior Project (2)(2)</td>
<td>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.</td>
</tr>
</tbody>
</table>
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.

DESCRIPTION OF COURSE IN 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.
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.

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.

**CURRICULAR CONCENTRATIONS**

Manufacturing Engineering

The purpose of this concentration is to prepare graduates for successful careers in enterprises involved in the manufacturing of products. The demand for graduates in this field is large and increasing.

Production Management

This concentration combines a thorough understanding of the fundamentals of engineering with a broad background in manufacturing processes, statistics, accounting, economics, social sciences and management principles.

**CURRICULUM IN INDUSTRIAL ENGINEERING**

<table>
<thead>
<tr>
<th>Freshman</th>
<th>F</th>
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<tbody>
<tr>
<td>Introduction to Industrial Engineering (IE 101)</td>
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<tr>
<td>Engineering Analysis (IE 122)</td>
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<tr>
<td>Systems Analysis (IE 123)</td>
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<tr>
<td>Elements of Electronics (EL 101)</td>
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<tr>
<td>Electronics Laboratory (EL 141)</td>
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<tr>
<td>* Manufacturing Processes</td>
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<tr>
<td>Engineering Drafting (ME 151, 152, 153)</td>
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<td>1</td>
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<tr>
<td>Analytic Geometry and Calculus (Math 141, 142, 143)</td>
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<td>General Physics (Phys 131, 132)</td>
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<td>Freshman Composition (Eng 104, 105, 106)</td>
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<td>§ Life Science</td>
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<td>Health Education (PE 107)</td>
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<tr>
<td>Physical Education (PE 141)</td>
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* EnvE 141, MP 141, 142, IE 141, WM 141, WM 142.

§ To be selected from General Education list.
Students Conducting Dynamometry Tests on Numerically Controlled Turret Drill in Industrial Engineering Laboratory
### Sophomore

<table>
<thead>
<tr>
<th>Course</th>
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<tbody>
<tr>
<td>Manufacturing Engineering Laboratory (IE 241, 242, 243)</td>
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<tr>
<td>Industrial Costs and Controls (IE 239)</td>
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<tr>
<td>Work Methods and Measurement (IE 236)</td>
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<tr>
<td>Engineering Problems—Digital Computer (IE 250)</td>
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<tr>
<td>Analytic Geometry and Calculus (Math 241)</td>
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<tr>
<td>Mathematics of Statistics (Stat 321)</td>
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<td>General Physics (Phys 133)</td>
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<td>Engineering Mechanics (ME 211, 212)</td>
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<td>General Chemistry (Chem 321, 322)</td>
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<td>Survey of Economics (Ec 201)</td>
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<tr>
<td>Principles of Accounting (Actg 221, 222)</td>
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<tr>
<td>Sports Education (PE 241)</td>
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* Electives and courses to complete major

| Units | 17½ | 18½ | 18½ |

### Junior

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<th>Course</th>
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<tr>
<td>Manufacturing Design (IE 341, 342)</td>
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<tr>
<td>Statistical Quality Control (IE 336)</td>
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<td>Industrial Presentation Techniques (Arch 357)</td>
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<td>Strength of Materials (ME 202, 203)</td>
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<td>Electrical Engineering (EE 207, 208)</td>
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<td>Electronic Engineering (EL 321)</td>
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<tr>
<td>Electronic Engineering Laboratory (EL 354)</td>
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<td>American Government (Pol Sc 301)</td>
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<td>Growth of American Democracy (Hist 304)</td>
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<td>U.S. in World Affairs (Hist 305)</td>
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<td>§ Literature</td>
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</table>

* Electives and courses to complete major

| Units | 18 | 17 | 15 |

### Senior

<table>
<thead>
<tr>
<th>Course</th>
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<tr>
<td>Sales Engineering (IE 401)</td>
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<tr>
<td>Engineering Economy (IE 414)</td>
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<tr>
<td>Manufacturing Management (IE 421)</td>
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<tr>
<td>Fundamentals of Supervision (IE 441, 442, 443)</td>
<td>2</td>
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<tr>
<td>Senior Project (IE 461, 462)</td>
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<td>Undergraduate Seminar (IE 463)</td>
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<tr>
<td>Human Factors Engineering (IE 435)</td>
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<tr>
<td>Elements of Machine Design (ME 423)</td>
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<td>General Psychology (Psy 202)</td>
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<td>§ Social Sciences</td>
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</tbody>
</table>

* Electives and courses to complete major

| Units | 18 | 17 | 16 |

### Descriptions of Courses in 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.

§ To be selected from the General Education list.

* From 19 to 21 of the elective units must be chosen with the approval of the adviser according to the field of concentration.
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 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: ME 143, 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. Concurrent: IE 243

IE 239  Industrial Costs and Controls (4)
Estimation and use of production costs, budgetary procedures and controls. Concepts and techniques employed in product costing. Application to practical manufacturing situations. 3 lectures, 1 laboratory. Prerequisite: Actg 222. 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 241, 242, 243  Manufacturing Engineering Laboratory (2) (2) (2)
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. 2 laboratories. Prerequisite: MP 142, IE 141, ME 143

IE 250  Engineering Problems—Digital Computers (1)
Solution of selected engineering problems by means of digital computers. 1 laboratory. Prerequisite: Math 142
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 243

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: IE 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.

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 sales in engineering, stressing service responsibilities related to the career of sales engineering. Indoctrination in qualities and attitudes essential to industrial engineering as well as sales engineering. Job qualifications, prime requisite factors, systems of distribution, the sales organization including its management and control, and fundamentals of salesmanship. 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. 2 lectures. Prerequisite: For non-IE students of Senior or advanced Junior 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.

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: IE 305, 421, 431

IE 425 Industrial Procurement (2)
A study of procurement organization, policies, and procedures in industry and government. Description of quality; optimum quantity and price; selecting sources of supply; vendor relations; forward buying and speculation; procurement of major equipment, new and used; make or buy; procurement budgets. 2 lectures. Prerequisite: Senior standing.

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 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: IE 243, 428

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 Fundamentals of Supervision (2)
Theory and principles of supervision. Application of fundamental concepts and techniques of supervision provided by assignment in manufacturing laboratories. 2 laboratories. Prerequisite: IE 236

IE 442 Fundamentals of Supervision (2)
Theory and principles of supervision. Additional application of fundamental concepts and techniques of supervision provided by assignment in manufacturing laboratories. 1 lecture, 1 laboratory. Prerequisite: IE 441

IE 443 Fundamentals of Supervision (1)
Theory and principles of supervision. Additional application of fundamental concepts and techniques of supervision provided by assignment in manufacturing laboratories. 1 laboratory. Prerequisite: IE 442
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 243, 331

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
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 expeditor, 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

### Freshman

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<th>Course</th>
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<td>Technical Computation (IT 101)</td>
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<td>Introduction to Industrial Technology (IT 111)</td>
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<td>Power Technology (IT 122, 123)</td>
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<td>Graphic Arts Processes (IT 127)</td>
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<tr>
<td>Engineering Drafting (ME 151, 152)</td>
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<td>Mathematics for Engineering (Math 117)</td>
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<td>Analytic Geometry and Calculus (Math 141)</td>
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<td>Human Relations (IR 118)</td>
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<td>Freshman Composition (Eng 104, 105)</td>
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<td>Physical Education (PE 141)</td>
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<tr>
<td>Technical Sketching (IT 245)</td>
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<td>Electronics, D.C. and A.C. (IT 131, 132)</td>
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<td>Industrial Electronic Circuits (IT 133)</td>
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<td>College Physics (Phys 121, 122, 123)</td>
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<td>Introduction to Philosophy (Phil 201)</td>
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<td>Industrial Design (IT 346)</td>
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<td>Audio Visual Methods (AV 432)</td>
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### Senior

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<td>Senior Project (IT 461, 462)</td>
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<td>American Government (Pol Sc 301)</td>
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<td>Growth of American Democracy (Hist 304)</td>
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*Eng 204 or 218 or 219.*

**EnvE 141; MP 141, 142; IE 141; WM 141, 142.
INDUSTRIAL EDUCATION OPTION (ADD COURSES BELOW TO BASIC CURRICULUM)

**Freshman**
- ME 153 Engineering Drafting (1)

**Sophomore**
- IT 125 Industrial Wood Processes (2)
- IT 236 Wood Technology (3)
- IT 238 Advanced Graphic Arts (3)

**Junior**
- Ed 312 Educational Psychology (1)
- Ed 401 Public Education in American Society (2)

*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)

**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)

**Senior**
- IT 404 Customer Relations (2)
- IT 405 Industrial Marketing (2)
- Bus 418 Quantitative Methods and Controls in Business (3)

**DESCRIPTIONS OF COURSES IN 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.

*Courses must be chosen with the approval of adviser in one or more of the following areas: specialties: electronics, metals, drafting, wood, power technology, or graphic arts.*
IT 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. 1 lecture, 2 laboratories.

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 238  Advanced Graphic Arts  (3)
Advanced study and related applications of design, layout, composition, presswork and bindery. 3 activities. Prerequisite: IT 127

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: ME 142

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 141, 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.)

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 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 141

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 to manufacturing processes. 2 lectures, 1 laboratory. Prerequisite: Junior standing or approval of instructor.

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 347, 348  Industrial Arts Crafts (2) (2)  
Design and construction of useful articles utilizing wood, art metal, ceramics, textiles, plastic, leather, reed, and other craft materials. Study of related processes and products. 2 laboratories. Prerequisite: IT 346

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: Approval 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
Engineering

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 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: IT 238 or permission of instructor.

IT 358  Offset Reproduction (3)
Design, layout, composition, photography, stripping, plate making, papers and inks as they relate to offset reproduction. Operation and maintenance of small offset presses and duplicators. 3 activities. Prerequisite: IT 238 or permission of instructor.

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 approval 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 approval of instructor.

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  Advanced Power Technology (3)
Fundamentals and technical aspects of suspension systems, steering, braking and other control systems of powered mobile equipment as well as tires and lubrication. 3 activities. Prerequisite: IT 123

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 459 Graphic Communication Developments (3)
Laboratory study of recent developments and trends in processes, methods, materials and equipment used in graphic communication. 3 activities. Prerequisite: Senior standing or permission of instructor.

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.
MANUFACTURING PROCESSES DEPARTMENT

Acting Department Head, Leo E. Rogers
Ellard W. Betz
Richard E. Hall
C. C. Richards
Francis F. Whiting

The Manufacturing Processes Department, a service department to the School of Engineering, provides courses in the engineering characteristics and capabilities of the manually and automatically controlled machine tools used in industry. Department courses include the design of special manufacturing tools, evaluation of cutting tool performance, physical properties of both tools and materials, chip formation and tool geometry, the machinability rating of materials, thermal aspects of cutting fluids, the stress and surface conditions resulting from the cutting process, and quality control by the use of precision measuring instruments as applied to both dimensional and surface conditions. American Standard Association standards, as applied to tools and machine elements, are an important feature of the courses and include the standard classifications and numbering systems for both ferrous and nonferrous materials.

The laboratories of the Manufacturing Processes Department are well equipped with modern instrumentation and machine tools to support the principal concept that engineering is a constant interplay between theory and application. These laboratory facilities enable the student to explore the basic mechanisms of the metal cutting process, thereby enabling him to successfully predict and plan manufacturing procedures.

DESCRIPTIONS OF COURSES IN MANUFACTURING PROCESSES

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)

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)

Uses, capabilities, and operational characteristics of grinding type machine tools. Standard classification, grade, and application of abrasive wheels. Thermal characteristics of grinding fluids. Stress and surface damage of heat treated and annealed materials. Safety standards. Fixturing and mounting of magnetic and non-magnetic materials. 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: MP 141, 142 and 152; ME 203 or Aero 206

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 155, 421
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.

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

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<td>General Physics (Phys 131, 132)</td>
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*EnvE 141, MP 141, 142, IE 141, WM 141, WM 142.*
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* Phys 212 and 1 unit technical elective may be substituted.

** One of the following sequences must be included: Welding Engineering (WM 434, 435, 436), Design of Piping Systems (ME 424, 425), Machine Design (ME 401, 402), Heat Transfer, Nuclear Power Plants, Turbomachinery (ME 411, 412, 413).

§ To be selected from the General Education list with adviser approval.
ME 121 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.

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.

ME 141 Engineering Drafting (2)
Review of basic principles of axonometric, oblique, and multiview drawing systems as applied to typical engineering design problems. Current industrial practices including section views, conventions and techniques of dimensioning. 2 laboratories.

ME 142 Engineering Drafting (2)
Application of multiview drawing system to typical layout and design problems involving points, lines, planes and geometric solids with curved surfaces. Introduction to graphical methods for engineering computation and recording of engineering data. 2 laboratories. Prerequisite: ME 141 or 151

ME 143 Engineering Drafting (2)
Theory of selecting dimensions, tolerances, and fits for interchangeable parts. Delineation and arrangement of detail and assembly working drawings. Application of welding, piping, and fastener symbols. Basic principles of architectural and structural drawings. 2 laboratories. Prerequisite: ME 141 or 151

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 151 Engineering Drafting (1)
Review of basic principles of axonometric, oblique, and multiview drawing systems as applied to typical engineering design problems. Current industrial practices including section views and conventions. 1 laboratory.

ME 152 Engineering Drafting (1)
Application of multiview drawing system to typical layout and design problems involving points, lines, planes, and geometric solids with curved surfaces. 1 laboratory. Prerequisite: ME 151 or 141

ME 153 Engineering Drafting (1)
Theory of selecting dimensions, tolerances, and fits for interchangeable parts. Delineation and arrangement of detail and assembly working drawings. 1 laboratory. Prerequisite: ME 151 or 141

ME 202, 203 Strength of Materials (3) (3)
Relation between physical properties of materials and their use in engineering structures. Calculation of deflection and required size of basic structural and machine elements. 3 lectures. Prerequisite: ME 211

ME 207 Simplified Drafting Methods (1)

ME 211, 212 Engineering Mechanics (3) (3)
General and specific consideration of moments, couples, centroid, multidimensional systems. Field concepts as applied to rigid bodies. Motion, momentum, and energy. 3 lectures. Prerequisite: Phys 131, Math 142
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. Prerequisite: ME 203

ME 250 Engineering Problems—Digital Computers (1)
Solution of selected engineering problems by means of digital computers. 1 laboratory. Prerequisite: ME 203

ME 249 Additional Engineering Laboratory (1)
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. Prerequisite: ME 203

ME 250 Engineering Problems—Digital Computers (1)
Solution of selected engineering problems by means of digital computers. 1 laboratory. Prerequisite: ME 203

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 321

ME 304 Thermodynamics (3)
Thermodynamic cycles, modern applications of these cycles. Introduction to heat transfer. 3 lectures. Prerequisite: Chem 321, ME 303

ME 308 Thermodynamics (3)
Systems, properties and measurements; work, heat and energy; first law of thermodynamics; second law of thermodynamics; gas laws; thermodynamic potentials. 3 lectures. Prerequisite: Phys 132

ME 309 Heat Transfer (3)
Introduction to heat transfer; momentum transfer (laminar and turbulent flow); heat transfer in laminar and turbulent flow; conduction; radiation. 3 lectures. Prerequisite: ME 308

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, compressible flow. Pumps, turbine, fluid power transmission systems, and fluid film lubrication. 3 lectures. Prerequisite: ME 212

ME 314 Engineering Materials (3)

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, ME 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) (3)
Fluid statics and dynamics. Flow measurement, networks, open channels, compressible flow, fluid machinery and control systems. 3 lectures. Prerequisite: ME 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 302

ME 345 Fluids Laboratory (1)
Experimental determination of operating characteristics and performance criteria for industrial flow equipment, including pumps, pipes, measuring devices and others. 1 laboratory. Prerequisite: ME 341

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 406 Contracts and Specifications (1)
A study of the legal requirements of contracts, the technical and legal requirements of specifications, the legal relationships of the technical man. 1 lecture. Prerequisite: Junior standing.

ME 411 Heat Transfer (3)
Basic principles of heat transfer. Steady state and transient conduction problems using analytical and numerical methods. Free and forced convection. Transfer of radiant energy. 3 lectures. Prerequisite: Math 318, ME 302

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 322

ME 413 Turbomachinery (3)

ME 416 Mechanical Vibrations (4)

ME 422 Instruments and Controls (3)
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. 2 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: ME 203, 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: ME 203, 302

ME 427, 428  Mechanical Design (3) (3)
Design of machine parts as determined by stress and deflection. Effect of varying stresses and stress concentrations. Design of shafts, springs, cranks, axles, and other machine parts. Bearings and lubrication. Mechanical and hydraulic power transmission. Balancing of rotating parts. Over-all design of machine assemblies. 2 lectures, 1 laboratory. Prerequisite: ME 203, ME 324, WM 306

ME 429  Mechanical Design (3)
Design of mechanical systems and components utilizing all disciplines of mechanical engineering such as stress analysis, materials engineering, thermodynamics, heat transfer, etc. 2 lectures, 1 laboratory. Prerequisite: ME 428

ME 431  Mechanical Design Technique (3)
Comprehensive study of design methods. Design factors, including market value, producibility, serviceability, 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 429

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: ME 203

ME 451  Advanced Graphical and Numerical Methods (1)

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.
WELDING AND METALLURGICAL ENGINEERING DEPARTMENT

Department Head, Richard C. Wiley

Enrico P. Bongio  Thomas D. Kay  Glenn E. Seeber
Harry H. Honegger  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

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§ Life Science

§ To be selected from the General Education list.

* EnvE 141, MP 141, 142, JE 141, WM 141, WM 142.
### sophomore

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<tr>
<td>Metallurgical Engineering (WM 324, 325, 326)</td>
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<td>Electrical Engineering (EE 207, 208)</td>
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<td>Electronic Engineering (EL 321)</td>
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<td>Strength of Materials (ME 202, 203)</td>
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<td>Physical Chemistry (Chem 432)</td>
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<td>Mathematics of Statistics (Stat 321)</td>
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<td>Growth of American Democracy (Hist 304)</td>
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### senior

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<td>Applied Metallurgical Engineering (WM 424, 425, 426)</td>
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<td>Senior Project (WM 461, 462)</td>
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<td>Undergraduate Seminar (WM 463)</td>
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<td>Survey of Economics (Ec 201)</td>
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### Descriptions of Courses in Welding and Metallurgical Engineering

**WM 121, 122 Principles of Metallurgy (2) (2)**


**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.

* 4 units of electives must be approved by the department in terms of individual student objectives.

§ To be selected from the General Education list.
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 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 142

WM 221, 222 Physical Metallurgy (3) (3)
Lattice structures, cooling curves, alloy systems. Mechanical test methods, strength, ductility, modules 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. 2 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 250 Engineering Problems—Digital Computers (1)
Solution of selected engineering problems by means of digital computers. 1 laboratory. Prerequisite: Math 142

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 322; or permission of instructor.

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 324, 325, 326 Metallurgical Engineering (4) (4) (4)

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.
THE SCHOOL OF APPLIED ARTS
THE SCHOOL OF APPLIED ARTS

Carl C. Cummins, 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 of Science degree in the following majors:

<table>
<thead>
<tr>
<th>Business Administration</th>
<th>Journalism</th>
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<tbody>
<tr>
<td>Child Development</td>
<td>Physical Education</td>
</tr>
<tr>
<td>English</td>
<td>Printing Technology and Management</td>
</tr>
<tr>
<td>Home Economics</td>
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</table>

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.
California State Polytechnic College

BUSINESS ADMINISTRATION DEPARTMENT

Department Head, Owen L. Servatius

Roy E. Anderson  John B. Hirt  Walter E. Rice
Edward S. Barber  John R. Jones  Rol W. Rider, Jr.
Lawrence E. Baur  Paul Kenyon  J. Weldon Rohner
John H. Beebe  Frank B. LeRoi  Roger L. Sherman
William M. Boyce  Eugene L. O'Connor  Fuad Tellew
Erling A. Breckan  Howard R. O'Daniels  John L. Trammell
Ralph Campbell  Philip H. Overmeyer  Robert P. Vartan
George M. Eastham  Dominic Perello  Victor F. Wolcott
John M. Hamers, Jr.

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, 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.

In addition, a minor in Business Administration is available for students who wish to take business as a part of their teaching credential requirements.

CURRICULAR CONCENTRATIONS

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

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
The program within this concentration emphasizes product management within the total marketing aspects of business.

Economics
This concentration stresses economic analysis and its application in business and government. It is a flexible program for the student seeking opportunities in the fields of business economics, general economics and government.
CURRICULUM IN BUSINESS ADMINISTRATION

**Freshman**

<table>
<thead>
<tr>
<th>Course</th>
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<tbody>
<tr>
<td>Freshman Composition (Eng 104, 105)</td>
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<tr>
<td>Public Speaking (Sp 201)</td>
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<tr>
<td>Introduction to Literature (Eng 207)</td>
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<tr>
<td>Physical Education (PE 141)</td>
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<tr>
<td>Health Education (PE 107)</td>
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<tr>
<td><strong>Natural Sciences</strong></td>
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<tr>
<td>Basic Mathematics for General Education (Math 200)</td>
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<tr>
<td>Finite Mathematics for Business (Math 210)</td>
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<tr>
<td>The Business Enterprise (Bus 101)</td>
<td>4</td>
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<td>Business Reports (Bus 103)</td>
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<tr>
<td>The Labor Movement in the United States (IR 111)</td>
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<tr>
<td>Human Relations (IR 118)</td>
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<td>Electives</td>
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**Sophomore**

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<tr>
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<tr>
<td>Advanced Public Speaking (Sp 202)</td>
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<tr>
<td>Sports Education (PE 241)</td>
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<tr>
<td>Introduction to Philosophy (Phil 201)</td>
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<tr>
<td>Principles of Management (Bus 201)</td>
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<tr>
<td><strong>Natural Sciences</strong></td>
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<tr>
<td>Mathematics of Business (Math 215)</td>
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<tr>
<td>Elementary Probability and Statistics (Stat 211)</td>
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<tr>
<td>Statistical Methods (Stat 212)</td>
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<tr>
<td>Principles of Economics (Ec 211, 212, 213)</td>
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<tr>
<td>Principles of Accounting (Actg 221, 222)</td>
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<tr>
<td>Cost Accounting and Analysis (Actg 223)</td>
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<tr>
<td>Business and Its Environment (Bus 202)</td>
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<tr>
<td>Marketing Principles (Mktg 204)</td>
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**Junior**

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<tr>
<td>Logic (Phil 202)</td>
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<tr>
<td>Ethics (Phil 204)</td>
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<td>General Psychology (Psy 202)</td>
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<td>Political and Economic Geography (Geog 315)</td>
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<tr>
<td>American Government (Pol Sc 301)</td>
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<tr>
<td>Growth of American Democracy (Hist 304)</td>
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<tr>
<td>U. S. in World Affairs (Hist 305)</td>
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<tr>
<td>Business Law (Bus 307, 308, 309)</td>
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<tr>
<td>Money, Credit and Banking (Ec 337)</td>
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<tr>
<td>Financial Management (FPM 342, 343)</td>
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<tr>
<td>Machine Techniques in Business (Bus 320)</td>
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<tr>
<td><strong>Electives and courses to complete major</strong></td>
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<td>3</td>
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<tr>
<td><strong>Total</strong></td>
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</table>

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

** To be selected from the General Education list.

*** 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.
Senior  
** Literature, Art or Music ................................................. 3

Social Sciences Elective .................................................. 3
Business Policies (Bus 413) .................................................. 3
Business Organization (Bus 414) .......................................... 3
Business and Human Relations (IR 415) ................................. 3
Senior Project (Bus 461. 462) .............................................. 2
Undergraduate Seminar (Bus 463) ......................................... 2

*** Electives and courses to complete major .......................... 16

16 16 16

DESCRIPTIONS OF COURSES IN 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 (2)
Process and standard costs; overhead costs, budgeting. Use of cost accounting data in economic analyses and managerial control. 2 lectures. 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 encumbance procedures and special reporting requirements. 2 lectures. Prerequisite: Actg 132 or 222

** To be selected from the General Education list.
*** 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.
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

DESCRIPTIONS OF COURSES IN 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 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.

Bus 202 Business and Its Environment (3)
A course designed to give students an appreciation of the business unit and its relation to social, economic, political and cultural institutions. 3 lectures. Prerequisite: Ec 201 or Ec 211

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 same as for Bus 307-308-309, though in less depth. 3 lectures. Not applicable for credit in Business Administration curriculum. Junior standing or consent of instructor.

Bus 307 Business Law (3)
American law sources, courts, contracts, agency. 3 lectures. Prerequisite: Bus 202 or Ec 201 or Ec 211 or permission of instructor.

Bus 308 Business Law (3)
Bailments, carriers, sales, negotiable instruments, partnerships. 3 lectures. Prerequisite: Bus 307

Bus 309 Business Law (3)
Corporations, real property, personal property, domestic relations, community property, will and administration, trusts, insurance, suretyship, bankruptcy. 3 lectures. Prerequisite: Bus 308
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 320  Machine Techniques in Business (2)
History and development of machine techniques in the functions of business. Experience in the use of basic business and accounting machines. Human and capital considerations. 2 lectures.

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.

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 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: Senior standing in Business Administration or consent of instructor.

Bus 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 or consent of instructor.

Bus 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.

Bus 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.

Bus 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.

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.

DESCRIPTIONS OF COURSES IN 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 201

Ec 213 Principles of Economics (3)
Application of economic principles in an increasingly complex world. 3 lectures. Prerequisite: Ec 212

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 313 Economic Problems (3)
Specific current problems selected with reference to the needs of the students. 3 lectures. Prerequisite: Ec 201 or 211

Ec 321, 322, 323 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 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 move-
ment, 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 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 instruc-
tor. Maximum of 6 units credit may be earned.

DESCRIPTIONS OF COURSES IN 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. Pre-
requisite: FPM 310

FPM 312  Life and Health Insurance (3)
Analysis of contracts from the viewpoint of the insurance consumer, interpreta-
tion 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 (3)
Survey of risk, media and objectives related to investment policies of individuals
and institutions. Techniques of analysis, valuation and selection of securities. 2 lec-
tures, 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

DESCRIPTIONS OF COURSES IN INDUSTRIAL RELATIONS

IR 111  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 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 213  Personnel Administration (3)
Relationship of the individual to his job, employment process, training, employee services, safety, performance ratings, and employee counseling. 3 lectures.

IR 216  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 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.

IR 312  Industrial Relations (3)
Employer-employee relationships in the area of labor relations and personnel administration; the foreman, employee, and "human relations" in industry. Background of U.S. Labor movement; current labor legislation. 3 lectures. Prerequisite: Junior standing.

IR 316  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 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 213

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.
DESCRIPTIONS OF COURSES IN 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 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 204

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 204 or consent of instructor.

Mktg 306  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 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 306

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.
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.

| Psychology, Sociology and Anthropology | 21 |
| Literature, Art and Music | 18 |
| Child Development | 43 |
| General Education | 72 |
| Electives and courses to complete major | 44 |

CURRICULUM IN CHILD DEVELOPMENT

<table>
<thead>
<tr>
<th>Freshman</th>
<th>F</th>
<th>W</th>
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<tbody>
<tr>
<td>Orientation (HE 101)</td>
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<tr>
<td>The Beginning Family (HE 103)</td>
<td>3</td>
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<tr>
<td>Orientation to Art Materials (Art 232)</td>
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<tr>
<td>Orientation to Crafts (Art 233)</td>
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<td>Music Theory (Mu 101)</td>
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<tr>
<td>Music Appreciation (Mu 204)</td>
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<tr>
<td>Freshman Composition (Eng 104, 105, 106)</td>
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<tr>
<td>Mathematics for Elementary Teachers (Math 121, 122)</td>
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<td>4</td>
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<tr>
<td>Introduction to Sociology (Soc 105)</td>
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<tr>
<td>Natural History (Bio 127, 128, 129)</td>
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<tr>
<td>Health Education (PE 107)</td>
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<tr>
<td>Physical Education (PE 141)</td>
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<tr>
<td>Electives</td>
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Child Care Laboratory of Home Economics Department
## Applied Arts

### Sophomore

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<thead>
<tr>
<th>Course</th>
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<tbody>
<tr>
<td>Nutrition (HE 210)</td>
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<td>3</td>
</tr>
<tr>
<td>Family and Community Health (HE 222)</td>
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<tr>
<td>The Child, Family, and Community (HE 233)</td>
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<tr>
<td>Children's Literature (Eng 205)</td>
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<tr>
<td>Introduction to Drama (Eng 202)</td>
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<tr>
<td>Basic Music (Mu 201)</td>
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<tr>
<td>Art in Contemporary Life (Art 231)</td>
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<tr>
<td>Cultural Anthropology (Ant 201)</td>
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<tr>
<td>Inorganic Chemistry (Chem 324, 325)</td>
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<td>Organic Chemistry (Chem 326)</td>
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<tr>
<td>General Psychology (Psy 202)</td>
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<tr>
<td>Survey of Economics (Ec 201)</td>
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<tr>
<td>Public Speaking (Sp 201)</td>
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<tr>
<td>Physical Education (PE 241)</td>
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<tr>
<td>American Government (Pol Sc 301)</td>
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<tr>
<td>Growth of American Democracy (Hist 304)</td>
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<tr>
<td>U.S. in World Affairs (Hist 305)</td>
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<tr>
<td>Social Problems (Soc 303)</td>
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<tr>
<td>Social Stratification (Soc 323)</td>
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<tr>
<td>Personality and Mental Health (Psy 301)</td>
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<tr>
<td>Genetics (Bio 303)</td>
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<tr>
<td>Human Growth and Development (Ed 304)</td>
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<tr>
<td>Nursery School Activities (HE 319)</td>
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<td>Nursery School Participation (HE 320)</td>
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<td>Parent Education (HE 313)</td>
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<td>Dynamics of Clothing (HE 341)</td>
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<td>Creative Speech Activities (Sp 347)</td>
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<td>Electives</td>
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### Senior

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<tr>
<td>Literature</td>
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<tr>
<td>Introduction to Philosophy (Phil 201)</td>
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<td>Urban Sociology (Soc 313)</td>
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<td>Psychological Testing (Psy 432)</td>
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<tr>
<td>Administration of Child Development Programs (HE 404)</td>
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<tr>
<td>Supervised Nursery School and Community Experiences (HE 403)</td>
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<td>Family Development (HE 405)</td>
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<td>Social Psychology (Psy 401)</td>
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<td>Undergraduate Seminar (HE 463)</td>
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<tr>
<td>Electives</td>
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* To be selected from the General Education list.
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.

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 use of teacher education committees composed of staff members in the major and the education departments who evaluate the progress and potentialities of each student. 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.

DESCRIPTIONS OF COURSES IN 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. 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. 3 lectures. Prerequisite: Psy 202

Ed 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.

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. 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. Prerequisite: Ed 312

Ed 406 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 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 approval of the credential adviser, 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 and approval of the credential adviser.

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 and approval of credential adviser.

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 and approval of credential adviser.

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 and approval of credential adviser.

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 and approval of credential adviser.

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 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 standard 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 standard credential.
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 standard credential.

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 standard credential.

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 standard credential.

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 standard credential.

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 standard credential.

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 standard credential.

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: Graduate standing, Ed 434 or permission of instructor.

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. Prerequisite: Graduate standing.

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. Prerequisite: Graduate standing.

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, and senior standing.

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 general 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 general credential.

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 permission of instructor.

Ed 578 Elementary School Curriculum (3)
Advanced study of issues, trends, and theories of curriculum development in the elementary school. 3 lectures. Prerequisite: Graduate standing.

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 Standard Teaching Credential, Ed 531 or 516, Ed 532 or 512, and permission of the 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.

DESCRIPTIONS OF COURSES IN 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 231 Art in Contemporary Life (3)
Principles of art as expressed in our contemporary culture, particularly in the fine and graphic arts. Influence of art expression in developing and expressing the personality of the individual. 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 238 Art in the Home (3)
Principles of art applied to the home and its furnishings, and to personal attire. Laboratory problems in the arrangement, selection, and evaluation of useful and well designed objects. Study of line, color, form, texture, and space in three-dimensional projects. 2 lectures, 1 activity period.

Art 255 Art in Industry (2)
Fundamental design problems common to all phases of industry and commerce. 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 permission of instructor.

Art 324 Advanced Crafts (2)
Applied principles of general design and color theory in ceramics, metal work, textile design, and simple woodworking. Emphasis on skill development, material handling, and current methods of applied design. Lecture-discussion, investigation, laboratory projects. 2 two-hour laboratories. Prerequisite: Art 233 or 321, or permission of the instructor.

Art 340, 341 Painting Techniques (2) (2)
Development of advanced skills in using art media. Concentration on oil, water color and mixed media. 2 laboratory periods. Prerequisite: Art 201 or permission of the 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 permission of the 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)
Instruction and practice in designing, planning, cutting, forming, joining, tooling, enameling and decorating aluminum, brass, copper, pewter, and steel to produce artistic metal articles. 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 permission 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 permission of the 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 424, 425 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.

DESCRIPTIONS OF COURSES IN 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 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 permission of the 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 permission of the 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 permission of the instructor.

DESCRIPTIONS OF COURSES IN 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.

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
The English and Speech Department serves all schools of the college by providing courses which will increase a student's understanding, appreciation, and use of his language, both in writing and speaking. 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, 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**

<table>
<thead>
<tr>
<th>Course</th>
<th>F</th>
<th>W</th>
<th>S</th>
</tr>
</thead>
<tbody>
<tr>
<td>Freshman Composition (Eng 104, 105, 106)</td>
<td>3</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>Introduction to Fiction, Drama, Poetry (Eng 201, 202, 203)</td>
<td>2</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>Principles of Speech (Sp 201)</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>Physical Education (PE 141)</td>
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<td>½</td>
<td>½</td>
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<tr>
<td>Health Education (PE 107)</td>
<td>2</td>
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<tr>
<td>Basic Mathematics for General Education (Math 100)</td>
<td></td>
<td>3</td>
<td></td>
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<tr>
<td>History of Civilization (Hist 101, 102, 103)</td>
<td>3</td>
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</tr>
<tr>
<td>*Natural Science</td>
<td>3</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>**Electives</td>
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<td>2</td>
<td></td>
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<tr>
<td>**Total</td>
<td>15½</td>
<td>14½</td>
<td>16½</td>
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</tbody>
</table>

* A minimum of 15 units of natural science is required for graduation. (See General Education List). 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.
### Sophomore

<table>
<thead>
<tr>
<th>Course</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>European Literature (Eng 211)</td>
<td>3</td>
</tr>
<tr>
<td>Advanced Composition (Eng 304, 305, 306)</td>
<td>3</td>
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<tr>
<td>American Literature (Eng 311, 312, 313)</td>
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<tr>
<td>American Government (Pol Sc 301)</td>
<td>3</td>
</tr>
<tr>
<td>Growth of American Democracy (Hist 304)</td>
<td>3</td>
</tr>
<tr>
<td>U.S. in World Affairs (Hist 305)</td>
<td>3</td>
</tr>
<tr>
<td>Sports Education (PE 241)</td>
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</tr>
</tbody>
</table>

### Natural Science

- Cultural Anthropology (Ant 201)                                       | 3     |
- General Psychology (Psy 202)                                         | 3     |
- Survey of Economics (Ec 201)                                         | 3     |
- Electives                                                            | 1     |
- **Total**                                                            | 16½   |

### Junior

<table>
<thead>
<tr>
<th>Course</th>
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<tbody>
<tr>
<td>British Literature (Eng 307, 308, 309)</td>
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</tr>
<tr>
<td>Modern English Grammar (Eng 301)</td>
<td>3</td>
</tr>
<tr>
<td>Introduction to Shakespeare (Eng 210)</td>
<td>3</td>
</tr>
<tr>
<td>Children's Literature (Eng 205) or Readings for Young Adults (Eng 316)</td>
<td>3</td>
</tr>
<tr>
<td>Oral Interpretation (Sp 305)</td>
<td>3</td>
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<tr>
<td>Introduction to Philosophy (Phil 201)</td>
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<tr>
<td>Art elective</td>
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</table>
- Electives                                                            | 6     |
- **Total**                                                            | 15    |

### Senior

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<th>Course</th>
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<tr>
<td>History of the English Language (Eng 303)</td>
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</tr>
<tr>
<td>Modern Novel (Eng 415) or Modern Poetry (Eng 416) or Elizabethan Drama (Eng 419)</td>
<td>3</td>
</tr>
<tr>
<td>Significant British Writers (Eng 417) or Significant American Writers (Eng 418)</td>
<td>3</td>
</tr>
<tr>
<td>Electives</td>
<td>9</td>
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</table>
- **Total**                                                            | 15    |

### CURRICULUM FOR THE MASTER OF ARTS DEGREE

(For complete requirements see Graduate Study Bulletin)

<table>
<thead>
<tr>
<th>Units</th>
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</thead>
<tbody>
<tr>
<td>Eng 502 Introduction to Critical Analysis</td>
</tr>
<tr>
<td>Eng 503 Contemporary Language Study</td>
</tr>
<tr>
<td>Eng 504 Problems in Language</td>
</tr>
<tr>
<td>Eng 505 Problems in Composition</td>
</tr>
<tr>
<td>Eng 511 Problems in American Literature</td>
</tr>
<tr>
<td>Eng 512 Problems in British Literature</td>
</tr>
<tr>
<td>Eng 590 Graduate Seminar in English</td>
</tr>
<tr>
<td>Additional units in the Eng 300, 400 and 500 series, selected with advisory committee approval</td>
</tr>
<tr>
<td>Elective units in other departments, selected with advisory committee approval</td>
</tr>
<tr>
<td><strong>Total Units</strong></td>
</tr>
</tbody>
</table>

* A minimum of 15 units of natural science is required for graduation. (See General Education List.) Include one sequence course which meets for three quarters with a minimum of 9 units.
DESCRIPTIONS OF COURSES IN 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 permission of the instructor.
Eng 207 Introduction to Literature (2)
Introduction to major forms of literature. Study in depth of selected works with reading for appreciation. May not be elected by English majors. 2 lectures. Prerequisite: Eng 105

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 105

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 105

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 105

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)
Selected readings in American writers from Colonial times to the present. 3 lectures. Prerequisite: Eng 105
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 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 permission of the 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, 462 Senior Project (2) (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 120 hours total time.

Eng 463 Undergraduate Seminar (2)
Reports of senior projects, discussion of professional articles on an appropriate level. 2 lectures. Prerequisite: Completion of Senior Project.

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. 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. 3 lectures. Prerequisite: Graduate standing 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 standing 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 standing.

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 standing in English.

DESCRIPTIONS OF COURSES IN 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. 2 lectures, 1 two-hour laboratory. 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. Prerequisite: Eng 105

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 Survey of Radio and Television (3)
History of American broadcast media. FCC licensing and control, advertising practices, and trends in programming. Production of special types of program. 3 lectures. Prerequisite: Sp 200 or 201

Sp 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.

Sp 301 Debate (2)
Study of the current debate question selected for American colleges. Preparation of briefs and practice in debating. May be repeated for 6 units. 2 two-hour laboratories. Prerequisite: Sp 200 or 201

Sp 304 Persuasion and Critical Listening (2)
Basic theory of persuasive speaking. Presentation of speeches to secure audience acceptance of proposals. Practice in analysis of persuasion methods used in speech-making. 1 lecture, 1 two-hour laboratory. Prerequisite: Sp 200 or 201
Sp 305 Techniques of Oral Reading (3)
Selection, preparation, and presentation of material for oral reading. Experience in individual and choral reading. 2 lectures, 1 two-hour laboratory. Prerequisite: Sp 200 or 201

Sp 321 Acting and Directing (3)
Basic acting and directing techniques, improvisation, characterization, pantomime, and movement. 1 lecture, 2 two-hour laboratories. Prerequisite: Sp 200 or 201

Sp 322 Stagecraft (3)
Scenery design, construction, painting, lighting, costumes, and make-up. 1 lecture, 2 two-hour laboratories. Prerequisite: Sp 200 or 201

Sp 331 Applied Theater Practices (2)
Preparation of a play for public presentation, including scene construction and painting, lighting, mounting of sets, shifting sets, properties, costumes, make-up, sound effects, publicity, and house management. For students working on college plays. May be repeated to 6 units. 2 laboratories.

Sp 347 Creative Speech Activities (2)
Role playing, group dramatization, and related activities. For students preparing to teach in the elementary school. 2 two-hour laboratories. Prerequisite: Sp 200 or 201

Sp 401 Voice and Diction (2)
Concentration on special skills of enunciation and articulation, phonetics, pronunciation, and voice improvement. 1 lecture, 1 two-hour laboratory. Prerequisite: Sp 200 or 201

Sp 403 Discussion (2)
Role of spoken discourse in the solution of problems. Practice in procedural planning, the defining of problems, and the evaluation of solutions. Participation in business conferences and discussion forums. 1 lecture, 1 two-hour laboratory. Prerequisite: Sp 200 or 201

Sp 451 Radio and Television Production Laboratory (2)
Practical work on programs for radio and/or television, including writing of original and adapted program material. May be repeated to 6 units. 2 two-hour laboratories. Prerequisite: Sp 214

Sp 590 Graduate Seminar in Speech (1-3)
Readings and papers on special problems in selected areas of speech. Total credits limited to 6 units. 1-3 lectures. Prerequisite: Graduate standing.

DESCRIPTIONS OF COURSES IN 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.
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.

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.
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**

<table>
<thead>
<tr>
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<tr>
<td>Orientation to Home Economics (HE 101)</td>
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<td>The Beginning Family (HE 103)</td>
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<td>Introduction to Foods (HE 121)</td>
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<tr>
<td>Freshman Composition (Eng 104, 105, 106)</td>
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<td>3</td>
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<td>Physical Education (PE 141)</td>
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<td>Basic Math for General Education (Math 100)</td>
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<td>Art in Contemporary Life (Art 231)</td>
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<td>Health Education (PE 107)</td>
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<td>Introduction to Sociology (Soc 105)</td>
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<td>Elementary Human Physiology (Zoo 122)</td>
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<td>Electives and courses to complete major</td>
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Sophomore

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<tr>
<td>Nutrition (HE 210)</td>
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<td>The Child, Family, and Community (HE 233)</td>
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<td>Survey of Economics (Ec 201)</td>
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<td>General Inorganic Chemistry (Chem 324, 325)</td>
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<td>Organic Chemistry (Chem 326)</td>
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Junior

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<td>Dynamics of Clothing (HE 341)</td>
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Senior

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<td>American Government (Pol Sc 301)</td>
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<td>U.S. in World Affairs (Hist 305)</td>
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<td>Introduction to Philosophy (Phil 201)</td>
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Total: 16½ 16½ 16½

HOME ECONOMICS EDUCATION OPTION
(Add Courses Below to Basic Curriculum)

Freshman

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<tr>
<td>HE 131 Clothing Construction .... (5)</td>
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<td>HE 142 Home Furnishings ........ (3)</td>
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Sophomore

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<tr>
<th>Course</th>
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<tbody>
<tr>
<td>HE 222 Family and Community Health .......... (2)</td>
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<td>HE 231 Household Equipment .... (3)</td>
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Junior

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<tr>
<td>HE 319 Nursery School Activities (2)</td>
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<td>HE 320 Nursery School Participation ..........</td>
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<td>HE 322 Textiles .... (3)</td>
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<tr>
<td>HE 328 Advanced Nutrition .... (3)</td>
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Senior

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<tr>
<td>HE 323 Housing for Contemporaries .......... (3)</td>
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<tr>
<td>HE 333 Clothing Design and Construction .... (3)</td>
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<td>HE 405 Family Development .... (3)</td>
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<td>HE 423 Home Management Residence .......... (3)</td>
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FOOD ADMINISTRATION—DIETETICS OPTION
(Add Courses Below to Basic Curriculum)

Freshman
Actg 221-2 Principles of Accounting ...................................... (8)

Junior
HE 328 Advanced Nutrition ........................................ (3)
Bact 421 Food Microbiology ........................................ (4)

Sophomore
Bus 206 Purchasing .................................................. (3)
Chem 328 Biochemistry ............................................. (4)

Senior
HE 425 Quantity Cookery ............................................ (3)
HE 426 Food Production and Management ............................ (3)
HE 427 Equipment and Layout ....................................... (3)
HE 429 Diet Therapy .................................................. (3)

CURRICULUM FOR THE MASTER OF SCIENCE DEGREE
(For complete requirements see the Graduate Study Bulletin)

A. Required:

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:

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

DESCRIPTIONS OF COURSES IN 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 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.

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 142 Home Furnishings (3)
Application of art principles to furnishing a home, with emphasis on aesthetic, economic, and social factors affecting individual choices. 2 lectures, 1 two-hour laboratory. Men and women.

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.

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 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 233 The Child, Family, and Community (4)
Study of children in the family-centered home. Includes observation and participation in the child care laboratory and conferences with parents for gaining insight into child development and competency in care of children. 3 lectures, 1 laboratory. Prerequisite: HE 103 or Psy 202

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)
Sources and characteristics of natural and synthetic fibers. Fabrics, weaves, and textile finishes. Consumer approach to textile fabrics-selection, use and care. 2 lectures, 1 two-hour laboratory.

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: Junior standing.
HE 325  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 or 221

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 326

HE 332  Advanced Home Furnishings (2)
Consumer approach to home furnishings through rebuilding, upholstering, or refinishing a unit of furniture, and drapery construction. 2 laboratories. Prerequisite: HE 142

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 322, 341

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, permission of instructor.

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. 4 lectures. Prerequisite: Ed 312

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 (3)
Planning, preparing, and serving meals for large groups with emphasis on creative table setting, food buying, and management. 1 lecture, 2 laboratories. Prerequisite: HE 121, 210, 321
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, permission 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

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. 2 lectures, 1 laboratory. Prerequisite: HE 425 or permission of instructor.

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. 2 lectures, 1 laboratory. Prerequisite: HE 426 or permission 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)
Study of the past through present forms of world dress. Correlation of costume to social and economic life. Illustration and creation of original designs. 1 lecture, 2 laboratories. Prerequisite: HE 333

HE 442  Tailoring (2)
Selection and construction of garments requiring tailoring techniques. 2 laboratories. Prerequisite: HE 333 or permission 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.

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 permission of the 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 permission of instructor.

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 approval 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.
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-seven 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 radio station operation and management. Twenty 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 radio 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 radio newscasting 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

**Freshman**

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**Sophomore**

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<td>Sports Education (PE 241)</td>
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<td>American Literature (Eng 311, 312, 313)</td>
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<td>General Physical Science (PSc 101, 102, 103 or equiv.)</td>
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<td>Journalism History (Jour 201)</td>
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<td>News Writing (Jour 202)</td>
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<td>Reporting I (Jour 203)</td>
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<td>Introduction to Sociology (Soc 105)</td>
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**Junior**

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<td>Graphic Arts Processes (IT 127)</td>
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<td>Broadcast Media News (Jour 333)</td>
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<td>Global Geography (Geog 308)</td>
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**Senior**

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<td>Newspaper and Magazine Advertising (Jour 421)</td>
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<td>Advertising Layout and Copywriting (Jour 425)</td>
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<td>Newspaper Management (Jour 403)</td>
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<td>Applied Journalism Techniques (Jour 451, 452, 453)</td>
<td>2</td>
<td>2</td>
<td>2</td>
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<tr>
<td>Journalism Press Laws (Jour 402)</td>
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<td>3</td>
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<tr>
<td>Public Relations (Jour 412)</td>
<td>6</td>
<td>8</td>
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</tr>
<tr>
<td>$ Electives</td>
<td>16</td>
<td>15</td>
<td>16</td>
</tr>
</tbody>
</table>

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

§ From 20 to 27 of the elective units must be chosen with the approval of the adviser according to the field of concentration.
DESCRIPTIONS OF COURSES IN JOURNALISM

Jour 118 Introduction to Journalism (2)
Explores career opportunities in Technical 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, and further exploration of techniques and problems in reporting. Some special assignments involving off-campus events. 1 lecture, 2 two-hour laboratories. Prerequisite: Jour 202 and proficiency in typing.

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 approval of instructor.

Jour 223 Photomontage (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 6 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: Permission 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 a more advanced level, in daily coverage of news events related to the campus community. Special assignments for off-campus news media. More thorough examination of press law. 1 lecture, 2 two-hour laboratories. Prerequisite: Jour 203

Jour 323 Fre-lance Photography (3)

Technique of the picture story, magazine article illustration, livestock and industrial equipment photography, advertising photography. 1 lecture, 2 two-hour laboratories. Prerequisite: Jour 222

Jour 333 Broadcast Media News (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, 223

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 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 Management (3)

Management problems in operation of smaller daily or weekly newspapers. Analysis of newspaper organization, circulation principles and practices, production problems, and industrial relations. 3 lectures. Prerequisite: Jour 233, 421

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 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 instructor's permission.
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 Advertising (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, radio or advertising, combined with supervisory responsibilities for campus news media. 2 laboratories. Prerequisite: Senior status in Technical 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: Instructor's approval.
MUSIC DEPARTMENT

Department Head, Harold P. Davidson

Emanuel R. Heifetz  William V. Johnson  Ronald V. Ratcliff

Clifton E. Swanson

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, orchestra, chamber 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.

DESCRIPTIONS OF COURSES IN 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. Standard orchestral repertory. Several informal, public concerts each season. 1 laboratory. Prerequisite: permission of the 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.
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 (2) (2) (2)
Survey of forms, materials, and composers found in modern radio and concert programs presented through lectures and recordings. Study of choirs and instruments of the symphony orchestra; development of folk songs into symphonic themes and treatment; study of contemporary artists. 2 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. Admittance 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)
A chronological study of music from the earliest times to the contemporary scene. Selected readings, recordings, and scores will be intensively studied. 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
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, health, safety education, and driver training. 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 modern 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 and all-weather tennis courts are also available for student use. The Men’s Physical Education Building provides excellent facilities for all phases of the total physical education and intercollegiate athletic program. The main gymnnasium 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 and an adaptive physical education laboratory are located in this area. A 75-foot 5-lane competitive swimming pool is adjacent to Crandall Gym and shower and locker rooms.

**CURRICULUM IN PHYSICAL EDUCATION**

<table>
<thead>
<tr>
<th>Course</th>
<th>F</th>
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<tr>
<td>Freshman Composition (Eng 104, 105, 106)</td>
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<tr>
<td>Basic Mathematics for General Education (Math 100, 200)</td>
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<tr>
<td>Health Education (PE 107)</td>
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<tr>
<td>Physical Education (PE 141)</td>
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<tr>
<td>Safety and First Aid (PE 121)</td>
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<tr>
<td>Community Recreation (PE 126)</td>
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<tr>
<td>Swimming and Water Sports (PE 123)</td>
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<tr>
<td>General Physical Science (PSc 101, 102 or equiv.)</td>
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<tr>
<td>General Zoology (Zoo 131, 132)</td>
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<tr>
<td>Electives</td>
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### Sophomore

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<th>Course Title</th>
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<tr>
<td>Survey of Economics (Ec 201)</td>
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<td>* Social Sciences elective</td>
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<tr>
<td>General Psychology (Psy 202)</td>
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<tr>
<td>Intramural Sports (PE 232)</td>
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<tr>
<td>General Physical Science (PSc 103 or equiv.)</td>
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<tr>
<td>Public Speaking (Sp 201)</td>
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<td>Sports Education (PE 241)</td>
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<td>Human Anatomy (Zoo 337)</td>
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<tr>
<td>Human Physiology (Zoo 338, 339)</td>
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<tr>
<td>Principles of Physical Education (PE 201)</td>
<td></td>
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<tr>
<td>Apparatus and Gymnastics (PE 255 or 256)</td>
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<td>School and Community Health Education (PE 203)</td>
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<td>Advanced Public Speaking (Sp 202)</td>
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<td>Sociology of Family Life (Soc 206)</td>
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### Junior (Women)

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<th>Course Title</th>
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<tbody>
<tr>
<td>American Government (Pol Sc 301)</td>
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<tr>
<td>Growth of American Democracy (Hist 304)</td>
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<tr>
<td>* Literature, Philosophy, or Arts</td>
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<tr>
<td>Educational Psychology (Ed 312)</td>
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<tr>
<td>Teaching Progression in Girls' Sports (PE 324, 325, 326)</td>
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<tr>
<td>Teaching Elementary School Physical Education (PE 332)</td>
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<tr>
<td>Physiology of Exercise (PE 303)</td>
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<tr>
<td>Camping and Outdoor Education (PE 337)</td>
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<tr>
<td>Physical Education Activity (PE 341, 342, 343)</td>
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<td>Kinesiology (PE 302)</td>
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<td>Introduction to Dance (PE 334)</td>
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### Senior (Women)

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<th>Course Title</th>
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<tr>
<td>Senior Project (PE 461, 462)</td>
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<tr>
<td>Undergraduate Seminar (PE 463)</td>
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<td>U.S. in World Affairs (Hist 305)</td>
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<tr>
<td>Teaching Progression in Dance (PE 446, 447, 448)</td>
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<tr>
<td>Individual and Dual Sports (PE 328)</td>
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<tr>
<td>Organization and Administration of Health and Physical Education (PE 401)</td>
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<tr>
<td>Tests and Measurements in Physical Education (PE 425)</td>
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<tr>
<td>Administration of School Health Education (PE 405)</td>
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<tr>
<td>Adaptive Physical Education (PE 406)</td>
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</table>

*To be selected from the General Education list. Include at least one course in literature, not more than 4 units in fine and practical arts.
### CURRICULUM FOR THE MASTER OF SCIENCE DEGREE

(For complete requirements see the Graduate Study Bulletin)

<table>
<thead>
<tr>
<th>Required graduate level courses in physical education (PE 501, 502, 511, 513 and 521)</th>
<th>Units</th>
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</thead>
<tbody>
<tr>
<td>Elective graduate level units in physical education (Of these, six may be taken in PE 599, Thesis)</td>
<td>9</td>
</tr>
<tr>
<td>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</td>
<td>21</td>
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</table>

### DESCRIPTIONS OF COURSES IN PHYSICAL EDUCATION

**PE 107 Health Education (2)**

Topics designed to acquaint the student with the major health problems of everyday living. 2 lectures.

**PE 121 Safety and First Aid (2)**

A standard American Red Cross first aid course. Instruction and practice in the immediate and temporary care of injuries and sudden illness. 1 lecture, 1 two-hour laboratory.

*To be selected from the General Education list. Include at least one course in literature, not more than 4 units in fine and practical arts.*
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, weight training, track and field, body mechanics, combatives for men. Social, square and folk dance. Modern dance for women. 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.

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)
A critical analysis of the problems and fundamentals in apparatus and gymnastic activities. 1 lecture, 1 two-hour laboratory. Women PE majors only.

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)
A critical analysis of the methods and problems of teaching and coaching baseball at the secondary school level. 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 Teaching Progression in Girls’ Sports (2) (2) (2)
Fundamentals, advanced techniques, and problems in volleyball, field hockey, basketball, field sports, track and field, and softball. 1 lecture, 1 two-hour laboratory.

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)
Organization and teaching of 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.

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  Direction of Physical Education Activity  (1) (1) (1)
Required of all majors in physical education. Experience in the supervision of physical education classes under the direction of regular faculty. 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  Teaching Progression in Dance  (2) (2) (2)
Folk, social and related areas; contemporary. 2 two-hour laboratories. Prerequisite: PE 334

PE 461, 462  Senior Project  (2) (2)
Selection and completion of a project under faculty supervision. Projects typical of problems which graduates must solve in their fields of employment. Project results are presented in a formal report. Minimum 120 hours total time.

PE 463  Undergraduate Seminar  (2)
Discussion of new developments in recreation, health, and physical education. 2 lectures.

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 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 599  Thesis (6)
   Independent research under the guidance and supervision of the staff.
The Printing Department offers a four-year curriculum in printing technology and management, leading to a Bachelor of Science degree in Applied Arts with a major in Printing Technology and Management. The curriculum is designed to prepare graduates for positions of responsibility in the allied trades of the printing and graphic arts industry, as well as to prepare them to be owners and operators of newspapers and printing plants. Majors must not only complete satisfactorily the printing technology and management curriculum requirements but must show proper aptitude and progress to indicate they may assume positions of responsibility and leadership in the printing and graphic arts industry.

A student successfully completing the four-year curriculum will be qualified to hold responsible positions in many branches of the graphic arts industry. A graduate has sufficient skill in all phases of printing and an adequate background of management and production practices so that he may accept positions of responsibility in production control, management, and sales and service. A graduate is qualified to operate his own print shop, or to publish a newspaper in connection with a job printing plant. A student who terminates his formal education prior to graduation still will have sufficient training to qualify him for positions in the printing and graphic arts industry.

The department is completely equipped with Intertype and Linotype typesetting machines, Elrod, Ludlow, platen presses, automatic job and cylinder presses, folding machines, hand and power paper cutters, perforators, drilling and punching machines, power stitchers, a wide assortment of new and modern type, stereotype equipment, darkroom and process camera equipment, stripping, plate-making and many other types of lithography and reproduction process equipment.

Practical instruction in management, cost estimating, plant organization and layout, and shop management is given in the senior year.

**CURRICULUM IN PRINTING TECHNOLOGY AND MANAGEMENT**

<table>
<thead>
<tr>
<th>Freshman</th>
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<tbody>
<tr>
<td>History of Printing (Pr 101)</td>
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<tr>
<td>Proofreading (Pr 102)</td>
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<td>2</td>
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<tr>
<td>Graphic Design and Display (Pr 103)</td>
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<tr>
<td>Elementary Typography (Pr 121)</td>
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<td>Stereotyping (Pr 143)</td>
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<td>Elementary Presswork (Pr 131)</td>
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<tr>
<td>Intermediate Presswork (Pr 133)</td>
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<tr>
<td>Bindery Operations (Pr 151)</td>
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<td>3</td>
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<tr>
<td>Editing and Copy Desk (Jour 233)</td>
<td></td>
<td>3</td>
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<tr>
<td>Freshman Composition (Eng 104, 105, 106)</td>
<td>3</td>
<td>3</td>
<td>3</td>
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<tr>
<td>Mathematics for Engineers (Math 117)</td>
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<td>5</td>
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<tr>
<td>Manufacturing Processes (MP 141, 142)</td>
<td>1</td>
<td>1</td>
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<tr>
<td>Manufacturing Processes (WM 141)</td>
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<tr>
<td>Applied Biology (Bio 110)</td>
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<tr>
<td>Physical Education (PE 141)</td>
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<tr>
<td>Electives</td>
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<td>16 1/2</td>
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</table>
The text describes the course offerings at California State Polytechnic College for different levels: Sophomore, Junior, and Senior. Each course has a description and credit hours assigned. The courses cover a wide range of topics from basic typography to advanced printing management, with a focus on the historical development of printing, technological advancements, and the practical aspects of the industry. The descriptions provide an overview of what each course entails, from the historical aspects of printing to current practices and future trends.
Pr 102 Proofreading (2)
Printshop English, proofreading, spelling, punctuation, division of words, compounding, style. Practical experience on the college paper and other publications. 2 lectures.

Pr 103 Graphic Design and Display (3)
Principles of design and display. Study of type classifications and their adaptation to good typography and art. Proper use of cuts, ornaments, borders, spacing and most effective arrangements of type to give greatest emphasis to artistic arrangement and display value. 3 lectures.

Pr 121 Elementary Typography (4)
Elementary training in fundamentals of typesetting, spacing, ornamentation, typographic styles, composing room procedures and practices. Principles of display, study of various type classifications and their adaptation to typography and proper use of copy-fitting. 2 laboratories. Prerequisite: Pr 103

Pr 131 Elementary Presswork (3)
Development, operation and maintenance of hand-fed platen and cylinder presses. Introduction to imposition and make-ready. Rollers, ink, and paper. 1 lecture, 2 laboratories.

Pr 133 Intermediate Presswork (3)
Operation and maintenance of automatic presses. Emphasis on proper make-ready, registration, ink control and properties of paper. Introduction to original plates and duplicate plates. 1 lecture, 2 laboratories. Prerequisite: Pr 131

Pr 143 Stereotyping (1)
Operation of stereotyping equipment, safety and accident prevention, metal content and care. 1 laboratory.

Pr 151 Bindery Operation (3)
Use of bindery equipment, its maintenance and repair, imposition, manual operations, and handling. Actual practice on all kinds of commercial bindery work, publications, and books. 2 lectures, 1 laboratory.

Pr 201 Theory of Color (3)
An understanding of the three concepts of color: physical, chemical and psychological. Basic principles involved in ink color mixing, and matching. Printing papers and their characteristics. Printing inks of today and their relationship to paper. The effect of bodies of ink on various types of paper. 3 lectures.

Pr 221 Intermediate Typography (4)
Proper methods of newspaper display and makeup. Practical application of principles of hand display and layout. Appreciation of importance of markup, designing and preparation of harmonious and balanced ads, with emphasis on good typography. 2 lectures, 2 laboratories. Prerequisite: Pr 121

Pr 224 Composing Machine Operation (3)
Introduction to operation of linecasting composing machines. Touch system and proper keyboard operation. Operational adjustments and care of machine. 1 lecture, 2 laboratories. Prerequisite: Pr 102, 121

Pr 225 Composing Machine Operation and Maintenance (3)
Advanced operation of linecasting machines and repair of composing room equipment. 1 lecture, 2 laboratories. Prerequisite: Pr 224

Pr 226 Composing Machine Operation and Maintenance (3)
Newspaper, bookwork, magazine and commercial composition. Advanced methods of maintenance and repair. 1 lecture, 2 laboratories. Prerequisite: Pr 225
Pr 232  Advanced Presswork (3)
Continuation of Pr 133 with emphasis on production, three- and four-color process printing, operation of rotary-flatbed cylinder press, pre-register equipment. Study and practical application of ink and paper, ink mixing and color matching. 1 lecture, 2 laboratories. Prerequisite: Pr 133

Pr 239  Automated Typesetting (3)
Theory and operation of automated typesetting devices used in the printing industry. Computerized typesetting. 1 lecture, 2 laboratories. Prerequisite: Bus 141 or equivalent

Pr 240  Additional Printing Laboratory (1-2)
Total credit limited to 4 units, with no more than 2 units in any one quarter.

Pr 322, 323  Cold Type Processes (3) (3)
Introduction to Fotosetter, Varityper, Cox Head-Liner, Prototype-composing and other reproduction processes. Copyfitting, composing and makeup of newspapers, magazines and catalog advertising using the type-to-negative and paste-up methods. 1 lecture, 2 laboratories. Prerequisite: Pr 321

Pr 324  Offset Camera Work (3)
Scaling copy for line and halftone negatives. Functions and operation of process camera. Darkroom techniques, mixing of chemicals, and developing of film. 1 lecture, 2 laboratories. Prerequisite: Jour 221 or equivalent.

Pr 325  Offset Stripping and Platemaking (3)
Stripping, opaquing, and layout of flats. Exposing and developing of various types of plates used in reproduction and offset printing. 1 lecture, 2 laboratories. Prerequisite: Pr 324

Pr 326  Offset Presswork (3)
Operation and maintenance of small offset presses. Study of fountain solutions, offset papers and ink. 1 lecture, 2 laboratories. Prerequisite: Pr 325

Pr 332  Publication Makeup and Markup (3)
Study of styles in advertising and page makeup. Use of markup code systems for markup of ads and commercial work. Practical experience in makeup of newspaper and magazine pages to enhance sales and reader interest. 1 lecture, 2 laboratories. Prerequisite: Pr 221

Pr 341  Composing Machine Maintenance (3)
Machine maintenance, advanced composing machine maintenance. Practice in administering maintenance of composing room equipment. Ordering parts, maintaining inventory. Supervision during actual laboratory sessions. 1 lecture, 2 laboratories. Prerequisite: Pr 226

Pr 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.

Pr 401  Printing Office Management (3)
Office problems, methods and procedures. Job tickets, time systems, inventory, control, cost accounting, page costs, circulation systems. Correlation of management and production. 3 lectures. Prerequisite: Senior standing.

Pr 411  Printing Estimating (3)
Fundamentals of pricing and estimating. Composition, presswork, binding, paper, ink, halftones, line cuts, electros, lithography. 3 lectures. Prerequisite: Senior standing.

Pr 412, 413  Estimating (1) (1)
Estimating and pricing all types of printing and offset procedures, purchasing, writing instructions, etc. 1 laboratory. Prerequisite: Pr 411
Pr 421, 422, 423 Production Problems (3) (2) (3)
Analysis of methods of coordinating all factors of production. Methods of promoting interdepartmental harmony and understanding. Review of all plant and shop skills. Pr 421: 1 lecture, 2 laboratories. Pr 422, 423: 2 or 3 laboratories.

Pr 431 Advanced Typography (3)
Composition and design of letterheads, business cards, invoices, labels, blotters, direct mail advertising, and other representative business forms. Study of color, display and efficiency of office forms. 1 lecture, 2 laboratories. Prerequisite: Senior standing.

Pr 433 Plant Organization and Layout (3)
Planning, designing and layout of printing plant equipment. Proper use of materials and equipment to cut costs and increase production. Emphasis on engineering skills and approach to departmental management and flow of work. 2 lectures, 1 laboratory. Prerequisite: Senior standing.

Pr 434 Advanced Offset Camera Work (3)
Methods of producing separation negatives by using three-color direct and indirect separation method, using opaque copy and color transparencies. 1 lecture, 2 laboratories. Prerequisite: Pr 324

Pr 435 Advanced Offset Presswork (3)
Operation and maintenance of offset presses 14"x20" and over. Importance of proper packings, mounting of plates and blankets, and correct setting of ink and dampener rollers. Running duotones and three-color process to exact register. 1 lecture, 2 laboratories. Prerequisite: Pr 326

Pr 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.

Pr 463 Undergraduate Seminar (2)
Senior students become familiar with data gathered by other seniors in preparation of senior project. Each student is required to conduct the seminar class, under supervision of instructor, at least twice during the quarter. Preparation, oral presentation, and discussion by students of technical papers on recent developments in the industry and senior project material. 2 lectures. Prerequisite: Senior standing.
THE SCHOOL OF APPLIED SCIENCES
THE SCHOOL OF APPLIED SCIENCES
Clyde P. Fisher, Dean

The School of Applied Sciences has four primary functions:

1. To provide courses for students working toward the Bachelor of Science Degree, the Master of Arts Degree, and the Master of Science Degree with majors in the Applied Sciences.

2. To provide for all students of the college courses designed to assist in meeting the requirements in general education so that every graduate will be prepared to take an active part as a citizen and productive member of the State, nation, and world.

3. To provide for students in Agriculture, Applied Arts, Applied Sciences, Architecture and Engineering those courses which support, directly complement, or are closely related to their areas of specialization.

4. To provide mathematical, natural and social sciences courses for students preparing to teach at the elementary and/or secondary school level.

Curricula offered by the School of Applied Sciences leading to the Bachelor of Science degree are: Biochemistry, Biological Sciences, Chemistry, Mathematics, Physics and Social Sciences. Graduate work leading to the following degrees is also given: Master of Arts in Mathematics, Master of Science in Biological Sciences, and Master of Science in Applied Mathematics. The School also offers, through the Military Science department, the elective Reserve Officer Training Corps (ROTC) program to all majors of the College. The College Library is a part of the School of Applied Sciences for administrative purposes, but serves the entire College.

In close cooperation with the School of Applied Arts the faculty of the School of Applied Sciences recommends candidates for the California Standard Teaching Credential with majors in Biological Sciences, Chemistry, 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.
The department offers a complete program of college work, leading to the bachelor of science degree and the master of science degree in biological sciences. Majors in the department may concentrate in botany, bacteriology, zoology, or other areas while developing a broad background in biology. Students majoring in agriculture are given the necessary bacteriological, botanical, and zoological background to enable them to appreciate and understand the basic biological principles underlying the more applied courses, and more advanced work is offered in certain technical fields such as plant pathology, and dairy bacteriology. Courses are offered to fulfill the general education requirement in biology for other Applied Arts and Applied Sciences departments and for engineers.

Graduates in the biological sciences generally enter the fields of college and high school teaching, medical and biological laboratory technology, public health and sanitation, fish and game management, state and national park service and pest control. In addition, graduates have entered veterinary, medical, dental, pharmacy and graduate schools.

The department laboratories are supplied with the most modern equipment. Classes are organized to make biology as meaningful as possible. San Luis Obispo County offers unusual opportunities for the study of a wide variety of plants and animals since in this county are found flora and fauna representative of both Southern and Northern 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.

CURRICULUM IN BIOLOGICAL SCIENCES

Freshman

General Botany (Bot 121, 122, 123) or General Zoology ..... 4 4 4
1 General Inorganic Chemistry (Chem 324, 325) ....... 4 4
Organic Chemistry (Chem 326) ....... 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 ....... 1 3

16 ½ 16 ½ 16 ½

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

Chem 321, 322 will substitute for Chem. 324 and 325.

Math 102 and 103 or Math 100 and 200 will substitute.
### Sophomore

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<tr>
<th>Course</th>
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<tbody>
<tr>
<td>General Zoology (Zoo 131, 132, 133)</td>
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<tr>
<td>General Bacteriology (Bact 221)</td>
<td>4</td>
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<tr>
<td>General Psychology (Psy 202)</td>
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<tr>
<td>General Entomology (Ent 126)</td>
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<tr>
<td>College Physics (Phys 121, 122, 123)</td>
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<tr>
<td>Principles of Economics (Ec 211, 212)</td>
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<tr>
<td>Sports Education (PE 241)</td>
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### Junior

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<tr>
<td>Ecology (Bio 325)</td>
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<tr>
<td>Genetics (Bio 303)</td>
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<td>3</td>
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<tr>
<td>Advanced Composition (Eng 304 or 301)</td>
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<tr>
<td>American Government (Pol Sc 301)</td>
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<td>Literature</td>
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<tr>
<td>Literature or Philosophy</td>
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<tr>
<td>Literature or Fine and Practical Arts</td>
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<tr>
<td>Senior Project (Bio 461)</td>
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<tr>
<td>Biochemistry (Chem 328)</td>
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<tr>
<td>Public Speaking (Sp 201)</td>
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<td><strong>Electives</strong></td>
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### Senior

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<tr>
<td>General Physiology (Bio 431)</td>
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<tr>
<td>Senior Project (Bio 462)</td>
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<td>Undergraduate Seminar (Bio 463)</td>
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<td>Growth of American Democracy (Hist 304)</td>
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<td>U.S. in World Affairs (Hist 305)</td>
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### Electives

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**CURRICULUM FOR THE MASTER OF SCIENCE DEGREE**

(For complete 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

Total units: 45**

* 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.
### DESCRIPTIONS OF COURSES IN BACTERIOLOGY

<table>
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<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Units</th>
<th>Description</th>
<th>Prerequisites</th>
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<tbody>
<tr>
<td>Bact 221</td>
<td>General Bacteriology</td>
<td>4</td>
<td>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</td>
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<tr>
<td>Bact 322</td>
<td>Dairy Bacteriology</td>
<td>4</td>
<td>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</td>
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<tr>
<td>Bact 333</td>
<td>Industrial Microbiology</td>
<td>4</td>
<td>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</td>
<td></td>
</tr>
<tr>
<td>Bact 342</td>
<td>Sanitary Inspection and Control</td>
<td>2</td>
<td>Domestic and commercial contamination, epidemiology, stressing practical applications of hygienic practices and methods of correcting and eliminating health hazards. 2 laboratories. Prerequisite: Bact 221</td>
<td></td>
</tr>
<tr>
<td>Bact 402</td>
<td>General Virology</td>
<td>3</td>
<td>Characteristics and classification of animal viruses. Methods for collection of specimens, cultivation and identification of pathogenic viruses. 3 lectures. Prerequisite: Bact 221</td>
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<tr>
<td>Bact 421</td>
<td>Food Microbiology</td>
<td>4</td>
<td>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 326</td>
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<tr>
<td>Bact 423</td>
<td>Public Health Microbiology</td>
<td>4</td>
<td>Detailed study of pathogenic yeasts, molds, viruses, and bacteria in relation to public health. 2 lectures, 2 laboratories. Prerequisite: Bact 221</td>
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<tr>
<td>Bact 436</td>
<td>Marine Microbiology</td>
<td>4</td>
<td>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</td>
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<tr>
<td>Bact 590</td>
<td>Seminar in Bacteriology</td>
<td>1-3</td>
<td>Problems and topics in advanced bacteriology selected according to the interest and needs of the students enrolled. 1 to 3 units in one quarter, maximum of 6 units. Prerequisite: Graduate standing and evidence of satisfactory preparation in bacteriology.</td>
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### DESCRIPTIONS OF COURSES IN BIOLOGY

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Units</th>
<th>Description</th>
<th>Prerequisites</th>
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<tr>
<td>Bio 100</td>
<td>Agricultural Biology</td>
<td>3</td>
<td>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.</td>
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<tr>
<td>Bio 101</td>
<td>General Biology</td>
<td>3</td>
<td>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</td>
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</tbody>
</table>
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

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 321 or 324 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 326; 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 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.
Physiograph Recording Heart Beat of a Frog Under Influence of Drugs in Biological Sciences Laboratory
Bio 524 Developmental Biology (3)
Developmental phenomena of higher and lower plants, vertebrate and invertebrate animals at the molecular, cellular, histological and organ levels. 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 (1-3)
Problems and topics in advanced biology selected according to the interest and needs of the students enrolled. 1 to 3 units in one quarter, maximum of 6 units. 1-3 lectures. Prerequisite: Graduate standing and evidence of satisfactory preparation in biology.

Bio 599 Thesis (3) (3) (3)
Individual research under the general supervision of the staff, leading to a graduate thesis of suitable quality.

DESCRIPTIONS OF COURSES IN 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 326

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 the 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.

Bot 590  Seminar in Botany (1-3)
Problems and topics in advanced botany selected according to the interest and needs of the students enrolled. 1-3 units in one quarter, maximum of 6 units. 1-3 lectures. Prerequisite: Graduate standing and evidence of satisfactory preparation in botany.

DESCRIPTIONS OF COURSES IN 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 326

DESCRIPTIONS OF COURSES IN 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 326 or permission of instructor.

Ent 590  Seminar in Entomology (1-3)
Problems and topics in advanced entomology selected according to the interest and needs of the students enrolled. 1-3 units in one quarter, maximum of 6 units. 1-3 lectures. Prerequisite: Graduate standing and evidence of satisfactory preparation in entomology.

DESCRIPTORS OF COURSES IN 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

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: permission of the instructor.

Zoo 428  Hematology  (4)
Microscopic and chemical examination of blood. Designed for preparing laboratory technologists. 2 lectures, 2 laboratories. Prerequisite: permission of the instructor. Recommended: Zoo 426

Zoo 590  Seminar in Zoology  (1-3)
Problems and topics in advanced zoology selected according to the interest and needs of the students enrolled. 1 to 3 units in one quarter, maximum of 6 units. 1-3 lectures. Prerequisite: Graduate standing and evidence of satisfactory preparation in zoology.
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.

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 a placement test, or Chem 106, or the equivalent.

**CURRICULUM IN CHEMISTRY**

<table>
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<tr>
<th>Course</th>
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<tbody>
<tr>
<td>General Chemistry (Chem 321, 322, 323, or Chem 324, 325, 323)</td>
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<tr>
<td>General Chemistry Laboratory (Chem 143)</td>
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<td>Freshman Composition (Eng 104, 105, 106)</td>
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<tr>
<td>Mathematics for Engineers (Math 117)</td>
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<tr>
<td>Analytic Geometry and Calculus (Math 141, 142)</td>
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<tr>
<td>Physical Education (PE 141)</td>
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<td>Health Education (PE 107)</td>
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<td>Biological Sciences (Bio 101, 110, Bot 121 or Zoo 131)</td>
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## Sophomore

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<tr>
<td>Quantitative Analysis (Chem 331, 332)</td>
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<td>Organic Chemistry (Chem 326)</td>
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<tr>
<td>Laboratory Glassblowing (Chem 342)</td>
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<td>General Physics (Phys 131, 132, 133)</td>
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<td>Analytic Geometry and Calculus (Math 143, 241)</td>
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## Junior

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<td>Organic Chemistry (Chem 327, 338)</td>
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<td>Biochemistry (Chem 328)</td>
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<td>Physical Chemistry (Chem 432, 433)</td>
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<td>Qualitative Organic Analysis (Chem 343)</td>
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<td>Introduction to Optics and Atomic Physics (Phys 211)</td>
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<td>American Government (Pol Sc 301)</td>
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<td>Social Sciences</td>
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## Senior

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<td>Inorganic Chemistry (Chem 402)</td>
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<td>Advanced Organic Chemistry (Chem 403)</td>
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<td>Advanced Physical Chemistry (Chem 437)</td>
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<td>Instrumental Analysis (Chem 439)</td>
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<td>Undergraduate Seminar (Chem 463)</td>
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<td>Growth of American Democracy (Hist 304)</td>
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<td>U.S. in World Affairs (Hist 305)</td>
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## Freshman

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<th>Course</th>
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<td>General Chemistry (Chem 324, 325, 323, or 321, 322, 323)</td>
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<tr>
<td>Freshman Composition (Eng 104, 105, 106)</td>
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<td>Mathematics for Engineers (Math 117)</td>
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<td>Analytic Geometry and Calculus (Math 141)</td>
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<td>Physical Education (PE 141)</td>
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<td>Health Education (PE 107)</td>
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<tr>
<td>General Zoology (Zoo 131) or General Botany (Bot 121)</td>
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<tr>
<td>Electives</td>
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1. To be selected from the General Education list.
2. To be selected from the General Education list with not more than four units from fine and practical arts.
**Sophomore**

<table>
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<tr>
<th>Course</th>
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<tr>
<td>Quantitative Analysis (Chem 331, 332)</td>
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<tr>
<td>Organic Chemistry (Chem 326)</td>
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<tr>
<td>Physics (Phys 121, 122, 123 or 131, 132, 133)</td>
<td>4</td>
</tr>
<tr>
<td>Laboratory Glassblowing (Chem 342)</td>
<td>1</td>
</tr>
<tr>
<td>Mathematics (Math 142 or Stat 211)</td>
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<tr>
<td>Literature, Philosophy or Arts</td>
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<tr>
<td>Sports Education (PE 241)</td>
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<td>Electives</td>
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**Junior**

<table>
<thead>
<tr>
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<tbody>
<tr>
<td>Organic Chemistry (Chem 327)</td>
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<tr>
<td>Biochemistry (Chem 328, 329)</td>
<td>4</td>
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<tr>
<td>Physical Chemistry (Chem 432, 433)</td>
<td>4</td>
</tr>
<tr>
<td>Qualitative Organic Analysis (Chem 343)</td>
<td>4</td>
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<tr>
<td>Report Writing (Eng 301)</td>
<td>3</td>
</tr>
<tr>
<td>Economics (Ec 201 or 211)</td>
<td>3</td>
</tr>
<tr>
<td>American Government (Pol Sc 301)</td>
<td>3</td>
</tr>
<tr>
<td>Social Sciences</td>
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<tr>
<td>Literature</td>
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</tr>
<tr>
<td>General Psychology (Psy 202)</td>
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<tr>
<td>Electives</td>
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**Senior**

<table>
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<tr>
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<tbody>
<tr>
<td>Advanced Biochemistry (Chem 434)</td>
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<tr>
<td>Food Analysis (Chem 435)</td>
<td>4</td>
</tr>
<tr>
<td>Agricultural Chemicals (Chem 436)</td>
<td>4</td>
</tr>
<tr>
<td>Senior Project (Chem 461, 462)</td>
<td>2</td>
</tr>
<tr>
<td>Undergraduate Seminar (Chem 463)</td>
<td>2</td>
</tr>
<tr>
<td>Special Problems for Advanced Undergraduates (Chem 400)</td>
<td>3</td>
</tr>
<tr>
<td>Growth of American Democracy (Hist 304)</td>
<td>3</td>
</tr>
<tr>
<td>U.S. in World Affairs (Hist 305)</td>
<td>3</td>
</tr>
<tr>
<td>Electives</td>
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</tbody>
</table>

**Descriptions of Courses in Chemistry**

**Chem 106 Introductory Chemistry (3)**

Symbols, nomenclature, molecular theory, problems dealing with the metric system, density, formulas, percentage composition, and chemical equations. For students who need an introductory course in chemistry. Not open to students who have credit in a college course in chemistry. 3 lectures. Prerequisite: Math 103 or equivalent.

**Chem 143 General Chemistry Laboratory (1)**

Additional laboratory to be taken with Chem 323. Includes semi-micro qualitative study of the nonmetals. 1 laboratory. Prerequisite: Chem 322 or 325

**Chem 321 General Chemistry (4)**

General principles including atomic structure, nuclear chemistry, solutions, stoichiometry and oxidation-reduction. For engineering, physics, chemistry, and mathematics majors. Not open to students having credit in Chem 324. 3 lectures, 1 laboratory. Prerequisite: Chem 106 or the passing of a placement test.

---

1 To be selected from the General Education list with not more than four units from fine and practical arts.

2 Chem 335 and Chem 338 may be substituted.

3 To be selected from the General Education list.
Gas Chromatograph in Use in Chemistry Laboratory
Chem 322 General Chemistry (4)
Continuation of Chem 321. Introduction to the carbon compounds emphasizing fuels and synthetic polymers. Not open to students having credit in Chem 325. 3 lectures, 1 laboratory. Prerequisite: Chem 321

Chem 323 General Chemistry (4)
Chemical equilibria, compounds of the metals, qualitative analysis of the metal ions in the laboratory. 3 lectures, 1 laboratory. Prerequisite: Chem 322 or 325

Chem 324 General Inorganic Chemistry (4)
Fundamental principles including atomic structure, chemical equations, states of matter, solutions, some non-metals. Not open to students with credit in Chem 321. 3 lectures, 1 laboratory. Prerequisite: Chem 106 or the passing of a placement test.

Chem 325 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 in Chem 322. 3 lectures, 1 laboratory. Prerequisite: Chem 324.

Chem 326 Organic Chemistry (4)
The fundamental concepts of organic chemistry with applications to agricultural and industrial processes. 3 lectures, 1 laboratory. Prerequisite: Chem 322 or 325

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 326

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 326

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 323

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 338 Organic Chemistry (5)
A continuation of Chem 327, including heterocyclic compounds, natural products, stereochemistry, steroids, dyes, 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 321 or 324

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 433

Chem 403 Advanced Organic Chemistry (3)
A detailed study of the mechanisms of organic reactions and related topics. 3 lectures. Prerequisite: Chem 327, 432

Chem 432 Physical Chemistry (4)
Physical and molecular constitution of gases; kinetic theory; atomic structure; elementary chemical thermodynamics and thermochemistry; chemical statistics; introduction to phase equilibria. 3 lectures, 1 laboratory. Prerequisite: Phys 123 or 133, Chem 323, Math 141

Chem 433 Physical Chemistry (4)
Phase equilibria, solutions; distillation theory; colligative properties; electrochemistry with analytical applications; non-ideal systems, chemical kinetics, radioactivity. 3 lectures, 1 laboratory. Prerequisite: Chem 432

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 bonds and molecular structure; experimental techniques for investigating molecular structure; spectroscopy, with applications to identification and analysis, polarography surface chemistry, catalysis, macromolecules. 3 lectures, 1 laboratory. Prerequisite: Chem 433 or consent of the 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, 433

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.
The Mathematical Sciences Department offers a complete program of college work leading to a bachelor of science degree with options in applied mathematics, computer science, statistics, and mathematics teaching. Besides the courses for these options, 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 these options in mathematical sciences.

High school students planning a mathematics 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.

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.

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.
# CURRICULUM IN MATHEMATICS

## Freshman

<table>
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<tr>
<th>Course</th>
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<tbody>
<tr>
<td>Analytic Geometry and Calculus (Math 141, 142, 143)</td>
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<td>4</td>
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<tr>
<td>Fortran Programming (CSc 252)</td>
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<td>Physics (Phys 131, 132 or Phys 121, 122)</td>
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<td>Health Education (PE 107)</td>
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<td>Physical Education (PE 141)</td>
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## Sophomore

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<tr>
<td>Analytic Geometry and Calculus (Math 241)</td>
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<tr>
<td>Programming for Digital Computers (CSc 221)</td>
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<tr>
<td>Differential Equations (Math 242)</td>
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<td>Mathematics of Statistics (Stat 321)</td>
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<td>Mathematics of Matrices (Math 204)</td>
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<tr>
<td>Physics (Phys 133 or Phys 123)</td>
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<td>Economics (Ec 201 or 211)</td>
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<tr>
<td>* Social Sciences</td>
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<td>* Oral and written expression</td>
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<td>General Psychology (Psy 202)</td>
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<td>Sports Education (PE 241)</td>
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<td>Electives and courses to complete major</td>
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<td>Total</td>
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## Junior

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<th>Course</th>
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<td>* Literature or Philosophy</td>
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<tr>
<td>* Biological Sciences</td>
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<tr>
<td>* Natural Sciences</td>
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<td>American Government (Pol Sc 301)</td>
<td>3</td>
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<td>Growth of American Democracy (Hist 304)</td>
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## Senior

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<th>Course</th>
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<tr>
<td>Senior Project (Math 461, 462)</td>
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<td>Undergraduate Seminar (Math 463)</td>
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<tr>
<td>* Literature</td>
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<td>U.S. in World Affairs (Hist 305)</td>
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### APPLIED MATHEMATICS OPTION (ADD COURSES BELOW TO BASIC CURRICULUM)

#### Junior and Senior Years

<table>
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<tr>
<td>Math 312 Linear Algebra</td>
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<tr>
<td>Math 318, 319 Advanced Engineering Mathematics</td>
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<tr>
<td>Math 332, 432 Numerical Analyses (6)</td>
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<tr>
<td>Math 381 Modern Algebra</td>
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<tr>
<td>Math 404 Vector Analysis</td>
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<tr>
<td>Math 408 Complex Variables</td>
<td>3</td>
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<tr>
<td>Math 412 Advanced Calculus</td>
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<tr>
<td>CSc 304 Computer Programming</td>
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#### COMPUTER SCIENCE OPTION (ADD COURSES BELOW TO BASIC CURRICULUM)

#### Sophomore Year

<table>
<thead>
<tr>
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<tbody>
<tr>
<td>CSc 218 Boolean Algebra</td>
<td>3</td>
</tr>
<tr>
<td>CSc 251 Programming</td>
<td>2</td>
</tr>
<tr>
<td>Math 318 Advanced Engineering</td>
<td>4</td>
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* To be selected from General Education List.
Junior and Senior Years

CSc 304 Computer Programming ... (3) CSc 452 Computer Programming ... (3)
CSc 351 Algorithmic Compilers ... (3) Math 332, 432 Numerical Analyses (6)
CSc 451 Programming ................... (3) Stat 322 Math of Statistics ............ (3)

MATHEMATICS TEACHING OPTION (ADD COURSES BELOW TO BASIC CURRICULUM)

Sophomore Year

CSc 251 Programming .................. (2) Math 217 Math of Digital Devices (3)

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 BASIC CURRICULUM)

Junior and Senior Years

Stat 332-3 Math of Statistics ....... (6) Math 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 Mathematics ........................................ (4)
Stat 332-3 Math of Statistics ....... (6) Math 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 Mathematics ........................................ (4)

CURRICULUM FOR THE MASTER OF ARTS DEGREE

(For complete requirements see the Graduate Study Bulletin)

Units

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, 351; Math 312, 313, 332, 381, 382, 404, 405, 408, 409, 411, 412, 413,
432, 441, 442 ........................................................................ 18
IV. Elect 9 additional units with approval of advisory committee .......... 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)

Units

I. Required: Math 512, 516, 580, 593 ........................................... 12
II. Select one of the following courses: Math 513, 531; Stat 527 ................... 3
III. Select with approval of advisory committee 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

DESCRIPTIONS OF COURSES IN COMPUTER SCIENCE

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.

* Satisfies Biological Sciences General Education course requirement.
CSc 221 Programming of Digital Computers (3)
Coding of general purpose and special purpose digital computers, preparation of programs for general purpose computers, sub-routines. 3 lectures.

CSc 251 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 252 Fortran Programming (1)
Emphasis on programming techniques for mathematical analysis. Business and science applications. 1 activity.

CSc 255 Data Processing (3)
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. 3 lectures.

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 the instructor.

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: Math 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: Math 452 or equivalent.

DESCRIPTIONS OF COURSES IN MATHEMATICS

Math 100 Basic Mathematics for General Education (3)
The number system of mathematics through irrational, imaginary, and complex numbers, and illustrations of uses of bases other than 10; geometry of mathematics, including basic triangle relationships, coordinates, distance in a plane, and inequalities, trigonometric functions and identities and relationship of complex numbers to trigonometric functions. 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

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 102 and/or Math 103. 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

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 121  Mathematics for Elementary Teachers I (4)
The language and nature of deductive reasoning; induction; elements of set theory; numeration systems; the fundamental operations and algorithms with respect to the whole numbers; elementary number theory. Not open for credential credit if student has credit in Math 100. 3 lectures and 2 activity hours.

Math 122  Mathematics for Elementary Teachers II (4)
Common and decimal fractions including some applications in other number bases; percentage; problem solving, use of mathematical models; the integers; positive and negative rational numbers; subsets of rational numbers; the irrational numbers; linear equations and inequalities; measurement of lengths and areas; modular arithmetic. 3 lectures and 2 activity hours. Prerequisite: Math 100 or 121, or permission of the instructor.

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 Basic 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; sociometric matrices and communication networks; absorbing Markov chains and genetics. 3 lectures. Prerequisite: Math 200

Math 215 Mathematics of Business (4)
Simple and compound interest principles, methods and applications; simple, due, deferred and ordinary general annuities; amortization of debts and sinking funds; perpetuities and capitalized costs. 4 lectures. Prerequisite: Math 210 or permission of the instructor.

Math 217 Mathematics of Digital Devices (3)
Algorithms and iterative computer methods; neurons and nerve nets; number systems and their applications to digital devices; traditional logic and the Boolean algebra of classes. 3 lectures. Prerequisite: Satisfactory grade in any degree mathematics course.

Math 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.

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

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, Fourier series, harmonic analysis and solution of partial differential equations. 3 lectures. Prerequisite: Math 242
Math 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.

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 prob-
lems. 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 particu-
lar emphasis on the new curricular materials that are being developed and intro-
duced 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 integra-
tion 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 432  Numerical Analysis  (3)
Continuation and expansion of Math 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, one activity period. Prerequisite: Math 332 and ability to program in Fortran.

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 or instructor's permission.

Math 442  College Geometry  (3)
Geometric constructions, similar and homothetic figures, properties of the triangle, harmonic division, properties of circles. This course is designed to extend the background of the teacher in the field of synthetic Euclidean geometry. 3 lectures. Prerequisite: At least 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  Introduction to Sets  (3)
An introduction to the basic ideas and concepts of sets. Functions and graphs are studied from the set point of view, applications of these concepts to other areas; important for understanding of the new elementary and secondary mathematics curricular materials; for both elementary and secondary teachers. 3 lectures. Prerequisite: Graduate standing or the consent of the instructor.

Math 506  Structure of Arithmetic and Algebra  (3)
The formation and development of integers and real numbers, development of properties and laws of integers and rational numbers; operations with numbers developed by the axiomatic method. Suitable for upper grade, and junior and senior high teachers. 3 lectures. Prerequisite: Graduate standing or consent of the instructor.
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 standing.

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 standing.

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 standing.

Math 510  Survey of Modern Mathematics (3)
Selected topics from the field of modern mathematics: projective, and synthetic geometry, topology, logic, matrices, vectors, theory of games, probability, linear and modern algebra and convex sets. 3 lectures. Prerequisite: Graduate standing 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 standing.

Math 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: Math 432

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: Instructor's approval.

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 standing and consent of the instructor.

DESCRIPTIONS OF COURSES IN 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 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.

DESCRIPTIONS OF COURSES IN 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; binomial 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 321

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
MILITARY SCIENCE DEPARTMENT

Department Head, Colonel Robert W. Green
Maj. Donald Phillips
Maj. Frederick A. Rall
Maj. Arnold T. Rossi
Maj. George L. Silva
Capt. Douglas W. Smith

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 ROTC courses are awarded toward college graduation. 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. 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, who are accepted in any accredited institution which offers graduate instruction are further deferred from active duty upon application to the Head, Military Science Department. This deferment, renewed on an annual basis, remains valid until the student completes or abandons his graduate course of instruction.

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. Upon enrollment in the basic course, or the advanced course, the student agrees to complete the course as a prerequisite to graduation unless relieved for cogent reasons acceptable to both the college authorities and the Secretary of the Army. 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.
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 $180 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 retainer pay 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 retainer pay and all other privileges of advanced course standing as enumerated above under the four year program.

DESCRIPTIONS OF COURSES IN 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, drill and command (drill). Academic subject in related fields. May be substituted for PE 141. One lecture. One hour and 20 minutes field instruction.

* MSc 201-202-203 (MS II) Basic Course (2) (2) (2)

American Military History; map and aerial photograph reading; introduction to basic tactics and techniques; leadership, drill and command (drill). May be substituted for PE 241. Two 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 and communication; leadership, drill 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.

* Enrollment in the basic course or in the advanced course makes completion thereof a prerequisite to graduation from the College unless the student is sooner discharged by appropriate authority.
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)
Operations; logistics; Army administration and military justice; role of the U.S. in world affairs; service orientation; leadership, drill and command (drill). Academic subjects in related fields. Four lectures. One hour and 20 minutes field instruction required during fall, winter, and spring quarters. Prerequisite: MS III or equivalent.

Enrollment in the basic course or in the advanced course makes completion thereof a prerequisite to graduation from the College unless the student is sooner discharged by appropriate authority.
PHYSICS DEPARTMENT
Department Head, Woodford E. Bowls

Athol J. D. Brunk Ray J. Holt T. M. Rickansrud
William E. Clements Blaine N. Howard David M. Roach
Walter E. Elliott Aeranet S. James Arthur Z. Rosen
Robert H. Frost Herbert R. Kabat Gordon A. Silver
Teymoor Gedayloo Vance D. Lewis William L. Van Wyngaarden
Lewis E. Hammitt Leon W. Magur Ralph S. Vrana
Robert E. Holmquist Kenneth S. Ozawa Lloyd J. Work

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

<table>
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<tr>
<th>Freshmen</th>
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<tr>
<td>Biological Sciences (Bio 101, 110, Bot 121, or Zoo 131)</td>
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<td>Freshman Composition (Eng 104, 105, 106)</td>
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<td>Manufacturing Processes (MP 141, 142)</td>
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<td>Analytic Geometry and Calculus (Math 241)</td>
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<td>Differential Equations (Math 242)</td>
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<td>Fortran Programming (CSc 252)</td>
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<td>Organic Chemistry (Chem 326)</td>
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<td>General Physics (Phys 133)</td>
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<td>Dynamics (Phys 202)</td>
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<td>Introduction to Optics and Atomic Physics (Phys 211)</td>
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<td>Introduction to Nuclear Physics (Phys 213)</td>
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<td>Introductory Nuclear Physics Laboratory (Phys 243)</td>
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<td>Electrical Circuits (Phys 206)</td>
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<td>Electrical Measurements Laboratory (Phys 256, 257)</td>
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<td>Physical Optics (Phys 223)</td>
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## Applied Sciences

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<tbody>
<tr>
<td>'Literature</td>
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<td>Vector Analysis (Math 404, 405)</td>
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<td>Analytic Mechanics (Phys 303)</td>
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<td>Sound (Phys 212)</td>
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<td>Atomic Physics (Phys 401)</td>
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<td>Atomic Physics Laboratory (Phys 441)</td>
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<td>Growth of American Democracy (Hist 304)</td>
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<td>Quantum Mechanics (Phys 405)</td>
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## DESCRIPTIONS OF COURSES IN 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

1 To be selected from the General Education list.
2 To be selected from the General Education list with not more than two units from fine and practical arts.
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 201 Statics (3)
Resolution and composition of forces. Equilibrium. Stresses and reactions in simple structures. Friction. Centroids and centers of gravity. Moments of inertia of area and mass. Introduction to dynamics. 3 lectures. Prerequisite: Phys 131, Math 142

Phys 202 Dynamics (3)
Rectilinear and curvilinear motion and the forces involved. Rotation. Work, energy, and power. Plane motion. Impulse, momentum, and impact. 3 lectures. Prerequisite: Phys 201

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)

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 255, 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 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 202, Math 242

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

Phys 403 Nuclear Physics (3)

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 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 405

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 or concurrent: 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. Pre-
requisite: Graduate standing.

Phys 502 Nuclear Physics (3)
Instrumentation, methods, and results of experiments. Systematics and theory of
nuclear structure. 3 lectures. Prerequisite: Graduate standing.

DESCRIPTIONS OF COURSES IN 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 quan-
titative 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. Pre-
requisite: Math 100, 103, 117.

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 recom-
mended.

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. Pre-
requisite: 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 organ-
zation of teaching material. Evaluation of results. 3 lectures. Prerequisite: Grad-
uate standing.
The Social Sciences Department serves the four 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 in democracy; 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.

Graduate courses are offered in the department which will permit the student to qualify for a Master of Arts degree in education with a concentration in the field of the 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.

**CURRICULUM IN SOCIAL SCIENCES**

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<tr>
<th>Course</th>
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<td>Freshman Composition (Eng 104, 105, 106)</td>
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<tr>
<td>Physical Education (PE 141)</td>
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<tr>
<td>Basic Mathematics for General Education (Math 100)</td>
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<tr>
<td>* Natural Science</td>
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<tr>
<td>History of Civilization (Hist 101, 102, 103)</td>
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<tr>
<td>Principles of Political Science (Pol Sc 101, 102, 103)</td>
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<td><strong>Electives</strong></td>
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16½ 16½ 17½

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

** A satisfactory skill in typing is required for graduation. A student who does not type may use two units of elective credit to take Bus 141, 142 to satisfy the requirement.
Sophomore

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<th>Course</th>
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<tbody>
<tr>
<td>Introduction to Philosophy (Phil 201)</td>
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<tr>
<td>Principles of Sociology (Soc 201, 202, 203)</td>
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<tr>
<td>Public Speaking (Sp 201)</td>
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<td>Health Education (PE 107)</td>
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<td>Sports Education (PE 241)</td>
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<td>General Psychology (Psy 202)</td>
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<td>† Natural Science</td>
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<tr>
<td>History of the United States (Hist 201, 202, 203)</td>
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<tr>
<td>** Electives</td>
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Junior

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<td>Literature (Eng 211, 212, 213; or 311, 312, 313)</td>
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<td>Advanced Public Speaking (Sp 202)</td>
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<td>Cultural Anthropology (Ant 201)</td>
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<td>Senior Project (Soc Sc 461)</td>
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<td>U.S. in World Affairs (Hist 305)</td>
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<td>Philosophy (Phil 202 or 204)</td>
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<td>Principles of Economics (Ec 211, 212, 213)</td>
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Senior

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<tr>
<td>Social Problems (Soc 303)</td>
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<tr>
<td>Senior Project (Soc Sc 462)</td>
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<tr>
<td>Undergraduate Seminar (Soc Sc 463)</td>
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<tr>
<td>Political Science or History (Any 6 units from 300 or 400 level)</td>
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<td>Geography (Geog 315)</td>
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<td>Comparative Economic Systems (Ec 304)</td>
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<tr>
<td>Social Psychology (Psy 401)</td>
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<td>* Electives and courses to complete the major</td>
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DESCRIPTION OF COURSE IN 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.

DESCRIPTIONS OF COURSES IN 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.

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

** A satisfactory skill in typing is required for graduation. A student who does not type may use two units of elective credit to take Bus 141, 142 to satisfy the requirement.

† To be selected from the General Education list.
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 geographical factors in current international affairs. 3 lectures.

DESCRIPTIONS OF COURSES IN 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. 3 lectures. Prerequisite: Sophomore 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 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.

Hist 402  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.

DESCRIPTIONS OF COURSES IN 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 305

Pol Sc 312 International Politics (3)
International political processes and problems; foreign policies and politics in relations between 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.

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 the 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.

DESCRIPTIONS OF INTERDISCIPLINARY COURSES
IN THE 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.

DESCRIPTIONS OF COURSES IN 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 permission 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 the 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 the 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 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.
THE SCHOOL OF ARCHITECTURE
A Section of Architectural Exhibit at Poly Royal
THE SCHOOL OF ARCHITECTURE

George J. Hasslein, Dean

Robert F. Asbury, Jr.  Billy J. Leftwich  Benjamin K. Polk
William H. Brown  Hans Mager  Charles W. Quinlan
R. L. Graves, Jr.  Paul R. Neel  Kenneth E. Schwartz
Louis H. Hampton, Jr.  Dell O. Nickell  John S. Stuart
Anatol Helman  Raymond E. Nordquist  Wesley S. Ward
George K. Ikenoyama  Gordon A. Phillips  Maurice L. Wilks
Donald J. Koberg  William R. Phillips  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 an Associate 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.

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

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<td>Materials of Construction (Arch 106)</td>
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<td>Analytic Geometry and Calculus (Math 141, 142, 143)</td>
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<td>Engineering Surveying (AE 237)</td>
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<td>Freshman Composition (Eng 104, 105)</td>
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<td>Health Education (PE 107)</td>
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<td>Basic Design (Arch 251, 252, 253)</td>
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<td>Strength of Materials (Arch 205, 206)</td>
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<td>Engineering Problems—Digital Computers (Arch 250)</td>
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<td>General Physics (Phys 133)</td>
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<td>American Government (Pol Sc 301)</td>
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<td>Growth of American Democracy (Hist 304)</td>
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<td>U.S. in World Affairs (Hist. 305)</td>
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<td>Introduction to Philosophy (Phil 201)</td>
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<td>Survey of Economics (Ec 201)</td>
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<tr>
<td>Sports Education (PE 241)</td>
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<tr>
<td><strong>Curriculum in Architecture</strong></td>
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</table>

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.
Architecture

### CURRICULUM IN ARCHITECTURE

#### Junior

<table>
<thead>
<tr>
<th>Course</th>
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<tbody>
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<td>Architectural Design (Arch 351, 352, 353)</td>
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<tr>
<td>Architectural Practice (Arch 341, 342, 343)</td>
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<tr>
<td>Stress Analysis (Arch 304)</td>
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<td>Steel and Timber Structures (Arch 305, 306)</td>
<td>3</td>
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<tr>
<td>Stress Analysis Laboratory (Arch 344)</td>
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<tr>
<td>History of Architecture (Arch 317, 318, 319)</td>
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<tr>
<td>Electrical Systems Design (EE 324)</td>
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<td>Plumbing and Building Sanitation (ME 333)</td>
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<td>Heating and Air Conditioning (EnvE 306)</td>
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<td>Introduction to Literature (Eng. 207)</td>
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<td>Business Law Survey (Bus 301)</td>
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#### Senior

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<td>Architectural Design (Arch 451, 452, 453)</td>
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<td>Professional Practice (Arch 441, 442, 443)</td>
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<td>Concrete and Masonry Structures (Arch 404, 405, 406)</td>
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<td>Undergraduate Seminar (Arch 463)</td>
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#### Fifth Year

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<td>Design Project (Arch 571, 572, 573)</td>
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<td>Engineering Economy (IE 414)</td>
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<td>*Social Sciences elective</td>
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<tr>
<td>**Electives</td>
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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.

### CURRICULUM IN ARCHITECTURAL ENGINEERING

#### Junior

<table>
<thead>
<tr>
<th>Course</th>
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<tbody>
<tr>
<td>Design Theory (Arch 314, 315, 316)</td>
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<td>Architectural Practice (Arch 341, 342, 343)</td>
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<td>Stress Analysis (Arch 304)</td>
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<tr>
<td>Steel and Timber Structures (Arch 305, 306)</td>
<td>3</td>
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<tr>
<td>Stress Analysis Laboratory (Arch 344)</td>
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<tr>
<td>Analytic Geometry and Calculus (Math 241)</td>
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<td>Mathematics of Matrices (Math 204)</td>
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<td>Introduction to Numerical Methods (Math 332)</td>
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<td>General Chemistry (Chem 321)</td>
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<td>Electrical Systems Design (EE 324)</td>
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<td>Heating and Air Conditioning (EnvE 306)</td>
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<td>*Literature</td>
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* To be selected from the General Education List.

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

CURRICULUM IN CITY AND REGIONAL PLANNING

Junior

<table>
<thead>
<tr>
<th>Course</th>
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<tbody>
<tr>
<td>Planning Theory (CRP 301, 302, 303)</td>
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<td>Planning Laboratory (CRP 351, 352, 353)</td>
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<td>Design for Planners (Arch 347, 348, 349)</td>
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<td>Business Law Survey (Bus 301)</td>
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<td>Political &amp; Economic Geography (Geog 315)</td>
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<td>State and Local Government (Pol Sc 401)</td>
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<td>Introduction to Sociology (Soc 105)</td>
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<td>Social Problems (Soc 303)</td>
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Senior

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<td>Planning Theory (CRP 401, 402)</td>
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<td>Planning Laboratory (CRP 451, 452, 453)</td>
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<td>Senior Project (CRP 461, 462)</td>
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<td>Undergraduate Seminar (CRP 463)</td>
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<tr>
<td>Design for Planners (Arch 447, 448, 449)</td>
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DESCRIPTIONS OF COURSES IN 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 Architectural 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.

* To be selected from the General Education List.
Arch 132  Introduction to Architectural 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 Architectural 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 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 312  Home Design (3)
For students not majoring in architecture. Historical development of the home and the effect of location, climate, social and technological factors on home design. 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

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 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 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

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 351, 352, 353  Architectural Design (4) (4) (4)
Continuation of Arch 233. 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.

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 for Architects (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 321; 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 242; Phys 133; Chem 321

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

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
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

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, 452, 453  Architectural Design (5) (5) (5)
Continuation of Arch 353. Problems of increasing architectural complexity with emphasis placed on comprehensive solutions. 5 laboratories. 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, 552, 553, 554  Architectural Design (5) (5) (5) (5)
Continuation of Arch 453. Stressing professional initiative and responsibility in integrating architectural design theory and practice with fields influencing the shaping of the total environment. 5 laboratories. Prerequisite: Arch 349, 406, 443, 453

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

DESCRIPTIONS OF COURSES IN 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)
Continuation 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 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. Redevelopment. 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

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.
DIRECTORIES
EMERITUS FACULTY

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
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
DEPARTMENT HEADS

SCHOOL OF AGRICULTURE

Agricultural Business Management ................................................................. Daniel C. Chase
Agricultural Education ......................................................................................... H. H. Burlingham
Agricultural Engineering ...................................................................................... Lloyd H. Lamouria
Animal Husbandry ............................................................................................... Richard F. Johnson
Crops .................................................................................................................... Corwin M. Johnson
Dairy .................................................................................................................... Edgar Hyer
Farm Management ................................................................................................. DeWitt F. Sampson
Food Processing .................................................................................................... Howard C. Brown
Ornamental Horticulture ........................................................................................ Richard Leach
Poultry Industry ...................................................................................................... Logan Carter
Soil Science ........................................................................................................... John Allen
Veterinary Science ................................................................................................. John Allen

SCHOOL OF ENGINEERING

Aeronautical Engineering ....................................................................................... Charles P. Davis
Electrical Engineering .......................................................................................... Fred W. Bowden
Electronic Engineering ........................................................................................ Fred H. Steuck
Environmental Engineering ................................................................................. James McGrath
Industrial Engineering ........................................................................................ Millard J. Potter
Industrial Technology ............................................................................................ J. M. McRobbie
Manufacturing Processes ..................................................................................... Leo E. Rogers, Acting
Mechanical Engineering ....................................................................................... Leon F. Osteyee
Welding and Metallurgical Engineering ............................................................... Richard C. Wiley

SCHOOL OF APPLIED ARTS

Audio-Visual ........................................................................................................... John A. Heinz
Business Administration ....................................................................................... Owen L. Servatius
Education .............................................................................................................. Walter P. Schroeder
English and Speech ............................................................................................... 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

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. Bowls
Social Sciences ..................................................................................................... M. Eugene Smith
COLLEGE LIBRARY

PROFESSIONAL LIBRARY STAFF

L. Harry Strauss ......................................................... College Librarian
Joy G. Berghell .............................................................. Reference Librarian
Charles R. Beymer ............................................................ Head, Technical Services
Frederick L. Genthner ....................................................... Special Collections Librarian
Phyllis J. Hansen ............................................................. Assistant Cataloger
Cheri Kong ................................................................. Assistant Cataloger
Flora H. MacKenzie ........................................................ Assistant Cataloger
Lois C. Makin ............................................................... Reference Librarian
Angelina Martinez ............................................................ Head, Public Services
Klaus Musman ................................................................. Assistant Acquisitions Librarian
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
Glenn V. Whaley ............................................................ Head Reference Librarian
Edward A. Wilk ............................................................ Assistant Cataloger
Evelyn L. Wood ............................................................. Periodicals Librarian
THE STATE BUREAU OF AGRICULTURAL EDUCATION

State Director of Vocational Education, Wesley P. Smith

The State Bureau of Agricultural Education is a division of the State Department of Education. The bureau has charge of all vocational agriculture instruction in the State offered in the public schools at the secondary level. A bureau office is located on the San Luis Obispo Campus, and the college and its staff participate actively in inservice training for vocational agriculture teachers.

Members of the bureau staff are well informed on activities of the college, and are always willing to discuss the college with prospective students. The State Bureau of Agricultural Education staff directory is listed below:

DIRECTORY STATE BUREAU OF AGRICULTURAL EDUCATION

Donald E. Wilson, Chief of Bureau
Room 413, State Education Bldg., 721 Capitol Mall, Sacramento 95814

E. D. Graf, Jr., Asst. Chief of Bureau
Room 413, State Education Bldg., 721 Capitol Mall, Sacramento 95814

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Room 4064, 1111 Jackson St., Oakland 94607

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Room 5044, State Bldg., 2550 Mariposa St., Fresno 93721

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47 Warner Street, Chico 95928

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California State Polytechnic College, San Luis Obispo 93401

E. M. Juergenson, Teacher Trainer
University of California, College of Agriculture, Davis 95616

O. E. Thompson, Teacher Trainer
University of California, College of Agriculture, Davis 95616

J. T. Davis, Special Supervisor and Assistant State FFA Adviser
Room 413, State Education Bldg., 721 Capitol Mall, Sacramento 95814
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.  

ALLEN, RAY (1955)  Environmental Engineering  
B.A., Santa Barbara State College, 1942; M.A., California State Polytechnic College, 1965; additional graduate study, University of Southern California.  

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.

ANDERSEN, OLIVE M. (1958)  Mathematical Sciences  
Experience: Teacher, Stanes European High School, Coonoor, India; Baldwin Girls' High School, Bangalore, India.
ANDERSON, ELIZABETH B. (1958) English and Speech
B.S., Ohio University, 1938; M.A., California State Polytechnic College, 1959.

ANDERSON, PAUL B. (1956) English and Speech
B.A., University of Minnesota, 1925; M.A., Harvard University, 1927; Ph.D., 1931; additional graduate study, University of Chicago, Ohio State University, University of California, Danforth seminars, Pacific School of Religion and Claremont College.
Experience: Instructor, Massachusetts State College; professor, Parsons College, Tusculum College; professor, director of debate, academic dean, Otterbein College; professor, academic dean, National College.

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
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.

ANDREINI, ROBERT L. (1954) English and 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.
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.

APPLEGARTH, 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; test officer and instructor in education, California State Polytechnic College.

ARNDT, DONALD R. (1964) Manager, Automatic Data Processing Services
Experience: U.S. Army; IBM unit record machine operator, data processing supervisor, computer programmer, systems analyst; Ventura Union High School District; Curtiss-Wright Corporation; The Martin Company; World Business Systems; Defense Research Lab, General Motors Corporation; International Business Machines Corporation.

ASBURY, ROBERT F., JR. (1964) Architecture and Architectural Engineering
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.

BABB, JAMES H. (1959) Printing Technology and Management
Experience: Fifteen years experience in printing, 6½ of which was as owner of Visalia 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 and Speech

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.
BARBER, EDWARD S. (1966) Business Administration
B.S., Pennsylvania State University, 1950; M.S., 1951.
Experience: Management trainee, Allstate Insurance Company; personnel manager, and manager manufacturing and control, Sylvania Electric; instructor, San Jose Junior College, Los Altos High Adult Education, Cabrillo College, University of California Extension.

BARR, STANLEY L. (1959) English and Speech
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.

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 School; band director, class program scheduler, California State Polytechnic College, San Luis Obispo.

BEEBE, JOHN H. (1966) Business Administration
B.A., Williams College, 1964; M.S., University of Texas, 1966.
Experience: Laboratory and office, Worden Laboratory, Houston; sales and delivery, Rudnick Laundry, Williamstown, Massachusetts; factory work, Hanau, Germany.

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, California; 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.
BETZ, ELLARD W. (1947) .................................................. Manufacturing Processes
B.A., Santa Barbara State College, 1942.
Experience: U.S. Navy; teacher, Victorville, California.

BEYMER, CHARLES R. (1966) .................................................. Library
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.

BLAINE, MARY H. (1967) .................................................. Activities Adviser—Foreign Students
B.A., University of Iowa, 1941; M.A., University of New Mexico, 1967.
Experience: Secretary/office manager, Foreign Policy Association, Washington, D.C.; diplomatic service, U.S. Department of State, Buenos Aires, Argentina, Santo Domingo, Dominican Republic; Albuquerque area representative, American Field Service International Scholarships; Assistant foreign student adviser, University of New Mexico.

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
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.

BOOTHE, ROBERT O. (1954) .................................................. English and Speech
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, McCullock 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) .................................................. Housing Coordinator
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: Geophysicist, 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.
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.

BREAZEALE, CONNIE R. (1966) .............................................. Home Economics
B.S., California State Polytechnic College, 1960.
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.

BROMLEY, J. PHILIP (1947) ..................................................... Farm Management
B.S., University of Southern California, 1934; M.S., 1936; additional graduate study, Columbia, Texas A & M, and University of California.

BROWN, HOWARD C. (1946) ..................................................... Head, Ornamental Horticulture Department
B.S., California State Polytechnic College, 1943; M.S., Ohio State University, 1954; Ph.D., 1963.

BROWN, MARVIN D. (1956, 1966) .............................................. English and Speech
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.

BROWN, WILLIAM H. (1957) ....................................................... Architecture and Architectural Engineering
B. Arch., University of Florida, 1954; graduate study, University of Florida.

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.

Experience: Sub-station operator, electrical engineer, U.S. Steel Corporation; graduate assistant, Illinois Institute of Technology; assistant professor, Purdue University Center.

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.

BULLOCK, FREDERICK E., JR. (1967). Education
B.A., Montana State University, 1957; M.A., University of California, 1965.
Experience: Elementary and secondary art instructor, La Mesa, San Diego, Berkeley; art teacher, Berkeley Adult School, University of California Extension, Oakland Recreation Department, Hayward Recreation Department; associate instructor, University of California, Berkeley.

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.

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). Education and Co-ordinator of 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.

CAMPBELL, RALPH G. (1965) Business Administration
Experience: Bookkeeper, C.A. McClure, P.A.; accountant, BelCal Corp., Visalia; accountant, EBSO, Inc., Santa Cruz; instructor, Loyola University.

CARNegie, E. J. (1963) Agricultural Engineering
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.

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.

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 Diego and 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, 1942; additional graduate study, University of Missouri, 1947.
Experience: Teacher, Nebraska and Iowa; instructor, Stephens College; assistant professor, Grinnell College.

CHANDLER, EVERETT M. (1951) Dean of Students
A.B., University of California, 1939; graduate study, University of California.
CHASE, DANIEL C. (1954)  
Head, Agricultural Business Management Department  
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.

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)  
Farm 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.

CHRISTENSEN, DAVID O. (1967)  
Social Sciences  

CLEMENTS, WILLIAM E. (1966)  
Physics  
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  
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, 1953; 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.
COATS, DONALD M. (1964)  
Associate Dean, Educational Services  
B.S., California State Polytechnic College, 1964.  

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.

COBURN, HELEN P. (1966)  
Journalism  
Experience: Free-lance writing and newspaper work, Arcadia and Preston, Kansas.

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, Sacramento.

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 Company; 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 University, 1967.  
Experience: U.S. Air Force; ranching; meat research and teaching assistant, New Mexico State University.

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.

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 and Speech
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.

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.

DETTLOFF, ERLAND G. (1967) ---------------- Education
Experience: Teacher, Great Falls, Montana; visiting professor, part-time instructor, assistant professor, University of Wyoming; assistant professor, Northern State College, South Dakota.

DETZER, JORDAN E. (1967) ---------------- Mathematical Sciences
B.A., Adrian College, 1948; Th.M., Iliff School, 1951; Th.D., 1953; additional post graduate study.
Experience: Instructor, Michigan State Training School, Colorado A. & M., Arizona State University; leadership counselor, pastor, Methodist Church.

DE VOROS, EVELYN K. (1955) ---------------- English and 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.

DILLION, JERRY L. (1954) ---------------- Electronic Engineering
B.S., California State Polytechnic College, 1954.
Experience: Electronic engineer, IBM; project engineer and consultant, Technical Material Corporation; electronic technician, U.S. Signal Corps.

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.
DIXON, JACKIE B. (1967) Mathematical Sciences
B.S., Oklahoma University, 1956; M.S., Louisiana Polytechnic Institute, 1963; additional graduate study, Pennsylvania State University.
Experience: Production engineer, Sunray D-X Oil Company; staff sergeant, U.S. Marine Corps; assistant professor, University of Southwestern Louisiana.

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.

DUARTE, ARTHUR C. (1967) Farm 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., JR. (1965) Education
A.B., University of California, 1951; M.A., University of Southern California, 1955.

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.

ECKROTE, LAWRENCE H. (1955) Printing Technology and Management
Experience: Foreman, Mail of Woodland and San Bernardino Orange Belt News; machinist, Santa Barbara News-Press and San Luis Obispo County Telegram-Tribune; over 30 years experience in the printing industry.

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.
ELLIOTT, WALTER E. (1965) .................................................. Physics
Experience: Instructor, Beauregard Pansh 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, 1949.
Experience: Teacher, Santa Barbara County Schools; instructor, head, Mathematics Department, Junior High School, and instructor, 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) ..................................................... English and Speech
A.B., 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.

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 and Speech
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.

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 Business Management
B.S., California State Polytechnic College, 1963; M.S. University of California, Davis, 1964; additional graduate study, University of California, Davis.
Experience: Research assistant, Department of Agricultural Economics, University of California, Davis.
FEDERER, M. DALE (1963) __ ________________________________Education
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 re-
search assistant, cardio-vascular trainee, University of California, Los Angeles; in-
structor, 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 Experi-
ment Station; associate professor, Pennsylvania State University; project leader,
fungicide and nematocide research, Monsanto Chemical Company, St. Louis, Mis-
souri.

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, Uni-
versity of Southern California; officer, U.S. Army; instructor, mathematics; assis-
tant 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 Fer-
nando Valley State College.

FLANAGAN, JAMES ROBERT (1959) ________________Animal Husbandry
B.S., California State Polytechnic College, 1959.
Experience: Rancher.

FOLDSOM, VOLMAR A. (1946) ______________________________Mathematical Sciences
B.S., Iowa State College, 1934; M.E., Colorado University, 1937; additional grad-
uate study, Southern Methodist University.
Experience: High school and junior college teaching; officer, U.S. Navy; assist-
ant professor, mathematics, Southern Methodist University; coordinator, relations
with schools, California State Polytechnic College.

FOTTER, MILLARD J. (1954) ________________Head, Industrial Engineering Department
B.S., Armour Institute of Technology, 1935; M.S., University of Southern Cali-
ifornia, 1936.
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, Inter-
national 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.

FRIETZSCHE, ARTHUR H. (1965) ........................................... English and Speech
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.
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.

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) ........................................... Electrical Engineering
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.

FURST, EMANUEL F. (1963) .............................................. Electronic Engineering
B.E.E., Clarkson College, 1962; M.S.E.E., Columbia University, 1963; additional graduate study, Worcester Polytechnic Institute.
Experience: Computer engineer, Brookhaven National Laboratory; engineer, Aurotronics.

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 and Speech
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
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.

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, Melfort, Saskatchewan.

GERSTEN, ROY (1967) ..................................................... Business Manager, Associated Students
B.S., Sacramento State College, 1966; graduate study, Sacramento State College.

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 Company, San Miguel; Pacific Valley Cattle Company, King City; U.S. Marine Corps.

GIBSON, J. CORDNER (1949) ............................................. Acting 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.

GILLIS, ELAINE (1967) .................................................... Activities Adviser
B.S., California State Polytechnic College, 1967.
GLIDDEN, WALLACE F. (1961) Veterinary Science
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 exchange, International Farm Youth Exchange; home economics teacher, Mishawaka, Indiana; graduate assistant, Ball State University.

GOLD, MARCUS (1947) Audio-Visual Service Coordinator
B.A., University of California, 1942; B.L.S., 1947; additional graduate study, University of California.
Experience: U.S. Army; library, University of California; audio-visual librarian, California State Polytechnic College; research assistant, University of California.

GOLDEN, JAMES R. (1966) Industrial Engineering
B.S., U.S. Military Academy, 1945; M.S., Ohio State University, 1961.

GORDON, RAYMOND G. (1967) Mechanical Engineering
B.S., Western New England College, 1966; M.S., University of Michigan, 1967.

GRANT, DAVID M. (1950) English and Speech
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.

GRAVES, R. L., JR. (1951) Architecture and Architectural Engineering
B.S., University of Kansas, 1948; M. Arch. and Urban Design, Cranbrook Academy of Art, 1950.
Experience: Instructor, University of Florida; University of Alabama; State College of Washington; University of Kansas; architect, private practice; designer, L. N. Boney, Architect; draftsman, R. R. Calder, Architect; U. S. War Department; U. S. Navy.

GRAVES, THEODORE G. (1947) Environmental Engineering
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
Experience: Overseas assignments: France, Central Europe, Vietnam; chief, War Plans Division; chief, Manpower Division, Joint Staff, Washington, D.C., faculty member, National War College, Washington, D.C.
GREEN, WILFRED M. (1966) English and Speech
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.

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.

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.

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.

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, 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 Hospital, Chicago; private practice, Fort Bragg, California; college physician, Fresno State College.
HALL, RICHARD E. (1947) ............................................ Manufacturing Processes
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.

HALLET, JAMES T. (1967) .................................................. Crops
B.A., San Francisco State College, 1959; additional study, California State Polytechnic College.
Experience: Research biologist, Stauffer Chemical Company; field research agronomist, U.S. Borax Research Corporation and Germain's Inc.

HAMERS, JOHN M., JR. (1957) ........................................ Business Administration
Experience: Branch office manager, Green Giant Co., Dayton, Washington; hospital business manager, Kennewick, Washington; accounting systems sales representative, C. R. Hadley Company; radio newscaster, Lancaster, California; senior accountant, Harry T. King Co., CPA, Los Angeles, Schofield & Company, CPA's, San Luis Obispo; self-employed, CPA; partner, Knight & Hamers, CPA's, San Luis Obispo; founding president and director, San Luis Obispo Savings and Loan Association; accounting referee for Superior Court of San Luis Obispo County.

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.

HAMPTON, LOUIS H., JR. (1965) ..................................... Architecture and Architectural Engineering
B.S., Texas A&M University, 1954; B.Arch., 1963.
Experience: Instructor, University of Southwestern Louisiana; teaching fellow, Texas A&M University; engineer, Columbia Southern Chemical Corp.

HANKS, CHARLES J. (1954) ............................................. Mathematical Sciences
Experience: Assistant professor, Drexel Institute of Technology; assistant football coach, University of Arkansas; officer, U.S. Coast Guard.

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
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
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) ———— Physical Education
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.

HASKELL, CHARLES THOMSON (1963) ———— Mathematical Sciences
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.

HATFIELD, R. C. (1949) ———— Biological Sciences
B.Sc., University of Dayton, 1941; M.A., University of California at Los Angeles, 1947; Ph.D., 1950.

HEAD, DWAYNE G. (1966) ———— Physical Education
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.

HELMAN, ANATOL (1957)  Architecture and Architectural Engineering  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 Espanoles Asociados, Madrid, Spain; Warsaw Municipality; instructor, University of Nebraska; University of Oklahoma; Navy Orientation School.


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)  Associate Dean, Academic Planning  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; acting head, Social Sciences Department, California State Polytechnic College.

HERALD, CHARLES A. (1958)  Electronic Engineering  B.Sc., M.S.c., 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.

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.

HIRT, JOHN B. (1965) ........................................ Business Administration  
Experience: Engineering analyst, Lorain Iron and Steel Foundry; engineer, Machine Shop Division, industrial engineer, American Bridge Division, supervising engineer, Construction Department, United States Steel Corporation; instructor, University of Pittsburgh Graduate School; aircraft engineering officer, U.S. Marine Corps. Acting Dean, School of Engineering.

HITCHCOCK, VAUGHAN D. (1962) ........................................ Physical Education  
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.  

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.

HOLLEY, F. JERALD (1961) ........................................ Registrar  
B.S., Utah State University, 1961.  

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. (1953) ........................................ 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.

HOMAN, DENNIS N. (1966) ........................................ Biological Sciences  
B.A., University of Iowa, 1953; 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
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.

Experience: Welder, Oregon Shipyards; U.S. Army; laboratory supervisor, Metallurgical Engineers, Inc.; registered professional engineer, Oregon.

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.

HOOVER, ROBERT F. (1946) Biological Sciences
B.A., Stanford University, 1934; M.A., University of California, 1935; Ph.D., 1937.
Experience: Teaching assistant and research assistant, University of California; instructor, Yakima Valley Junior College; U.S. Army.

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.

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, BLAINE N. (1965) Physics
B.S., Ricks College, 1953; M.S., New York University, 1961; M.S., Brigham Young University, 1964.
Experience: Health physicist, Brookhaven National Laboratory; physicist, United States Army, Applied Research Associates; radio-physical chemist, University of Utah; teaching assistant, University of Utah, Brigham Young University; research assistant, New York University; instructor, Eastern New Mexico University.
HOWARD, LORRAINE H. (1964) ........................................... Associate Dean, Women
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.

HUGHES, LEROY BARRY (1950) ............................................ Physical Education
B.S., University of Oregon, 1931; M.A., Stanford University, 1950.

HUOT, ROBERT J. (1963) ................................................. English and Speech
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.

HUTTON, REX L. (1966) .................................................. Mathematical Sciences
Experience: Teacher, Brooklyn Junior High School; research assistant, Education Research Council of Greater Cleveland; instructor, Cuyahoga Community College.

HYER, EDGAR A. (1951) ................................................ Head, Farm Management Department
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 and Architectural Engineering
B.S., California State Polytechnic College, 1955.
Experience: Associate, John Badgley, AIA.

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.

JAMES, AERNAT S. (1965) ........................................... Physics
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.
JENKINS, STARR (1961) .......................... English and Speech
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; informa-
tion specialist (writer-photographer), U. S. Forest Service, Southwestern Regional
Office, Albuquerque, New Mexico; free-lance writer-photographer.

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, RICHARD F. (1950) .................. Head, Animal Husbandry 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 and Speech
B.A., University of Denver, 1939; M.A., 1949; additional graduate study, Uni-
versity 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 and Speech
B.A., Gustavus Adolphus College, 1947; M.A., University of Minnesota, 1951;
M.A., University of Denver, 1953; additional graduate study, University of Wash-
ington, University of Southern California.
Experience: Presidential assistant, Johnson Wholesale and Manufacturing Com-
pany; instructor and publications adviser, Florence State College; instructor and
publications chairman, Memphis State University; instructor, University of Ten-
nessee (ext.); assistant professor, Luther College; instructor, University of Puget
Sound.

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, Wash-
ington.

JOHNSON, WILLIAM V. (1966) ........................... Music
Experience: Instructor, Seegar Memorial High School, Indiana; equipment man-
ger, University of Michigan.

JOHNSTON, ROBERT M. (1946-54) (1956) ................ Mechanical Engineering
B.A., Santa Barbara State College, 1937; graduate study, Boeing School of Aero-
nautics.
Experience: Meteorologist, Pan American Airways and Pennsylvania Central
Airlines; meteorology instructor, Randolph Field and Pan American Airways;
junior civil engineer, Division of Highways, California.

JONES, JOHN R. (1961) ................................. Business Administration
B.S., University of Minnesota, 1931; L.L.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.
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.

KEETCH, BRENT H. (1967) Journalism
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, newsmen, 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.

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.
KENNEDY, ROBERT E. (1940)  ..................................................  President
A.B., San Diego State College, 1938; M.A., Stanford University, 1950; Ph.D.,
Claremont Graduate School, 1966.
Obispo Telegram-Tribune, Palo Alto Times; at California State Polytechnic Col-
lege: 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.

KERR, JOHN F. (1967)  .........................................................  English and Speech
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 pro-
fessor, Westminster College, Missouri; instructor, University of Missouri; teaching
assistant, University of Texas; assistant professor, Louisiana State University.

KERR, SHARRON L. (1966) ...................................................  Physical Education
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.

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 Opera-
tions Administration, U.S. Government.

KLAUSTERMEYER, JAMES A. (1964) ............................................  Crops
B.S., California State Polytechnic College, 1960; graduate study, 1961.
Experience: Sales and service, Southern Ammonia Service; Vocational Agricul-
ture 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 instruc-
tor, private schools, art associations, Los Angeles.
KOBERG, DONALD J. (1962) Architecture and Architectural Engineering  
B. of Arch., Tulane University, 1958.  
Experience: Architectural practice as designer and draftsman in New Orleans; instructor, North Dakota State College; lecturer, University of California at Berkeley; research associate, Research Associates, Berkeley.

KOGAN, IRVIN J. (1957) Electronic Engineering  
Experience: Instructor, Orange Coast College; U.S. Air Force.

KOMBRINK, RICHARD T. (1955) Mechanical Engineering  
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.  

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.

LANDYSHEV, ALEXANDER (1956) Electrical Engineering  
E.E., University of Vladivostok, Russia, 1927.  
Experience: Electrical engineer, Donez Basin Power System, Russia; Energiebauost 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.

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, JOHN D. (1951) ................................................. Associate Dean (Activities)

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.

LAWSON, JOHN D. (1951) ................................................. Associate Dean (Activities)

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.

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.

LEROI, FRANK B. (1965) ............................................. Business Administration

Experience: Student teacher, San Jose State College; instructor, Foothill College, Los Altos.
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 Brosi; 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, VANCE D. (1946) Physics
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; science and mathematics instructor and administrator, California secondary schools; staff member, 1955 summer physics institute, University of New Mexico; U.S. Naval Aviation officer.

LINDAMOOD, CHARLES H. (1958) English and Speech
B.A., University of Minnesota, 1949; M.A., Columbia University, 1951; additional graduate study, University of Minnesota, Stanford University, 1957.

LINER, RENIL C. (1966) Assistant to the Dean of Students

LINT, ROBERT G. (1967) English and Speech
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.

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

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.

MacKENZIE, FLORA H. (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.

McCABE, DONALD L. (1962) ................................. Public Information Specialist
B.S., Los Angeles State College, 1958; graduate study, Los Angeles State College.

McCORKLE, ROBERT E. (1962) .............................. Agricultural Business Management
B.S., California State Polytechnic College, 1960; M.S., University of California, 1962.
Experience: Research statistician, Department of Agricultural Economics, University of California; research assistant, Farm Economics Division, Economic Research Service, United States Department of Agriculture.

McGRATH, JAMES M. (1946) ......................... Head, Environmental Engineering Department
B.A., Santa Barbara State College, 1941; M.A., California State Polytechnic College, 1953.

McMEEN, GEORGE H. (1960) ............................. Mathematical Sciences
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
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
Experience: Template and patternmaker, The Boeing Company, Seattle; instructor and civilian personnel recruiter, Puget Sound Naval Shipyards, Bremerton; industrial arts teacher, Santa Clara County; industrial arts teacher-consultant, San Diego County Schools; coordinator of industrial arts, Tulare County Schools.

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.

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 and Architectural Engineering
Experience: Lecturer, Railway Engineering School; constructor of railway bridges, administration of Estonian Railways; structural engineer, Building Concern H.S.B., Stockholm, Sweden. Registered professional engineer, California.

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.
Experience: Librarian, Elementary Schools, Long Beach, California; humanities reference librarian, San Jose State College.

MAKSOUDIAN, 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.
MARSTON, ENA LESLIE (1946) .......................................................... English and Speech
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.

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.
Experience: Instructor, Eastern Montana College, University of Utah; U.S. Army.

MENDENHALL, CHARLES E. (1967) .................................................... Agricultural Information

MERRIAM, JOHN L. (1958) ............................................................ Agricultural Engineering
B.S., California Institute of Technology, 1938; graduate study, California Institute
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.

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.

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, JEANNE (1961) Graduate Nurse
R.N., St. Alexius 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.

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.

MORRIS, HAROLD D. (1966) Farm 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 and Speech
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.
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 Shoffar Tool Company.

MUSMAN, KLAUS (1967)                       Library
                                    Experience: Librarian, Detroit Public Library; Michigan State University.

                                    B.S., California State Polytechnic College, 1958; B. of Arch. University of Southern California, 1962.
                                    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, CARL RUSSELL (1949)             Dairy
                                    B.S., Kansas State College, 1941; M.S., University of Missouri, 1958.
                                    Experience: Instructor, Kansas State College; supervisor, dairy herd and farm management association, Kansas; extension agent, extension dairyman, Kansas; dairy inspection, U.S. Public Health Service; U.S. Army.

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
                                    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 OREY (1965)              Architecture and Architectural Engineering
                                    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.
NIELSEN, KEITH E. (1959) English and 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.

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.

NORLE, 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 and Architectural Engineering
B.S., Montana State College, 1950.
Experience: Private practice; designer, Cushing and Terrell, Architects; draftsman, Edwin Osness, Architect; Atkinson and Jones, Construction.

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.

ODANIELS, 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.

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.

OSTEYEE, LEON F. (1957) Head, Mechanical Engineering Department
B.M.E., Rensselaer Polytechnic Institute, 1945; M.M.E., 1957.
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.

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.

PAUTZ, ROLAND K. (1959) ........................................ Poultry Industry
B.S., Oregon State College, 1957; graduate study, Oregon State College.

PEDISSON, WILLARD M. (1961) .............................. Head, English and Speech 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.

PELLATON, EVELYN I. (1966) .................................. Physical Education
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, PRATAPSINHA C. (1966) ............................... Biological Sciences
B.S., Bombay University, 1947; M.S., Poona University, 1951; M.S., Utah State University, 1959; Ph.D., 1965.
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.

PETKOSKI, JAMES J. (1964) .................................... English and Speech
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
B.S., California State Polytechnic College, 1956; graduate study, Montana State University.

PHILBIN, LEO F. (1948) Aeronautical Engineering
B.S., California State Polytechnic College, 1944.
Experience: Aircraft instructor, Naval Flight Preparatory School; aircraft instructor, Fourth Air Force Headquarters, San Francisco; civilian training administrator, Salinas Army Air Base; training officer, Veterans Administration Office, San Luis Obispo; registrar, California State Polytechnic, San Luis Obispo.

PHILLIPS, DON, Maj. (1967) Military Science
Experience: Staff and command assignments in the European and Vietnam areas.

B.S., University of Illinois, 1941; M.Arch., Massachusetts Institute of Technology, 1949.
Experience: Private architectural practice; instructor, Washington University, Montana State University, University of Illinois.

PHILLIPS, WILLIAM R. (1957) Architecture and Architectural Engineering
B.Arch., University of Southern California, 1952.

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.

PINKSTON, HOWELL C. (1966) Education
B.S., Wayne State University, 1961; M.A., 1965; additional graduate study, Wayne State University.
Experience: Summer camp arts and crafts supervisor; instructor, Thurston High School, Detroit, Wayne State University, Bloomsburg State College; instructor of sculpture, Perry Sound, Ontario.

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.

PRATER, EUGENE G. (1967) English and Speech
B.A., Phillips University, 1962; B.D., Vanderbilt University, 1954; M.A., 1955; S.T.M., Harvard University, 1956; Ph.D., American University, 1963; additional 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, BYRD L. (1957) English and Speech
B.A., Baylor University, 1927; M.A., 1932; additional graduate study, Harvard University, University of Colorado, University of California.
Experience: Assistant professor, Texas A. & M. College; assistant professor, San Jose State College; instructor, Modesto Junior College.

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
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
Experience: Instructor, Atascadero High School; lecturer, California State Polytechnic College, San Luis Obispo.

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.

QUINN, PETER L. (1967) Mathematical Sciences

RABE, PETER (1967) Education
B.A., Ohio State University, 1943; M.A., Western Reserve University, 1948; Ph.D., 1949.
Experience: Lecturer, Western Reserve University; research fellow, Jackson Laboratory, Maine; self employed writer, therapy, psychological counseling.
RAGHAVAN, RENUKA (1966) .................................................. Home Economics
B.A., Nagpur University, Nagpur, India, 1957; B.E., University of Delhi, India, 1959; M.E., Smith College, Northampton, Massachusetts, 1960; additional graduate study, Merrill-Palmer Institute, Oregon State University.
Experience: Counselor, Edenwald School, New York; graduate assistant, language instructor for Peace Corps, instructor, Oregon State University.

RALL, FREDERICK A., Maj., U.S.A. (1965) .............................. Military Sciences
B.S., United States Military Academy, 1956; Infantry Basic Officers Course, 1956; Infantry Career Officers Course, 1961; Special Warfare School, 1962; Personnel Officers School, 1962; Army Airborne School, 1957; Army Ranger School, 1957.
Experience: Staff and command assignments in the United States and overseas; military advisor to Vietnam Army units.

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.

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.

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)  Mechanical Engineering
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)  Industrial Technology

Rice, Walter E. (1965)  Business Administration
Experience: Assistant floor manager, Roos/Atkins; student teacher, College of San Mateo; tutor, San Francisco.

RICH, GLENN W. (1953)  Foreign Student Counselor
Experience: Journeyman carpenter, U.S. Coast Guard; instructor, California State Polytechnic College.

RICHARDS, CARLOS C. (1946)  Manufacturing Processes
B.A., Santa Barbara State College, 1942.

RICHARDSON, JOY O. (1948)  Foreign Student Counselor
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.

RICKANSRUD, TORLEIF M. (1943)  Physicis
B.A., Luther College, 1922; M.S., Iowa State University, 1940; additional graduate study, University of St. Louis.
Experience: Superintendent of schools and director of science department, Rolla, North Dakota; Omemee, North Dakota; Lansing Iowa; electronics instructor, Advanced Radar School, Truax Field, Madison, Wisconsin.

RIDER, ROL W., JR. (1960)  Business Administration
B.A., University of California, 1941; M.A., 1967.
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.

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.

ROGALLA, JOHN A. (1959) .............................................. Farm Management
B.S., California State Polytechnic College, 1956; M.S., Cornell University, 1958; Ph.D., Cornell University, 1968.
Experience: U.S. Air Force; graduate assistant, Cornell University; material control analyst, Ryan Aeronautical Company.

ROGERS, LEO E. (1954) .............................................. Acting Head, Manufacturing Processes Department
B.S., California State Polytechnic College, 1950.
Experience: Instructor, San Luis Obispo High School; engineering aid, Division of Highways, San Luis Obispo.

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.
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
Experience: Interior designer, Sherman Oaks; teaching assistant, instructor, Uni-
versity 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; Field artillery officers courses, U.S. Army
Missile School, 1964; missile courses, U.S. Army Defense School, 1964; parachute

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 Commis-
sion; program administrator, Navy Bureau of Ordnance; engineer, Proctor and
Gamble, Dow Chemical. Registered professional engineer, California, Michigan,
Virginia, and District of Columbia.

SAAM, PATRICIA (1966) ......................................................... Home Economics
B.S., College of St. Catherine, St. Paul, Minnesota, 1950; graduate study, Uni-
versity 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.

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,
Experience: Research chemist, American Can Company, Maywood, Illinois; dis-
trict manager of research, Portland, Oregon, Seattle, Washington, San Francisco;
general manager of technical service.

SANDERSON, JAMES D. (1967) .................................................. Physical Education
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.

SCALA, RICHARD B. (1967) ................................................. Mathematical Sciences
Experience: Instructor, University of Detroit High School, Catholic Central High
School, Bloomfield Hills High School.

SCALES, HARRY H. (1958) ...................................................... Education
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.S.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
Experience: Librarian, California State Polytechnic College; U.S. Army Special Services, Frankfort Post, Germany.

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.

SCHWARTZ, KENNETH E. (1952) .................................................. Architecture and Architectural Engineering
B. of Arch., University of Southern California, 1952.

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.

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 Business Management
Experience: Farming; instructor, Ferndale Union High School.

SEEKER, GLENN E. (1954) ......................................................... Welding and Metallurgical Engineering
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

SHAFFER, PAULINE (1961) ......................................................... Home Economics
B.S., Juniata College, 1953.
Experience: Southern Counties Gas Company, Ventura; dietician, 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) Assistant Business Manager, Associated Students
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.

SHEIKHOLESAMI, HABIB (1967) English and Speech
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.

SHIRLEY, DELBERT W. (1963) Agricultural Education
B.S., Oregon State University, 1959; M.Ed., 1963.
Experience: Vocational agriculture instructor, Siletz High School, Siletz, Oregon; graduate assistant, Oregon State University.

SILVA, GEORGE L., Maj. (1967) Military Science
B.S., University of San Francisco, 1965.

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) English and Speech
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.

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.

Experience: Staff and command assignments in the United States and Vietnam areas.
SMITH, GLEN H. (1962) .............................................. English and Speech
Experience: Program director, Station KUOM, University of Minnesota; radio
director and account executive, advertising agency, Ft. Wayne, Indiana; radio-TV
officer, Naval Command, Tokyo; advertising manager, Station KGAY, Salem,
Oregon; speech and forensics teacher, secondary schools, Oregon; free lance drama
director.

SMITH, J. MURRAY (1960) .............................................. English and Speech
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 Play-
house; 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.

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 of Chicago, 1945.
Experience: Cataloger and reference librarian, Milwaukee Public Library; librar-
ian, U.S. Public Health Service, Cincinnati; cataloger, Northrop Aircraft; reference
librarian, Los Angeles Public Library.

STALLARD, MARY L. (1965) .............................................. Physical Education
Experience: Instructor, Hamilton Junior High, Fresno; teaching assistant, Uni-
versity of Washington.
STANSFIELD, WILLIAM D. (1963)  
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)  
B.S., University of California, 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.

STEFANAC, JOSEPH B. (1958)  
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.

STOUCK, FRED H. (1947)  
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)  
B.M.E., University of Santa Clara, 1950; M.E., University of Santa Clara, 1955. 
Experience: Engineer, automatics, Aerojet-General, Northrop Aircraft; Robertshaw-Fulton Controls, Norris-Thermador Corp.; chemist, U.S. Industrial Chemicals; registered professional engineer, California.

STONER, HOWARD F. (1960)  
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 shipbuilding, Electric Boat Co.; repair and construction superintendent, Mare Island Shipyard; production officer, Long Beach Naval Shipyard.

STOOKEY, ELLEN T. (1961)  
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)  
B.S., California State Polytechnic College, 1958. 

STRAUSS, L. HARRY (1961)  
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.
<table>
<thead>
<tr>
<th>Name</th>
<th>Field</th>
<th>Degrees/Institutions</th>
<th>Experience</th>
</tr>
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<tbody>
<tr>
<td>Streichert, Gretchen (1958)</td>
<td>Home Economics</td>
<td>B.S., Oregon State College, 1936; M.S., 1951.</td>
<td>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.</td>
</tr>
<tr>
<td>Swanson, Clifton E. (1967)</td>
<td>Music</td>
<td>B.A., Pomona College, 1963; M.M., University of Texas, 1965; additional graduate study, University of California.</td>
<td>Teaching assistant, University of Texas, University of California; visiting assistant professor, Portland State College; member, Group for Contemporary Music, Portland.</td>
</tr>
<tr>
<td>Tellew, Fuad H. (1960)</td>
<td>Business Administration</td>
<td>B.S., College of Commerce and Economics, Baghdad, Iraq, 1950; M.A., University of Southern California, 1954; Ph.D., 1959.</td>
<td>Accountant, Engineering Department, Iraqi State Railways; supervisor, Testing Bureau, University of Southern California; teaching assistant and lecturer, University of Southern California.</td>
</tr>
<tr>
<td>Thomson, David H. (1946)</td>
<td>Biological Sciences</td>
<td>B.S., University of Arizona, 1944, M.A., Claremont Graduate School, 1948; additional graduate study, Oregon State College and University of Oregon.</td>
<td>Laboratory instructor, Pomona College; ranger-naturalist, Sequoia National Park.</td>
</tr>
<tr>
<td>Thurmond, William (1951)</td>
<td>Biological Sciences</td>
<td>A.B., University of California, 1948; M.A., 1950; Ph.D., 1957.</td>
<td>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.</td>
</tr>
</tbody>
</table>
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, University of Michigan, Arizona State University, University of Georgia.  
Experience: Teacher, Tomahawk High School, San Bernardino City Schools, Grossmont Union High School District and College; assistant professor, Wisconsin State College, Stevens Point.

TRAMMELL, JOHN L. (1965) .................................................. Business Administration  
Experience: Counselor, part-time Dean of Men, teaching assistant, lecturer, University of Southern California.

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  
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.

B.S., California State Polytechnic College, 1952; M.S., South Dakota State University, 1966.  

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.

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.

VARTAN, ROBERT P. (1967) ........................................ Business Administration
B.A., University of Michigan, 1936; M.B.A., 1937; C.P.A., 1946; L.L.B., University
of Toledo, 1955.
Experience: Supervising senior, Price Waterhouse & Company; chief of audit
section, financial analyst, adviser to Renegotiation Board, Detroit Ordnance Dis-
tric; controller and assistant treasurer, Greer Hydraulics, Inc.; controller for
Plymouth Body Plant, divisional controller for Airtemp Division, Chrysler Corpor-
at; vice president-finance, assistant treasurer, assistant secretary, Dorr Records,
Inc.

VOELTZ, HERMAN C. (1965) ........................................ Social Sciences
Experience: Instructor, 83 Div I and E School, Bad Ischl, Austria; instructor and
associate professor, Division of Continuing Education, University of Oregon; assis-
tant 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; officer,
U.S. Navy.

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., Ari-
izona State University, 1963; additional graduate study, University of Wyoming,
Marshall University, Yeshiva University, Arizona State University, University of
Colorado.
Experience: Teacher, Boulder School, Rufust Consolidated School, Scarsdale
Schools; graduate assistant, New York University; instructor, New Lincoln School,
Gilillard Junior High School.

WAHL, WILLIAM B. (1966) ........................................ English and Speech
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
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 and Speech
B.S., Northwestern University, 1953; M.A., University of Texas, 1955; Ph.D., 1965.
Experience: Teaching assistant, special instructor, University of Texas; instruc-
tor, 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 Uni-
versity.
Experience: Supervising psychologist, Rockland County New York Center for
Mental Health; psychotherapist, Rockland Consultation Center; certified psy-
chologist, New York.

WARD, CLARENCE H. (1966) Physical Education
Experience: Recreation intern, correctional officer, California Men's Colony;
summer swimming instructor, California State Polytechnic College.

WARD, WESLEY S. (1954) Architecture and Architectural Engineering
B. of Arch., University of Southern California, 1953.
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.

WASIL, WILLIAM N. (1967) Physical Education
B.S., Bowling Green State University, 1958; M.S., Florida State University, 1960;
additional graduate work, University of California at Los Angeles.
Experience: Physical education instructor, Ohio, Florida; science instructor,
Georgia; instructor, Tampa City Schools; coach and physical education instructor
San Diego County Schools; instructor, administrative assistant, University of Cali-
fornia at Los Angeles.

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.

WEBER, BARBARA P. (1966) Home Economics
B.S., University of Nevada, 1951; graduate work, 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 high-
way engineer, California Division of Highways; field survey chief and project
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.

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
Experience: Reference librarian, Drake University; librarian, Milwaukee Public Library.

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, Cottey College, College of the Desert; teaching assistant, University of the Pacific.

WHITTON, DERRELL B. (1964) ...................................................... Biological Sciences
Experience: Assistant professor, Eastern Illinois University.

WHITSON, 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.

WHITTING, FRANCIS F. (1946) ...................................................... Manufacturing Processes
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.

WHITSTON, 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.

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 profes-
sional engineer, California.

WILK, EDWARD A. (1966) ........................................Library
Experience: I.B.M. operator, Allstate Insurance Company; salesman, Arts Interna-
tional, Detroit, Michigan.

WILKS, MAURICE L. (1966) .....................................Architecture and Architectural Engineering
B.Arch., Yale University, 1952.
Experience: Consultant and architect, private practice; coordinator, Victor Gruen
Associates; associate architect, Robert Kliegman, AIA; instructor, University of
Utah, University of Kansas; draftsman and designer, P. J. Ellerbroek, AIA.

WILLIAMS, ROBERT E. (1957) ....................................Architecture and
Architectural Engineering
B.S., California State Polytechnic College, 1954.
Experience: Assistant resident engineer, California Division of Highways; sur-
veyor and designer, Pacific Engineers; Griffith Construction Co.

WILLS, MAX THOMAS (1967) .......................................Chemistry
Experience: Chemist, Oil and Refining Co.; laboratory technician, General Mills
Inc.; teacher and research assistant, University of Washington; research chemist,
Shell Development Co.

WILLSON, IRWIN A. (1958) .........................................Education
B.A., University of North Dakota, 1930; M.A., University of Denver, 1940; addi-
tional 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; superintend-
ent of schools, Fall River Mills; assistant professor, San Diego State College; asso-
ciate professor, chairman of the division of education and psychology, director of
teacher education, Westmont College.
WILSON, HAROLD O. (1936, 1946) — Acting Administrative Vice President
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.

WINER, DONLEY J. (1963) — Electronic Engineering

Experience: Graduate assistant and instructor, University of North Dakota.

WINNER, C. PAUL (1940) — Associate Dean (Admissions and Records)
B.S., Montana State College, 1931.

Experience: Director of vocational agriculture and critic teacher, Montana and California high schools; teacher trainer of agriculture education.

WIRSHUP, ARTHUR D. (1952) — Mathematical Sciences
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.

WOLCOTT, VICTOR F. (1962) — Business Administration


WOOD, EVELYN L. (1966) — Library

Experience: Librarian, Barryton Consolidated Schools, Eastern Michigan University, Reedley Joint Union High School.

WOODWORTH, JOHN A. (1949) — Mathematical Sciences
A.B., Hastings College, 1939; M.S., University of Southern California, 1948; additional graduate study, University of California, Berkeley.

Experience: Teacher-principal, Nebraska schools; instructor, Baldwin Park, Salinas, Santa Ana Army Air Base; physicist, University of California Radiation Laboratory; principal, Hopland Union High School.

WORK, LLOYD J. (1958) — Physics
B.S., California State Polytechnic College, 1954; M.E., Harvard University, 1967.


WRIGHT, MARSHALL S., JR. (1960) — Chemistry
B.A., Reed College, 1946, 1952; M.A., University of Oregon, 1949; additional graduate study, University of California.

Experience: Teaching assistant, University of Portland, University of Oregon; research assistant, University of California, and Institute for Metabolic Research; teaching assistant, University of California; instructor, Orange Coast College.

YOUNG, BARBARA J. (1967) — Social Sciences
B.A., University of California, Berkeley, 1953; M.A., 1956; additional graduate studies, University of California, San Jose State College, University of British Columbia, Simon Fraser University.

Experience: Teacher, Edison High School (Stockton), Los Gatos High School, California; White Rock Junior Secondary School, Princess Margaret Senior Secondary School, British Columbia; teaching assistant, Simon Fraser University, B.C.; assistant professor, San Jose State College.
YOUNG, CHESTER G. (1954) Assistant to the President
A.B., San Diego State College, 1936; M.S., Stanford University, 1954; additional
graduate study, University of California and San Jose State College.
Experience: Teacher and vice principal, Lemoore Elementary Schools; U.S.
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of Santa Clara; instructor, mathematics, California State Polytechnic College.

ZARABOZO, PHILIP J. (1966) English and Speech
Diplôme De La Sorbonne, 1936; Diploma in Literature, University of Madrid,
1959; additional graduate study, University of Marseille; B.A., University of Miami,
1961.
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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FOR ADDITIONAL INFORMATION

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ENTRANCE EXAMINATION
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STUDENT EMPLOYMENT
Placement Office

SCHOLARSHIPS AND LOANS
Financial Aid Counselor

VETERANS AFFAIRS
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STUDENT ACTIVITIES
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