California State Polytechnic College

BULLETIN

1966-1967 Catalog Issue

San Luis Obispo Campus
Kellogg Campus, Pomona
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?
Agriculture, at San Luis Obispo, page 71, and at Kellogg Campus, page 289.
Engineering, at San Luis Obispo, page 131, and at Kellogg Campus, page 331.
Applied Arts (including business), at San Luis Obispo, page 179.
Applied Sciences, at San Luis Obispo, page 235.
Arts and Sciences (including business) at Kellogg Campus, page 367.

Does the college offer nondegree occupational curricula? Page 72.

Can I meet the requirements for admission? Page 23.

May a student transfer from another college? Page 23.

What fees are charged? Page 64; at Kellogg Campus, page 282.

Where can I obtain board and room? Page 46; at Kellogg Campus, page 276.

What scholarships are available to freshmen? At San Luis Obispo, page 51 and at Kellogg Campus, page 277.

Does the college have an ROTC unit? Page 47.

What services does the college maintain for students?
Counseling and testing, at San Luis Obispo, page 48; at Kellogg Campus, page 276.
Advising, at San Luis Obispo, page 49; at Kellogg Campus, page 276.
Health, at San Luis Obispo, page 49; at Kellogg Campus, page 276.
Assistance in finding part-time employment, at San Luis Obispo, page 50; at Kellogg Campus, page 277.
Loan funds, at San Luis Obispo, page 58; at Kellogg Campus, page 280.
Placement at graduation, at San Luis Obispo, page 50; at Kellogg Campus, page 276.

How do I apply for admission? See inside back cover.
TABLE OF CONTENTS

ACADEMIC CALENDAR, 1966-67.................................................. 6
1966-67 Calendars ......................................................................... 8

ADMINISTRATION ....................................................................... 11

GENERAL INFORMATION ......................................................... 17
  California State Colleges ..................................................... 17
  Aims of the College ........................................................... 17
  History ................................................................................ 18
  Accreditation ....................................................................... 19
  The Foundation ................................................................. 19
  Alumni Association ........................................................... 19
  Special Instructional Services ............................................. 20
  Admissions ........................................................................... 23
  Requirements for Admission as an Undergraduate Student .... 23
  Requirements for Admission as a Graduate Student .......... 26

GENERAL REGULATIONS ......................................................... 28
  Matriculation .................................................................... 28
  Registration Procedure ..................................................... 28
  Change of Curriculum ...................................................... 28
  Revision of Curriculum Requirements .............................. 29
  Curriculum Deviation ........................................................ 29
  Change of Program ............................................................ 29
  Academic Obligations ......................................................... 29
  Class Attendance .............................................................. 30
  Minimum Scholarship Requirements ................................ 30
  Grading System .................................................................. 30
  Maximum and Minimum Loads .......................................... 31
  Holding of Records ............................................................ 31
  Honors ............................................................................. 32
  Transfer to Other Colleges ............................................... 32
  Credit by Examination ...................................................... 32
  Auditing of Courses ......................................................... 32
  Credit for Military Service ............................................... 33
  Eligibility for Intercollegiate Athletics .............................. 33
  Honorable Dismissal ........................................................ 33
  Student Conduct .................................................................. 33
  Course Numbering System ............................................... 35
  Degrees ............................................................................. 36
  Application for Graduation ............................................... 37
  Double Majors ................................................................... 37
  Bachelor of Science Degree ............................................. 37
  Two-year Technical Curricula ........................................... 38
  Master of Arts Degree ....................................................... 38

SAN LUIS OBISPO CAMPUS .................................................. 43
  Buildings and Equipment .................................................... 43
  Special Instructional Services ............................................ 46
  Reserve Officers Training Corps ....................................... 47
  Student Organizations and Activities .............................. 47
TABLE OF CONTENTS—Continued

SAN LUIS OBISPO CAMPUS—Continued

Student Personnel Services .......................................................... 48
Student Housing and Dining Facilities ............................................. 49
Financial Aid ................................................................................. 51
Student Loan Funds .................................................................... 58
Fees and Expenses .................................................................... 64
Preparation for Elementary and Secondary School Teaching ........... 66

THE AGRICULTURAL DIVISION ......................................................... 71
Technical Curricula in Agriculture .................................................. 72
Agricultural Business Management Department ............................. 75
Agricultural Education Department .................................................. 79
Agricultural Engineering Department .............................................. 81
Animal Husbandry Department ..................................................... 89
Crops Department ..................................................................... 94
Dairy Department .................................................................... 101
Farm Management Department ..................................................... 106
Food Processing Department ......................................................... 110
Ornamental Horticulture Department ............................................ 115
Poultry Industry Department ......................................................... 120
Soil Science Department ............................................................... 124
Veterinary Science Department .................................................... 128

THE ENGINEERING DIVISION .......................................................... 131
Aeronautical Engineering Department ............................................... 132
Air Conditioning and Refrigeration Department ............................... 138
Architecture and Architectural Engineering Department .................. 142
Electrical Engineering Department .................................................. 148
Electronic Engineering Department ............................................... 154
Industrial Engineering Department .................................................. 161
Manufacturing Processes Department .............................................. 166
Mechanical Engineering Department .............................................. 167
Welding and Metallurgical Engineering Department.......................... 173

THE APPLIED ARTS DIVISION .......................................................... 179
Business Administration Department .............................................. 180
Education Department ................................................................ 188
English and Speech Department ..................................................... 196
Home Economics Department ........................................................ 202
Music Department .................................................................... 208
Physical Education Department ....................................................... 211
Printing Engineering and Management Department ....................... 217
Technical Arts Department .............................................................. 222
Technical Journalism Department ..................................................... 228

THE APPLIED SCIENCES DIVISION .................................................. 235
Biological Sciences Department ...................................................... 236
Mathematics Department ............................................................... 243
Military Science Department ........................................................... 251
Physical Sciences Department ........................................................ 254
Social Sciences Department ............................................................. 264

[ 3 ]
### TABLE OF CONTENTS—Continued

<table>
<thead>
<tr>
<th>Section</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>KELLOGG CAMPUS</td>
<td>273</td>
</tr>
<tr>
<td>Facilities</td>
<td>273</td>
</tr>
<tr>
<td>Student Organizations and Activities</td>
<td>275</td>
</tr>
<tr>
<td>Student Personnel Services</td>
<td>276</td>
</tr>
<tr>
<td>Scholarships</td>
<td>277</td>
</tr>
<tr>
<td>Student Loans</td>
<td>280</td>
</tr>
<tr>
<td>Fees and Expenses</td>
<td>282</td>
</tr>
<tr>
<td>Special Instructional Services</td>
<td>284</td>
</tr>
<tr>
<td>Preparation for Elementary and Secondary School Teaching</td>
<td>284</td>
</tr>
<tr>
<td>THE AGRICULTURE DIVISION</td>
<td>289</td>
</tr>
<tr>
<td>Agricultural Business Management Department</td>
<td>293</td>
</tr>
<tr>
<td>Agricultural Services and Inspection Department</td>
<td>297</td>
</tr>
<tr>
<td>Agronomy Department</td>
<td>301</td>
</tr>
<tr>
<td>Animal Science Department</td>
<td>305</td>
</tr>
<tr>
<td>Foods and Nutrition Department</td>
<td>311</td>
</tr>
<tr>
<td>Fruit Industry Department</td>
<td>314</td>
</tr>
<tr>
<td>Landscape Architecture Department</td>
<td>318</td>
</tr>
<tr>
<td>Ornamental Horticulture Department</td>
<td>322</td>
</tr>
<tr>
<td>Related Agricultural Courses</td>
<td>326</td>
</tr>
<tr>
<td>THE ENGINEERING DIVISION</td>
<td>331</td>
</tr>
<tr>
<td>Aerospace Engineering Department</td>
<td>332</td>
</tr>
<tr>
<td>Chemical Engineering Department</td>
<td>337</td>
</tr>
<tr>
<td>Civil Engineering Department</td>
<td>340</td>
</tr>
<tr>
<td>Electronic Engineering Department</td>
<td>345</td>
</tr>
<tr>
<td>Industrial Engineering Department</td>
<td>350</td>
</tr>
<tr>
<td>Mechanical Engineering Department</td>
<td>354</td>
</tr>
<tr>
<td>Metal Processes Engineering Department</td>
<td>361</td>
</tr>
<tr>
<td>Welding Department</td>
<td>363</td>
</tr>
<tr>
<td>THE ARTS AND SCIENCES DIVISION</td>
<td>367</td>
</tr>
<tr>
<td>Business Curricula</td>
<td>367</td>
</tr>
<tr>
<td>Accountancy Department</td>
<td>367</td>
</tr>
<tr>
<td>Biological Sciences Department</td>
<td>371</td>
</tr>
<tr>
<td>Business Management Department</td>
<td>379</td>
</tr>
<tr>
<td>Economics Department</td>
<td>386</td>
</tr>
<tr>
<td>Language Arts Department</td>
<td>390</td>
</tr>
<tr>
<td>Marketing Department</td>
<td>399</td>
</tr>
<tr>
<td>Mathematics Department</td>
<td>402</td>
</tr>
<tr>
<td>Music and Art Department</td>
<td>407</td>
</tr>
<tr>
<td>Physical Education Department</td>
<td>411</td>
</tr>
<tr>
<td>Physical Sciences Department</td>
<td>417</td>
</tr>
<tr>
<td>Social Sciences Department</td>
<td>425</td>
</tr>
<tr>
<td>DIRECTORIES</td>
<td>435</td>
</tr>
<tr>
<td>INDEX</td>
<td>519</td>
</tr>
</tbody>
</table>
### SUMMER QUARTER, 1966

<table>
<thead>
<tr>
<th>Date</th>
<th>Day</th>
<th>Event</th>
</tr>
</thead>
<tbody>
<tr>
<td>June 10</td>
<td>Friday</td>
<td>Last day to complete application for admission to summer quarter</td>
</tr>
<tr>
<td>June 20</td>
<td>Monday</td>
<td>Registration of all students</td>
</tr>
<tr>
<td>June 21</td>
<td>Tuesday</td>
<td>Classes begin for all students</td>
</tr>
<tr>
<td>June 28</td>
<td>Tuesday</td>
<td>Last day to enroll for summer quarter</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Last day to add courses</td>
</tr>
<tr>
<td>July 4</td>
<td>Monday</td>
<td>Independence Day—academic holiday</td>
</tr>
<tr>
<td>July 5</td>
<td>Tuesday</td>
<td>Last day to withdraw from classes without penalty</td>
</tr>
<tr>
<td>August 31-</td>
<td>Wednesday-</td>
<td></td>
</tr>
<tr>
<td>September 2</td>
<td>Friday</td>
<td>Final examinations</td>
</tr>
<tr>
<td>September 2</td>
<td>Friday</td>
<td>End of summer quarter</td>
</tr>
</tbody>
</table>
### FALL QUARTER

<table>
<thead>
<tr>
<th>Date</th>
<th>Day</th>
<th>Event</th>
</tr>
</thead>
<tbody>
<tr>
<td>August 20</td>
<td>Saturday</td>
<td>Last day to complete application for admission to fall quarter</td>
</tr>
<tr>
<td>September 19</td>
<td>Monday</td>
<td>Beginning of academic year (faculty only)</td>
</tr>
<tr>
<td>September 22-23</td>
<td>Thursday-Friday</td>
<td>Registration of all students</td>
</tr>
<tr>
<td>September 26</td>
<td>Monday</td>
<td>Classes begin for all students</td>
</tr>
<tr>
<td>October 3</td>
<td>Monday</td>
<td>Last day to enroll for fall quarter</td>
</tr>
<tr>
<td>October 10</td>
<td>Monday</td>
<td>Last day to withdraw from classes without penalty</td>
</tr>
<tr>
<td>November 11</td>
<td>Friday</td>
<td>Veteran's Day—academic holiday</td>
</tr>
<tr>
<td>November 23</td>
<td>Wednesday-Friday</td>
<td>Thanksgiving—academic holiday</td>
</tr>
<tr>
<td>November 26</td>
<td>Saturday</td>
<td>Final examination period</td>
</tr>
<tr>
<td>December 15</td>
<td>Thursday</td>
<td>End of fall quarter</td>
</tr>
<tr>
<td>December 16-31</td>
<td>Friday</td>
<td>Christmas—academic holiday</td>
</tr>
</tbody>
</table>

### WINTER QUARTER

<table>
<thead>
<tr>
<th>Date</th>
<th>Day</th>
<th>Event</th>
</tr>
</thead>
<tbody>
<tr>
<td>December 15</td>
<td>Thursday</td>
<td>Last day to complete application for admission to winter quarter</td>
</tr>
<tr>
<td>January 4</td>
<td>Wednesday</td>
<td>Registration of all students</td>
</tr>
<tr>
<td>January 5</td>
<td>Thursday</td>
<td>Classes begin for all students</td>
</tr>
<tr>
<td>January 12</td>
<td>Thursday</td>
<td>Last day to enroll for winter quarter</td>
</tr>
<tr>
<td>January 19</td>
<td>Thursday</td>
<td>Last day to withdraw from classes without penalty</td>
</tr>
<tr>
<td>February 22</td>
<td>Wednesday</td>
<td>Washington's birthday—academic holiday</td>
</tr>
<tr>
<td>March 18-23</td>
<td>Saturday-Thursdays</td>
<td>Final examination period</td>
</tr>
<tr>
<td>March 23</td>
<td>Thursday</td>
<td>End of winter quarter</td>
</tr>
<tr>
<td>March 24-28</td>
<td>Friday-Tuesday</td>
<td>Academic holiday</td>
</tr>
</tbody>
</table>
ACADEMIC CALENDAR—1966-67—Continued

SPRING QUARTER

<table>
<thead>
<tr>
<th>Date</th>
<th>Day</th>
<th>Event</th>
</tr>
</thead>
<tbody>
<tr>
<td>March 10</td>
<td>Friday</td>
<td>Last day to complete application for admission to spring quarter</td>
</tr>
<tr>
<td>March 29</td>
<td>Wednesday</td>
<td>Registration of all students</td>
</tr>
<tr>
<td>March 30</td>
<td>Thursday</td>
<td>Classes begin for all students</td>
</tr>
<tr>
<td>April 6</td>
<td>Thursday</td>
<td>Last day to enroll for spring quarter</td>
</tr>
<tr>
<td>April 13</td>
<td>Thursday</td>
<td>Last day to withdraw from classes without penalty</td>
</tr>
<tr>
<td>April 21</td>
<td>Friday</td>
<td>Last day to apply for June commencement</td>
</tr>
<tr>
<td>April 29</td>
<td>Saturday</td>
<td>Last day to file for master's examination</td>
</tr>
<tr>
<td>May 30</td>
<td>Tuesday</td>
<td>Memorial Day—academic holiday</td>
</tr>
<tr>
<td>June 10-15</td>
<td>Saturday—Thursday</td>
<td>Final examination period</td>
</tr>
<tr>
<td>June 17</td>
<td>Saturday</td>
<td>Commencement—San Luis Obispo</td>
</tr>
<tr>
<td>June 18</td>
<td>Sunday</td>
<td>End of academic year (faculty only)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Commencement—Kellogg</td>
</tr>
</tbody>
</table>

TENTATIVE SUMMER QUARTER, 1967

<table>
<thead>
<tr>
<th>Date</th>
<th>Day</th>
<th>Event</th>
</tr>
</thead>
<tbody>
<tr>
<td>June 9</td>
<td>Friday</td>
<td>Last day to complete application for admission to summer quarter</td>
</tr>
<tr>
<td>June 19</td>
<td>Monday</td>
<td>Registration of all students</td>
</tr>
<tr>
<td>June 20</td>
<td>Tuesday</td>
<td>Classes begin for all students</td>
</tr>
<tr>
<td>June 27</td>
<td>Tuesday</td>
<td>Last day to enroll for summer quarter</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Last day to add courses</td>
</tr>
<tr>
<td>July 4</td>
<td>Tuesday</td>
<td>Independence Day—academic holiday</td>
</tr>
<tr>
<td>July 5</td>
<td>Wednesday</td>
<td>Last day to withdraw from classes without penalty</td>
</tr>
<tr>
<td>August 30—September 1</td>
<td>Wednesday—Friday</td>
<td>Final examinations</td>
</tr>
<tr>
<td>September 1</td>
<td>Friday</td>
<td>End of summer quarter</td>
</tr>
<tr>
<td>JANUARY</td>
<td>JULY</td>
<td>JANUARY</td>
</tr>
<tr>
<td>---------</td>
<td>------</td>
<td>---------</td>
</tr>
<tr>
<td>S M T W T F S</td>
<td>S M T W T F S</td>
<td>S M T W T F S</td>
</tr>
<tr>
<td>2 3 4 5 6 7 8 9</td>
<td>1 2 3 4 5 6 7 8 9</td>
<td>1 2 3 4 5 6 7 8 9</td>
</tr>
<tr>
<td>FEBRUARY</td>
<td>AUGUST</td>
<td>FEBRUARY</td>
</tr>
<tr>
<td>S M T W T F S</td>
<td>S M T W T F S</td>
<td>S M T W T F S</td>
</tr>
<tr>
<td>MARCH</td>
<td>SEPTEMBER</td>
<td>MARCH</td>
</tr>
<tr>
<td>S M T W T F S</td>
<td>S M T W T F S</td>
<td>S M T W T F S</td>
</tr>
<tr>
<td>APRIL</td>
<td>OCTOBER</td>
<td>APRIL</td>
</tr>
<tr>
<td>S M T W T F S</td>
<td>S M T W T F S</td>
<td>S M T W T F S</td>
</tr>
<tr>
<td>MAY</td>
<td>NOVEMBER</td>
<td>MAY</td>
</tr>
<tr>
<td>S M T W T F S</td>
<td>S M T W T F S</td>
<td>S M T W T F S</td>
</tr>
<tr>
<td>JUNE</td>
<td>DECEMBER</td>
<td>JUNE</td>
</tr>
<tr>
<td>S M T W T F S</td>
<td>S M T W T F S</td>
<td>S M T W T F S</td>
</tr>
</tbody>
</table>
ADMINISTRATION
Administration Building, San Luis Obispo
ADMINISTRATION

TRUSTEES OF THE CALIFORNIA STATE COLLEGES

EX OFFICIO TRUSTEES

Edmund G. Brown, LL.B.---------------------------------State Capitol, Sacramento 95814
Governor of California and President of the Trustees

Glenn M. Anderson, A.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 Ave., 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)----------------------14 Montgomery St.,
San Francisco 94104

Donald M. Hart, B.A. (1968)--------------------------------2230 Pine St., Bakersfield 93302


Paul Spencer, B.A. (1969)--------------------------------------P.O. Box 145, San Dimas 91773

Theodore Meriam, A.B. (1971)--------------------------------P.O. Box 370, Chico 95927

Albert J. Ruffo, LL.B., B.S. in E.E. (1971)-------------------1680 Hedding St., 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. (1967)---------------------------------604 Pine St., Long Beach 90801

George D. Hart, A.B. (1967)----------------------------------111 Sutter St., San Francisco 94104

Gregson E. Bautzer, B.A., LL.B. (1968)-------------------------190 N. Cañon Dr., Beverly Hills 90210

Simon Ramo, B.S., Ph.D. (1972)--------------------------8433 Fallbrook Ave., Canoga Park 91304

James F. Thacher, B.A., LL.B. (1970)--------------------------310 Sansome St., San Francisco 94104

Los Angeles 90024


Chester R. Bartalini (1966)-----------------------------------240 Golden Gate Ave., San Francisco 94102

OFFICERS OF THE TRUSTEES

Governor Edmund G. Brown
President

Donald M. Hart
Vice Chairman

Albert J. Ruffo
Chairman

Chancellor Glenn S. Dumke
Secretary-Treasurer
OFFICE OF THE CHANCELLOR OF THE CALIFORNIA STATE COLLEGES
5670 Wilshire Blvd., Los Angeles, California 90036
213 938-2981

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

COLLEGE ADMINISTRATION

Julian A. McPhee...........................................President
Leona M. Boerman........................................Secretary to the President
Robert E. Kennedy......................................Administrative Vice President
Eugene E. Brendlin......................................Foundation Manager
Douglass W. Miller........................................Publications Manager

SAN LUIS OBISPO CAMPUS

Dale W. Andrews.........................................Vice President
Everett M. Chandler.....................................Dean of Students
Carl C. Cummins.........................................Dean, Applied Arts Division
Clyde P. Fisher..........................................Dean, Applied Sciences Division
Harold P. Hayes..........................................Dean, Engineering Division
Jerald F. Holley..........................................Registrar
Lorraine H. Howard......................................Associate Dean (Women)
John D. Lawson..........................................Associate Dean (Activities)
Billy W. Mounts..........................................College Physician
Donald S. Nelson........................................Business Manager
Eugene Rittenhouse......................................Placement Officer
Warren T. Smith..........................................Dean, Agriculture Division
Joies B. Stone...........................................Associate Dean (Counseling and Testing)
Howard West............................................Assistant to the President
Harold O. Wilson........................................Executive Dean
C. Paul Winner...........................................Associate Dean (Admissions and Records)

KELLOGG CAMPUS

Robert C. Kramer........................................Vice President
C. O. McCorkle..........................................Dean of the College
Robert E. Alberti......................................Associate Dean (Activities)
Albert J. Aschenbrenner...............................Dean, Arts and Sciences Division
Carl R. Englund.........................................Dean, Agriculture Division
Lauren J. Henderson....................................College Physician
Henry House................................................Dean of Students
Cecil W. Jones...........................................Business Manager
Kenneth Kitch...........................................Director, Voorhis Educational Center
Hugh La Bounty........................................Executive Dean
George Mulder............................................Associate Dean (Counseling and Testing)
Mary Etta Selle..........................................Associate Dean (Women)
Harold P. Skamsen......................................Dean, Engineering Division
Milton R. White.........................................Placement Officer
Richard G. York..........................................Associate Dean (Admissions and Records)

Admin experience limited solely to Cal Poly.
THE CALIFORNIA STATE COLLEGES

San Jose State College .................................................. Dr. Robert D. Clark, President
125 South Seventh Street, San Jose, California 95114

Chico State College .......................................................... Dr. Glenn Kendall, President
First and Normal Streets, Chico, California 95927

San Diego State College .................................................. Dr. Malcolm A. Love, President
5402 College Avenue, San Diego, California 92115

San Francisco State College ............................................. Dr. Stanley F. Paulson, Acting President
1600 Holloway Avenue, San Francisco, California 94132

California State Polytechnic College ................................ Dr. Julian A. McPhee, President
San Luis Obispo campus, San Luis Obispo, California 93401

Fresno State College ............................................................ Dr. Frederic W. Ness, President
Shaw and Cedar Avenues, Fresno, California 93726

Humboldt State College .................................................... Dr. Cornelius H. Siemens, President
Arcata, California 95521

California State College at Los Angeles .................................. Dr. John A. Greenlee, Acting President
5151 State College Drive, Los Angeles, California 90032

Sacramento State College .................................................. Dr. Stephen L. Walker, Acting President
6000 Jay Street, Sacramento, California 95819

California State Polytechnic College ................................ Dr. Julian A. McPhee, President
Kellogg-Voorhis campus, Pomona, California 91766

California State College at Long Beach .................................. Dr. Carl W. McIntosh, President
6101 East 7th Street, Long Beach, California 90804

California State College at Fullerton .................................... Dr. William B. Langsdorf, President
800 North State College Boulevard, Fullerton, California 92631

California State College at Hayward .................................... Dr. Fred F. Harcleroad, President
25800 Hillary Street, Hayward, California 94542

San Fernando Valley State College ..................................... Dr. Ralph Prator, President
18111 Nordhoff Street, Northridge, California 91326

Stanislaus State College .................................................. Dr. Alexander Capurso, President
800 Monte Vista Avenue, Turlock, California 95380

Sonoma State College ...................................................... Dr. Ambrose R. Nichols, Jr., President
265 College View Drive, Rohnert Park, California 94928

California State College at Palos Verdes ................................ Dr. Leo F. Cain, President
27608 Silver Spur Road, Palos Verdes Peninsula, California 90274

California State College at San Bernardino ................................ Dr. John M. Pfau, President
5500 State College Parkway, San Bernardino, California 92407
GENERAL INFORMATION
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, 10 new colleges have been developed; one is operating in temporary quarters in southwestern Los Angeles, and another has been authorized, to be located in Kern County. Enrollment in the system is expected to reach 225,000 by 1970.

AIMS OF CALIFORNIA STATE POLYTECHNIC 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 experiences and field work with constant interplay between general principles and practical 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 occupational 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

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 2,850 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, 1962.

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.

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

In 1938, a completely equipped school and farm of 157 acres near San Dimas in Los Angeles County, was deeded to California State Polytechnic College by its owners, Charles B. Voorhis of Pasadena, and his son, former Congressman Jerry Voorhis. Admirably situated and adaptable for technical instruction in citriculture, deciduous fruit production, agricultural inspection and landscape gardening, this campus was immediately put to use as a plant industries branch of the college. Although it was necessary to close the Voorhis Unit during the war period, 1942-45, it was reopened in the fall of 1945 and instruction was continued until it was moved to the Kellogg Campus following the completion there of the Science Building in 1956. In 1961, the Voorhis Unit became the home of Cal Poly’s new Educational Center devoted to workshops, conferences, seminars, etc.

The Kellogg Campus, which consists of 816 acres just outside of Pomona, was given to the California State Polytechnic College in 1949 by the W. K. Kellogg Foundation of Battle Creek, Michigan. It was founded by W. K. Kellogg in 1925 as the Kellogg Arabian Horse Ranch and became famous as one of the outstanding Arabian horse breeding farms in the world. This property was deeded to the State to be used for occupational training consistent with the philosophy and educational
objectives of California State Polytechnic College. A condition of the deed provides that the college maintain an Arabian horse breeding program.

Beginning with the Science Building in 1956 the State of California has developed a new college facility on the Kellogg Campus at a cost to date of more than $25,000,000. The major instructional operation of the college's southern branch is now carried on at the Kellogg Campus which now offers not only an expanded agricultural program but also majors in engineering, business, and arts and sciences. Coeds were admitted for the first time in the fall of 1961.

**ACCREDITATION**

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

**THE 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, at both campuses, 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, an executive secretary, 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 at 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 for both of the campuses.

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

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

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 at both its Kellogg and its San Luis Obispo Campus 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, Southern California Arabian Association, Junior Engineer Technical Society, Southern California Botanist's Association, Turf Grass Association, and American Society of Tool and Manufacturing Engineers meeting.

Educational Center

The Educational Center at the Voorhis Unit serves groups from business, industry, agriculture, education, government and professional organizations for conferences, workshops, seminars, institutes, training programs and creative retreats. The Center is able to accept in-residence groups up to 127 and day groups up to 175. The groups which it is serving represent local, regional, statewide, west coast and national areas.
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 1965-66 the cooperating universities were: 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 1966-67 these costs are: France, Germany, Spain, Japan: $1,870; Italy, $1,970; Sweden, $2,070; Taiwan, $1,370. Payments may be scheduled throughout the year.

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

Application for the 1967-68 academic year should be made early in the Fall semester of 1966. 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.
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.”

[ 23 ]
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 to the San Luis Obispo Campus should complete and submit the results of the College Entrance Examination Board Scholastic Aptitude Test (SAT). Applicants to the Kellogg Campus should complete and submit the results of the American College Testing Program Test (ACT).

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-3596 or ACT-738.

<table>
<thead>
<tr>
<th>Grade Point Average</th>
<th>Minimum SAT Score</th>
<th>Minimum ACT Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>3.20 and above</td>
<td>Eligible with any score</td>
<td></td>
</tr>
<tr>
<td>2.80</td>
<td>796</td>
<td>18</td>
</tr>
<tr>
<td>2.40</td>
<td>1,196</td>
<td>26</td>
</tr>
<tr>
<td>2.00</td>
<td>1,596</td>
<td>34</td>
</tr>
<tr>
<td>1.99 and below</td>
<td>Not eligible</td>
<td></td>
</tr>
</tbody>
</table>

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 1966-67. The minimum required eligibility index is SAT-4036 or ACT-834.

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

At the San Luis Obispo Campus 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.

* The eligibility index is computed by multiplying the grade point average by 1000 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.
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.

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 to the San Luis Obispo Campus should complete and submit the results of the College Entrance Examination Board Scholastic Aptitude Test (SAT). Applicants to the Kellogg Campus should complete and submit the results of the American College Testing Program Test (ACT).

Applicants with 60 or More Semester Units (90 Quarter Units)

An applicant who has completed 60 or more semester units or the equivalent will be admitted if he has achieved a grade point average of 2.0 (C) on all 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.

INTERCAMPUS TRANSFER

An undergraduate student who has attended one or more quarters at either the San Luis Obispo or the Kellogg campus may apply for transfer to the other campus without payment of an additional application fee provided (1) he has not since been registered in a regular session in another institution, and (2) he has been enrolled at either campus during one or more of the three quarters immediately preceding the quarter for which application is being made. The proper forms to effect such a transfer may be obtained from the Registrar or Admissions Office. These forms must be filed with that office at least two weeks prior to the effective date of transfer.

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.

A graduate of this college or of another four-year institution having substantially the same requirements for the baccalaureate degree is eligible to apply to the Admissions Office for admission as a graduate student. Admission does not imply that the student is accepted as a candidate for the master's degree or for an institutional recommendation for a credential, but it does place him on graduate standing and authorizes him to take graduate work for which he is otherwise eligible.

EVALUATION FOR ADMISSION TO GRADUATE STANDING

For purposes of evaluation, applications must be accompanied by a copy of all official transcripts of previous college work. Such evaluation should be accomplished through correspondence prior to registration.

Applicants who wish to become candidates for the master's degree must, following admission to graduate standing, file an application for tentative candidacy for the degree. The form for this application may be obtained from the Co-ordinator of Graduate Studies. The Graduate Study Committee must have accepted the application for tentative candidacy for the master's degree before graduate work may be applied to degree requirements.

Admission to full graduate standing may be denied on the basis of: (1) undergraduate scholarship average below 2.0 (2) graduation from a nonaccredited college, (3) completion of a four-year program not considered comparable to the bachelor of science degree.
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. Certain 300 series courses may be approved for graduate credit on petition to the Coordinator of Graduate Studies.

ADMISSION FROM A NONACCREDED COLLEGE

Provisional admission to graduate study may be granted to one who holds a bachelor's degree from a nonaccredited college. Such a student will be eligible for full graduate standing when he has completed 12 units of upper division or graduate work with a grade point average of 3.0 and has removed such baccalaureate deficiencies as may have existed.

ADMISSION FOR THOSE NOT YET CLEARED FOR GRADUATE STANDING

Provisional graduate standing will be granted to those applicants for graduate standing who have not yet been cleared at the time the college opens and courses start. Such candidates enter graduate work at their own risk, since no candidate may use such work for the master's degree unless he is later placed on full graduate standing.

ADMISSION TO GRADUATE COURSES

To be admitted to graduate courses a student must have graduate standing (either provisional or full) and, unless he has an undergraduate major in the field, have permission of the instructor of the course. Candidates are referred to the specific course descriptions, since in some cases the permission of the department head or division dean may be specified.
GENERAL REGULATIONS

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.

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 curriculum 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 an F grade in each course depending upon whether passing or failing work has been accomplished up to the time of withdrawal.

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 22% 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 13% 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 division 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 division 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 grade P) as follows:

For each unit of Grade A—4 points
For each unit of Grade B—3 points
For each unit of Grade C—2 points
For each unit of Grade D—1 point
For each unit of Grade E—0 point
For each unit of Grade F—0 point

Passing grades are marked A, B, C, D. Grade E indicates incomplete work. For the purpose of computing grade point averages, a recorded grade E is counted as grade F. It 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 grade points assigned to his completed grade. A student may not within a period of one year from the time the grade is recorded retake for credit a course for which a grade E is recorded. If not removed within the one-year period, the grade E remains on the student's permanent record and credit for the course may be obtained only by repeating it.

Grade E may be given to a student for either of the following reasons:

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

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 division dean 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.”
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.

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.

A student enrolled either as a regular or limited student may be permitted, at the discretion of his division 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.

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, 13½ quarter units of elective credit will be allowed toward graduation to any student submitting evidence that he has received a commission in the Army, Navy, Air Force, Coast Guard, or Marine Corps. Maximum total credit possible toward graduation for military service is 22½ quarter units. Credit is not given for completion of the six-month Reserve Training Programs or for college level General Educational Development Tests.

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 by students attending either the San Luis Obispo Campus or the Kellogg Campus is regulated in general by the rules of the National Collegiate Athletic Association and specifically by the following college regulations:

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

2. The student must have at the beginning of his competition in any sport at least a “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, basketball, baseball, or track.

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

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 given an opportunity to state his case with reasons for his action and to present his own defense against the charges and to 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) give the student an official warning, (2) process a formal probation, suspension, or expulsion action according to provisions of the California Administrative Code, Title 5, Sections 41302 and 41303, or (3) dismiss the case.

The period for which the student may be placed on probation or suspended shall not exceed 12 months. No fees paid by or for such student for the quarter 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, or destruction of state, Foundation, or personal property.
3. Violations of motor vehicle laws, especially where grossly serious violations or repeated minor violations are involved.
4. Infringing upon the rights of others to pursue their normal activities as students or employees of the college.

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

Disciplinary action varies with the severity of the violation. If the unacceptable behavior involves use of motor vehicles, the student may be restricted from driving or parking on campus. If the unacceptable behavior involves matters pertaining to on-campus housing or dining, the student may be restricted from living or dining on campus. Students on disciplinary probation may 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 offered only at the San Luis Obispo campus and 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 300-499 may be used for graduate credit with permission of the Coordinator of Graduate Studies. Courses numbered 600-699 are for professional advancement within a special field and do not carry credit for degree requirements in any of the curricula.
DEGREES

Curricula leading to graduation with the degree of bachelor of science and programs leading to teaching credentials authorizing service in the public schools are offered at both campuses of California State Polytechnic College. In addition there are offered at the San Luis Obispo Campus programs leading to the two-year technical certificate in agriculture and to the degree of master of arts in education.

The occupational majors in agriculture, engineering, applied arts and applied sciences are listed under the respective division in the two sections of this catalog. Requirements for teaching credentials are listed under the heading “Preparation for Elementary and Secondary School Teaching.”

<table>
<thead>
<tr>
<th>SUMMARY OF DEGREE PROGRAMS</th>
<th>San Luis Obispo Campus</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>BACHELOR OF SCIENCE</strong></td>
<td></td>
</tr>
<tr>
<td>Agriculture Division</td>
<td>Electronic Engineering</td>
</tr>
<tr>
<td>Agricultural Business</td>
<td>Industrial Engineering</td>
</tr>
<tr>
<td>Animal Husbandry</td>
<td>Mechanical Engineering</td>
</tr>
<tr>
<td>Crops Production</td>
<td>Metallurgical Engineering</td>
</tr>
<tr>
<td>Fruit Production</td>
<td></td>
</tr>
<tr>
<td>Dairy Husbandry</td>
<td></td>
</tr>
<tr>
<td>Dairy Manufacturing</td>
<td></td>
</tr>
<tr>
<td>Farm Management</td>
<td></td>
</tr>
<tr>
<td>Food Processing</td>
<td></td>
</tr>
<tr>
<td>Mechanized Agriculture</td>
<td></td>
</tr>
<tr>
<td>Ornamental Horticulture</td>
<td></td>
</tr>
<tr>
<td>Poultry Industry</td>
<td></td>
</tr>
<tr>
<td>Soil Science</td>
<td></td>
</tr>
<tr>
<td>Engineering Division</td>
<td></td>
</tr>
<tr>
<td>Aeronautical Engineering</td>
<td>BACHELOR OF ARCHITECTURE</td>
</tr>
<tr>
<td>Air Conditioning and</td>
<td></td>
</tr>
<tr>
<td>Refrigeration Engineering</td>
<td></td>
</tr>
<tr>
<td>Architectural Engineering</td>
<td>BACHELOR OF VOCATIONAL EDUCATION</td>
</tr>
<tr>
<td>Electrical Engineering</td>
<td></td>
</tr>
</tbody>
</table>

| Kellogg Campus              |                        |
| BACHELOR OF SCIENCE         | Industries             |
| Agriculture Division        | Industrial Engineering |
| Agricultural Business       | Mechanical Engineering |
| Animal Science              |                         |
| Foods and Nutrition         |                         |
| Forest Industries           |                         |
| Landscape Architecture      |                         |
| Ornamental Horticulture     |                         |
| Engineering Division        |                         |
| Aerospace Engineering       |                         |
| Chemical Engineering        |                         |
| Civil Engineering           |                         |
| Electronic Engineering      |                         |
| Arts and Sciences Division  |                         |
| Accountancy                 |                         |
| Biological Sciences         |                         |
| Business Management         |                         |
| Economics                   |                         |
| Language Arts               |                         |
| Marketing                   |                         |
| Mathematics                 |                         |
| Physical Education          |                         |
| Physical Sciences           |                         |
| Social Sciences             |                         |
APPLICATION FOR GRADUATION

Students shall make application for graduation in the Registrar's Office prior to the last date for filing such applications, as shown in the college calendar.

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 a bachelor of science degree with two majors if the complete requirements of both major curricula have been met.

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

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 Engineering Division must present a minimum of 210 quarter units of credit for graduation. Candidates from the Agriculture Division (except agricultural engineering which requires 210 quarter units) and from the Applied Arts and Applied Sciences Divisions must present a minimum of 198 quarter units of credit for graduation.

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 AmCiv 301, 302, 303; Pol Sc 301; Hist 304, 305
6-12 units from Ec 201, 202, 213, 304, 308, 313, 413, 414; IR 311, 312; Hist 101, 102, 103, 112; Geog. 308, 312, 315; Bus 301; Soc 105, 206; Soc Sc 101; Ant 201, 301; Pol Sc 401; Actg 121, 131

Natural Sciences (Minimum 15 Units—Maximum 24 Units) †

3-21 units of Life Sciences from Bio 101, 102, 103, 110, 115, 127, 128, 129, 145, 200, 213, 227, 228, 229, 303, 307, 321; Bact 221; Bot 116, 121, 122, 124, 125; Zoo 122, 131, 132, 134, 135, 234, 237; Ent 126
3-21 units of Physical Sciences from PSc 101, 102, 103, 209, 216, 329; Phys 121, 122, 123, 131, 132, 133, 204, 211; Chem 321, 322, 323, 324, 325, 326

Mathematics (Minimum 3 Units—Maximum 10 Units) †

3-10 units from Math 100, 101, 102, 103, 106, 108, 110, 111, 112, 117, 118, 121, 122, 200, 204, 205, 206, 207, 210, 211

† 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.
Literature, Philosophy, and Arts (Minimum 9 Units—Maximum 13 Units) †
2-13 units from Eng 110, 111, 201, 202, 203, 207, 211, 212, 213, 306, 311, 312, 313, 315, 403, 406
0-9 units from Phil 201, 202, 204, 205
0-4 units from courses in Fine and Practical Arts

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 203, 205, 301, 314

Oral and Written Expression (Minimum 8 Units—Maximum 12 Units) †
6 units from Eng 104, 105
2-6 units from Eng 106, 216, 218, 219, 301; Sp 200, 201, 202, 203, 300

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
(San Luis Obispo)

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 OF ARTS DEGREE
(San Luis Obispo)

FIELDS OF CONCENTRATION
The California State Polytechnic College offers a master of arts degree in education with concentration in the fields listed below. The purpose of the graduate program is to serve teachers, or to prepare students for teaching. In making application for admission to a program leading to the master of arts degree the student indicates one of these fields of concentration, based on the undergraduate and teaching major:

1. Agriculture
2. Biological sciences
3. Education
4. Mathematics
5. Physical education
6. Physical sciences
7. Social sciences

† 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 THE
MASTER OF ARTS DEGREE

To be admitted to candidacy for a master's degree a student shall have full graduate standing and shall have met the following criteria:

1. The candidate must possess an acceptable baccalaureate degree from an accredited college or have made up such deficiencies as may have existed. As indicated in the section on Admissions a copy of all transcripts of previous work must be filed in the Admissions Office.

2. The candidate shall have achieved a minimum grade point average of at least 2.5 in all undergraduate work and 3.0 in all courses taken subsequent to admission to graduate standing. A candidate with less than a 2.5 grade point average in undergraduate work may submit a request for special consideration by the Graduate Study Committee for admission to candidacy after he has completed in residence 12 units of graduate work with a grade point average of at least 3.0.

3. The candidate must possess a valid regular day school service California credential other than an emergency or a provisional credential, or complete by the time of receiving the master's degree the requirements for such a credential. Under certain circumstances the requirements for the credential may be waived:
   a. For students who because of citizenship in a foreign country are ineligible for a California credential, but who are teachers or are preparing to teach in a foreign country.
   b. For teachers with a minimum of one year of teaching experience who hold a license to teach in another state, or
   c. For applicants preparing to teach in institutions not requiring teaching credentials provided that a minimum of 18 quarter units in professional education be included in their graduate year.

4. Applicants must complete 12 quarter units of work at the California State Polytechnic College with a minimum grade point average of 3.0 before being admitted to full candidacy. Applicants who fail to maintain this average will be warned and if the deficiency continues through a second quarter, will be rejected.

5. The applicant must receive the approval of the major department and of the Graduate Study Committee.

6. The candidate must meet such standards of character, emotional stability, and general competence as may be established by the Graduate Study Committee and evaluated by tests or other evidence.

7. The applicant must pass a health examination. The regular credential examination, if taken early enough and at this college, will satisfy this requirement.

GRADUATION REQUIREMENTS FOR THE MASTER OF ARTS DEGREE

1. There must be a satisfactory completion of the candidate's degree program as determined by the Graduate Study Committee and the candidate's committee.

2. The program of graduate work must be completed with a grade point average of 3.0. (Courses are acceptable for the master's degree program only if grades of "A," "B," or "C" have been received.)

3. There must be a total of 45 quarter units of work approved for graduate credit after the candidate has been accorded graduate standing. In general all 400 or 500 series courses will be accepted for graduate credit except where 500 series courses are specifically required. The candidate should consult his adviser concerning exceptions. Certain 300 series courses may be approved for graduate credit on petition to the Coordinator of Graduate Studies.
   a. At least 36 of the total 45 units must be taken at the California State Polytechnic College in residence. At least 18 of these units must be in 500 series (graduate) courses.
b. A minimum of 18 units must be in the candidate's area of concentration (major), including 3 units in curriculum and methods, and 9 additional units of graduate courses (500 series).
c. A minimum of 12 graduate units in Education is required, to be selected in conference with the student’s adviser.
d. The candidate's adviser and his committee will indicate such additional courses as may be required to complete the minimum program of 45 units and to meet the student's needs.
e. Not more than 9 units of the graduate program shall be in directed teaching, extension courses, and transfer credit.

4. Candidates who are completing their credential pattern concurrently with the master's degree must complete the credential work before they will be granted the degree.

5. Comprehensive written and oral examinations are required of all candidates.

6. Candidates are required to complete one year of successful teaching before completing the work for the master's degree. Exception may be made to this requirement in the following situations: (1) a foreign student who cannot secure a credential; (2) students intending to teach on the college level, and who need the degree to enter the field; (3) other problem situations which may merit such an exception.
SAN LUIS OBISPO CAMPUS

INTRODUCTION

The campus at San Luis Obispo on which operations began in the fall of 1903 following the establishment of Cal Poly in 1901 by the Legislature of the State of California offers students of the entire state opportunity to obtain occupational higher education in agriculture, engineering, applied arts and applied sciences. Each of these divisions offers majors leading to the bachelor of science degree. The Agriculture Division also offers two-year technical curricula. Students satisfactorily completing these curricula receive technical certificates.

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 science instructors.

Air Conditioning and Refrigeration

Laboratories for the Air Conditioning and Refrigeration 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.

**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 Architectural Engineering Department, the Technical Arts 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 Engineering and Management, and Technical 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.

**Little Theater and Music**

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.
San Luis Obispo Campus

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.

AGRICULTURAL 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; four glasshouses, three 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

The San Luis Obispo campus has four new three-story residence halls for 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. A total of 1,581 single men students can be accommodated in these on-campus housing 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, attractive, 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

There are a few one- and two-bedroom dwellings used to house families with children. These are very much in demand and a waiting list is maintained in the Housing Office.

The Off-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 1967. It is to be the center of campus social, cultural, and recreational activities. Operated by an advisory committee, 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 (ROTC) 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, Applied Sciences Division.

**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 Department of Physical Education 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, boxing, 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. \textit{El Mustang}, the official newspaper of the associated students of the San Luis Obispo campus, is published twice each week during the school year. \textit{El Rodeo} is the yearbook of the San Luis Obispo campus. Miscellaneous publications include the \textit{California Future Farmer} magazine, a monthly magazine supported by and mailed to 10,000 Future Farmers of America members in nearly 200 California high schools; the Mustang Handbook; \textit{Poly Syllables}, a student literary magazine.

POLY ROYAL

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

CAMPUS ORGANIZATIONS

Clubs and organizations cover all departments and activities, and the opportunity exists for every student to take an active part in club life. There are departmental and professional organizations, hobby-interest clubs and many others serving the areas of honor societies, service clubs, residence groups, ethnic groups, and religious faith groups. The college does not recognize either national or local social fraternities or sororities and students are advised against participation in unofficial student organizations that are not in keeping with the college's traditions.

STUDENT 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 $6 per regular quarter or $16 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.

Student Housing and Dining Services

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.

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

There are a limited number of one and two bedroom dwellings for married students with children on-campus. One bedroom units rent for $40 per month and two bedroom units rent for $45 per month including utilities. The apartments are unfurnished and the occupants must furnish their own major appliances. Information about these apartments is available at the Foundation Business Office. The apartments are rarely available to new students.

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

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. On-the-job application of course material stimulates an interest in and shows a need for subsequent courses.

The Placement Office receives many summer job listings. Ranchers and businessmen visit the campus in person and large business concerns send recruiters to interview undergraduates for summer employment. A summer job often leads to permanent 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 from $1.25 per hour to $2.50 per hour depending on the job requirements and the skills of the worker.

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 may be obtained by writing to the Dean of Students.

SCHOLARSHIPS—SAN LUIS OBISPO CAMPUS *

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, and a parent's confidential statement of finances. 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.

Selection Criteria

Applicants are judged upon their need, scholastic ability, character and participation in school and community affairs. In addition, certain scholarships require special conditions concerning field of study, residence, and other similar factors. Generally, students must have at least a "B" average to place high enough in the scholarship ratings to be granted an award. However, there are scholarships which are granted to students with a lesser grade average. In some cases need, special qualifications, or a specific field of study will compensate for a lower grade average. It is recommended that a student apply if in doubt.

Freshman Scholarships

AGRICULTURE

California State Grange Scholarships

Two scholarships of $250 for entering freshmen students who will enroll to study animal husbandry, dairy husbandry, or field crops at the San Luis Obispo campus.

Challenge Creamery Scholarship

One 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.

* Scholarships and loans at the Kellogg Campus are listed in the Kellogg section of the catalog.
California State Polytechnic College

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
Ten 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 $250 for a freshman majoring in Electrical Engineering.

Western Electronic Manufacturers' Association Scholarship
A $250 award to a freshman student entering the Electronic Engineering Department.

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.

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

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 Association of Nurserymen's Scholarship, Monterey Bay Chapter
A $200 award to a student specializing in the field of ornamental horticulture.

California Co-op Cotton Gins Association
A $500 award to an agriculture junior or senior who has successfully completed the cotton-ginning course.

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

Gordon G. Dunn Scholarship
The Engineering and Grading Contractors Association awards $900 for a two-year period to a junior or senior majoring in Agricultural Engineering or Architectural Engineering.

Kimber Scholarship in Poultry Husbandry
Kimber Farms, Inc., makes one annual $400 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 $50 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 $150 award to an Animal Husbandry major specializing in beef or horses.

Tractor and Implement Club of Northern California Scholarship
A $500 award to an upper division student majoring in agricultural engineering.

Tractor and Implement Club of Southern California Scholarship
A $500 award for a sophomore or junior student who is specializing in the field of agricultural engineering. Preference is given to the student who is interested in the power and machinery or mechanized agriculture phases of agricultural engineering.

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

Western Fairs Association
Four $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

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, Los Angeles Section Scholarships
Two $500 awards are made available to students who have completed one year in Welding and Metallurgical Engineering and who have had a concentration of welding courses, and who have shown exceptional interest and aptitude in this field.

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.

Gordon G. Dunn Scholarship
The Engineering and Grading Contractors Association awards $900 for a two-year period to a junior or senior majoring in Agricultural Engineering or Architectural Engineering.

Hewlett-Packard-Alumni Scholarship
On 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.

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.

Solar Company Awards

Three annual $100 awards for engineering students who are entering their junior year 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. (Two $100 Solar Junior Awards are made at the Kellogg Campus.)

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 $250: 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.

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.

Equipment Distributors and Manufacturers of Southern California

One $500 scholarship is awarded each year to a student who will enroll as a senior in the Technical Arts Department, interested in working in the sales and service phase of construction equipment distribution.

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 $400 scholarships to be awarded to junior, senior, or graduate students in elementary education and one $400 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 $500 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 out-
standing 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 should be made in the office of the Dean of Students.

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.
San Luis Obispo Campus

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.

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 air conditioning and refrigeration.

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.

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.

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.

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 the San Luis Obispo campus of the 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.

Roy E. Metz Memorial Loan Fund
The loan fund has been established by the many friends of Roy E. Metz who gave untiringly of himself as an aeronautical engineering instructor and as advisor to student organizations, including the “Block P.”

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.
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 engineering 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
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 $500 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
The student chapter of Alpha Zeta, the national agricultural scholastic honor society, has a loan fund with preference to students majoring in agriculture.

Alumni Association Loan Fund

Architecture (A.I.A.) Fund
This fund, available to deserving young men and women enrolled in the Architecture Department, has been donated by the Santa Barbara Chapter of the American Institute of Architects.

California State Polytechnic College Foundation

Joseph Cardani Memorial Loan Fund
This fund, available to students enrolled in Business, has been donated by the family of Joseph C. Cardani, his friends and students at California State Polytechnic College.
California State Polytechnic College

Class of 1964 Loan Fund
Green and Gold BBQ Fund
This fund has been made available by a group of faculty members at California State Polytechnic College who earn their contribution by catering barbecues.

Jack Bertram and John Lee Loan Fund
A loan fund 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, students majoring in Food Industries or Home Economics, and students who are Cafeteria employees for at least one quarter.

Roy E. Metz Memorial Loan Fund
Established by the many friends of Roy E. Metz who gave unceasingly of himself as an aeronautical engineering instructor and as adviser to student organizations, including the "Block P."

Clarence Radius Memorial Fund
A fund for students majoring in Electronic Engineering given by friends, alumni, staff members and students in memory of Clarence Radius, former head of the Electronic Engineering Department.

The California State Polytechnic Women’s Club Fund

Yellow Dog, Los Angeles Kennel, Loan 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.

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.

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.
FEES AND EXPENSES

STATE FEES

Materials and service fee (quarter)
Each student enrolled for six units or less $13.00
Each student enrolled for over six units $25.50

Nonresident tuition—U.S. ($800 annual maximum):
Each student enrolled for 15 units or more (per quarter) $200.00
Each student enrolled for less than 15 units (per quarter per unit or fraction of unit for the first 14 units) $13.50
 for the 15th unit or fraction thereof $11.00

Nonresident tuition—Foreign ($340 annual maximum):
Each student enrolled for 15 units or more (per quarter) $85.00
Each student enrolled for less than 15 units (per quarter per unit or fraction of unit for the first 14 units) $5.75
 for the 15th unit or fraction thereof $4.50

Late registration fee $5.00

Transcript of record (no charge for first copy) $1.00

Course credit by special examination fee (per unit) $1.00

Extension course fee (per quarter unit):
Lecture and discussion courses $8.75
Activity courses $11.50
Laboratory courses $17.20

Conference, Short Course or Institute, per person Estimated Cost

Application fee $5.00

Change of program fee $1.00

Failure to meet administratively required appointment or time limit $2.00

Library fees See schedule in library

Check returned for any cause $2.00

Parking fee (nonreserved spaces, per quarter)
Each student enrolled for more than six units $9.00
Each student enrolled for six units or less $4.00
Each alternate car in addition to fee for first vehicle $1.00

Library fees $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
Fall quarter $7.50
Winter, spring, and summer quarters, each $3.75
Each student enrolled for six units or less
Fall quarter $3.00
Winter, spring, and summer quarters, each $2.00

Note 1: Payment of the foregoing student body organization fees during the fall, winter, and spring quarters shall entitle any student who is also enrolled in the summer quarter next succeeding to membership in the student body organization for that quarter without payment of additional fees.

* Not state fees, subject to change.
† Proportionate fees apply during summer session.
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) .................................. 50
Optional medical fee (per quarter) .................................. 6.00
Graduation fee
Bachelor’s degree .................................................. 10.00
Master of Arts degree .................................................. 12.50

Note 2: 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 per quarter (subject to change) .................................. $275.00
Housing security deposit (payable prior to occupancy) .................................. 20.00

Note: 1. Room and board payable in advance. Arrangements to pay in two equal 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 cafeterias 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, $7.50, winter and spring quarters, $3.75 each) .................................. $7.50
Post office fee (per quarter) ........................................... .50
Medical fee—optional (per quarter) ........................................... 6.00
Materials and service fee (per quarter) ........................................... 25.50
Room and board (19 meals per week) ........................................... 275.00
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) ........................................... $424.50

* 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.

♦ Effective fall quarter, 1966.
FAMILY HOUSING

The college Foundation has available the following partially furnished on-campus housing accommodations:

- Poly Ninos, one-bedroom apartments, including utilities (per month) $40.00
- Poly Ninos, two-bedroom apartments, including utilities (per month) $45.00
- Housing security deposit (payable prior to occupancy) $20.00

Inquiries should be made of "Housing Officer," California State Polytechnic College, San Luis Obispo, for family housing either on or off campus well in advance of registration.

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 consult the Education Department.

ADMISSION TO CANDIDACY FOR TEACHING CREDENTIAL

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

- Step 1. Approval to enter the teacher education program
- Step 2. Approval to participate in student teaching
- Step 3. Final approval for a teaching credential

A student who enters the college with the intention of earning a teaching credential must be approved as a candidate for the particular credential which he is seeking. This procedure involves the filing of an application and completing certain steps as explained later in this section.

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 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.** Satisfactory performance must be shown in the areas of English usage, reading, spelling, arithmetic, science, handwriting, and the social sciences as indicated by scores on achievement tests.

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.
THE AGRICULTURE DIVISION
The Agriculture Division 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 division 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 Agriculture Division 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 Agriculture Division 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 Agriculture Division requires high school graduation, with satisfactory grades, but does not require a specific pattern of courses taken in high school. However, a student who anticipates enrolling in the Agriculture Division of the college will find a strong background in mathematics and physical and biological sciences advantageous.

Curricula are offered in the following majors in the Agriculture Division at San Luis Obispo: agricultural business management, agricultural engineering, mechanized agriculture, animal husbandry, crops production, fruit production, dairy, farm management, food processing, ornamental horticulture, poultry industry, and soil sciences.

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

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

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

1. Major agriculture—The required sequence of courses offered by the department in which the student expects to graduate. These courses constitute the core instruction leading to specific preparation for the production field of the student's choice.

2. Related agriculture—Supporting courses in agriculture selected from closely allied fields. They supplement the major agriculture block in (1).

3. Science and mathematics—Courses selected from scientific fields which provide basic biological, physical and social science, and mathematical background and support to the agricultural block in (1) and (2) above.

4. Humanistic-social—Courses which provide cultural background for intelligent living in a complex world society.
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>12</td>
<td>12</td>
<td>12</td>
<td>6</td>
</tr>
<tr>
<td>Related agriculture</td>
<td>9</td>
<td>18</td>
<td>12</td>
<td>11</td>
</tr>
<tr>
<td>Science and mathematics</td>
<td>18</td>
<td>7</td>
<td>15</td>
<td>3</td>
</tr>
<tr>
<td>Humanistic-social</td>
<td>10½</td>
<td>8½</td>
<td>6</td>
<td>12</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 Agriculture Division 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, 102)</td>
<td>2</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Market Beef Production (AH 121)</td>
<td></td>
<td></td>
<td>4</td>
</tr>
<tr>
<td>Elements of Swine Production (AH 122)</td>
<td></td>
<td></td>
<td>4</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>2</td>
</tr>
<tr>
<td>*Applied English Composition (Eng 100)</td>
<td></td>
<td></td>
<td>3</td>
</tr>
<tr>
<td>Agricultural Math (Math 102)</td>
<td></td>
<td></td>
<td>3</td>
</tr>
<tr>
<td>Physical Education (PE 141)</td>
<td></td>
<td></td>
<td>½</td>
</tr>
<tr>
<td>*Agricultural Biology (Bio 100)</td>
<td></td>
<td></td>
<td>3</td>
</tr>
<tr>
<td>Soils (SS 121)</td>
<td></td>
<td></td>
<td>4</td>
</tr>
<tr>
<td>Electives</td>
<td>4</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.
Agriculture Division

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></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Commercial Beef Production (AH 222)</td>
<td>4</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Market Swine (AH 223)</td>
<td></td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>Tractors and Machinery (AE 141, 142, 143)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Prin. of Livestock Hygiene and Sanitation (VS 100)</td>
<td></td>
<td></td>
<td>2</td>
</tr>
<tr>
<td>Forage Crops (CP 123)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Farm Records and Farm Mgt. Practice (FM 102)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Health Education (PE 107)</td>
<td></td>
<td></td>
<td>2</td>
</tr>
<tr>
<td>Sports Education (PE 241)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>U.S. Hist. and Government (Pol Sc 100)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Farm Management or ABM Elective</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Electives</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>16½</td>
<td>16½</td>
<td>15½</td>
</tr>
</tbody>
</table>

A student enrolled in the technical program may transfer to a degree program by following the procedure under "Change of Curriculum."

HORSESHOEING

A 12-week short course in horseshoeing is offered in the fall, spring and summer quarters. Those interested in this special course should write to the Dean of Agriculture for details.

AGRICULTURAL ENTERPRISE PROJECT FACILITIES AT SAN LUIS OBISPO

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, corrales, 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

* 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.

Math 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.
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></td>
<td></td>
</tr>
<tr>
<td>Agricultural Marketing Programs in California (ABM 102)</td>
<td></td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Agricultural Business Organization (ABM 103)</td>
<td></td>
<td></td>
<td>3</td>
</tr>
<tr>
<td>Agricultural Mathematics (Math 102, 103)</td>
<td></td>
<td></td>
<td>3</td>
</tr>
<tr>
<td>Agricultural Mechanics (AE 121, 122)</td>
<td>2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Freshman Composition (Eng 104, 105, 106)</td>
<td></td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>Physical Education (PE 141)</td>
<td></td>
<td>½</td>
<td>½</td>
</tr>
<tr>
<td>Health Education (PE 107)</td>
<td></td>
<td></td>
<td>2</td>
</tr>
<tr>
<td>Life Science</td>
<td></td>
<td>3</td>
<td></td>
</tr>
<tr>
<td><strong>Electives</strong></td>
<td>5</td>
<td>5</td>
<td>5</td>
</tr>
<tr>
<td>Total Units: 16½</td>
<td>16½</td>
<td>16½</td>
<td></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.
Sophomore

<table>
<thead>
<tr>
<th>Course</th>
<th>F</th>
<th>W</th>
<th>S</th>
</tr>
</thead>
<tbody>
<tr>
<td>Agricultural Business Sales and Service (ABM 201)</td>
<td></td>
<td></td>
<td>3</td>
</tr>
<tr>
<td>Agricultural Cooperative Organization and Management (ABM 202)</td>
<td></td>
<td></td>
<td>3</td>
</tr>
<tr>
<td>Agricultural Business Credit and Finance (ABM 203)</td>
<td></td>
<td></td>
<td>3</td>
</tr>
<tr>
<td>Basic Accounting (Actg 131, 132)</td>
<td></td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>Principles of Economics (Ec 201)</td>
<td></td>
<td></td>
<td>3</td>
</tr>
<tr>
<td>Agricultural Marketing (FM 304)</td>
<td></td>
<td></td>
<td>3</td>
</tr>
<tr>
<td>* Literature</td>
<td></td>
<td></td>
<td>3</td>
</tr>
<tr>
<td>Public Speaking (Sp 201)</td>
<td></td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>Report Writing (Eng 301)</td>
<td></td>
<td></td>
<td>3</td>
</tr>
<tr>
<td>Sports Education (PE 241)</td>
<td>½</td>
<td>½</td>
<td>½</td>
</tr>
<tr>
<td>* Life Science</td>
<td></td>
<td></td>
<td>4</td>
</tr>
<tr>
<td>Descriptive Statistics (Math 211)</td>
<td></td>
<td></td>
<td>3</td>
</tr>
<tr>
<td>Statistical Methods (Math 212)</td>
<td></td>
<td></td>
<td>3</td>
</tr>
<tr>
<td>** Electives</td>
<td></td>
<td>4</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>16½</td>
<td>16½</td>
<td>16½</td>
</tr>
</tbody>
</table>

Junior

<table>
<thead>
<tr>
<th>Course</th>
<th>F</th>
<th>W</th>
<th>S</th>
</tr>
</thead>
<tbody>
<tr>
<td>Agricultural Business Management and Government Policy (ABM 301)</td>
<td></td>
<td></td>
<td>3</td>
</tr>
<tr>
<td>Agricultural Business Sales Management (ABM 302)</td>
<td></td>
<td></td>
<td>3</td>
</tr>
<tr>
<td>Agricultural Property Management and Sales (ABM 321)</td>
<td></td>
<td>4</td>
<td>4</td>
</tr>
<tr>
<td>Advanced Agricultural Business Management (ABM 322, 323)</td>
<td></td>
<td></td>
<td>3</td>
</tr>
<tr>
<td>General Psychology (Psy 202)</td>
<td></td>
<td></td>
<td>2</td>
</tr>
<tr>
<td>Advanced Public Speaking (Sp 202)</td>
<td></td>
<td></td>
<td>2</td>
</tr>
<tr>
<td>General Inorganic Chemistry (Chem 324, 325)</td>
<td></td>
<td>4</td>
<td>4</td>
</tr>
<tr>
<td>Organic Chemistry (Chem 326)</td>
<td></td>
<td></td>
<td>4</td>
</tr>
<tr>
<td>American Government (Pol Sc 301)</td>
<td></td>
<td></td>
<td>3</td>
</tr>
<tr>
<td>** Electives</td>
<td></td>
<td>3</td>
<td>6</td>
</tr>
<tr>
<td></td>
<td>17</td>
<td>17</td>
<td>16</td>
</tr>
</tbody>
</table>

Senior

<table>
<thead>
<tr>
<th>Course</th>
<th>F</th>
<th>W</th>
<th>S</th>
</tr>
</thead>
<tbody>
<tr>
<td>Agricultural Labor Relations and Personnel Management (ABM 403)</td>
<td></td>
<td></td>
<td>3</td>
</tr>
<tr>
<td>Agricultural Business Operations Analysis (ABM 421)</td>
<td></td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>Agricultural Business Communication (ABM 402)</td>
<td></td>
<td></td>
<td>3</td>
</tr>
<tr>
<td>Senior Project (ABM 461, 462)</td>
<td></td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>Undergraduate Seminar (ABM 463)</td>
<td></td>
<td></td>
<td>2</td>
</tr>
<tr>
<td>* Literature or Philosophy</td>
<td></td>
<td></td>
<td>2</td>
</tr>
<tr>
<td>Business Law Survey (Bus 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>U.S. in World Affairs (Hist 305)</td>
<td></td>
<td></td>
<td>3</td>
</tr>
<tr>
<td>** Electives</td>
<td></td>
<td>5</td>
<td>9</td>
</tr>
<tr>
<td></td>
<td>17</td>
<td>16</td>
<td>16</td>
</tr>
</tbody>
</table>

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 commercial agricultural industries. 3 lectures.

ABM 102 Agricultural Marketing Programs in California (3)

California marketing orders and agreements, integration and contract farming; their implications and effects on farming and marketing institutions. 3 lectures.

* 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.
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 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.

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, 323 Advanced Agricultural Business Management (4) (4)
Agricultural business management with primary emphasis on economic analysis and 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: ABM 203, Ec 201.

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

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 Chairman, 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 Agriculture Division and other divisions 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 OF ARTS 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.
Agriculture Division

AGRICULTURAL ENGINEERING DEPARTMENT

Department Head, Lloyd H. Lamouria

James Bermann, William M. Kirkpatrick, Glenn W. Rich
Edgar Carnegie, Willard H. Loper, Glenn W. Salo
James H. Carrington, Robert M. Matheny, James Webster
Frank G. Coyes, John L. Merriam, Gerald Westesen
John Dunn, Clive O. Remund

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 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 Agriculture Division.

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.

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

CURRICULUM IN AGRICULTURAL ENGINEERING

<table>
<thead>
<tr>
<th>Course</th>
<th>F</th>
<th>W</th>
<th>S</th>
</tr>
</thead>
<tbody>
<tr>
<td>Introduction to Agricultural Engineering (AE 100)</td>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Agricultural Mechanics (AE 128)</td>
<td></td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>Tractors and Machinery (AE 141, 142, 143)</td>
<td>2</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>Mathematics for Engineers (Math 117)</td>
<td></td>
<td>5</td>
<td></td>
</tr>
<tr>
<td>Analytic Geometry and Calculus (Math 118)</td>
<td></td>
<td>5</td>
<td></td>
</tr>
<tr>
<td>Freshman Composition (Eng 104, 105)</td>
<td>3</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Engineering Drafting (ME 151, 152, 153)</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Manufacturing Processes (MFGP 151, 141, 142)</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Manufacturing Processes (WM 141, 142)</td>
<td></td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Plant Production</td>
<td></td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>Soils (SS 121)</td>
<td></td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>Animal Production</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>Applied Biology (Bio 110)</td>
<td></td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Physical Education (PE 141)</td>
<td>½</td>
<td>½</td>
<td>½</td>
</tr>
</tbody>
</table>

17½ 16½ 17½
## Sophomore

<table>
<thead>
<tr>
<th>Course</th>
<th>F</th>
<th>W</th>
<th>S</th>
</tr>
</thead>
<tbody>
<tr>
<td>Agricultural Power (AE 234, 235)</td>
<td>3</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Principles of Irrigation (AE 236)</td>
<td>4</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Engineering Surveying (AE 237, 238)</td>
<td>2</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>Analytic Geometry &amp; Calculus (Math 201, 202, 203)</td>
<td>3</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>General Physics (Phys 131, 132, 133)</td>
<td>4</td>
<td>4</td>
<td>4</td>
</tr>
<tr>
<td>Engineering Statics (Phys 201)</td>
<td></td>
<td></td>
<td>3</td>
</tr>
<tr>
<td>Engineering Dynamics (Phys 202)</td>
<td></td>
<td></td>
<td>3</td>
</tr>
<tr>
<td>Technical Writing (Eng 219)</td>
<td></td>
<td></td>
<td>3</td>
</tr>
<tr>
<td>Public Speaking (Sp 201)</td>
<td></td>
<td></td>
<td>2</td>
</tr>
<tr>
<td>* Literature</td>
<td></td>
<td></td>
<td>2</td>
</tr>
<tr>
<td>Principles of Economics (Ec 201)</td>
<td></td>
<td></td>
<td>3</td>
</tr>
<tr>
<td>Sports Education (PE 241)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Electives</strong></td>
<td>½</td>
<td>½</td>
<td>½</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>16½</td>
<td>17½</td>
<td>18½</td>
</tr>
</tbody>
</table>

## Junior

<table>
<thead>
<tr>
<th>Course</th>
<th>F</th>
<th>W</th>
<th>S</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hydraulics (AE 312)</td>
<td>4</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Principles of Agricultural Machinery (AE 322)</td>
<td></td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Rural Electrification (AE 324, 325)</td>
<td></td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>Irrigation Systems (AE 331)</td>
<td></td>
<td></td>
<td>3</td>
</tr>
<tr>
<td>Farm Building Planning (AE 332)</td>
<td></td>
<td></td>
<td>3</td>
</tr>
<tr>
<td>Soil Conservation (SS 202)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Thermodynamics (ME 308)</td>
<td></td>
<td></td>
<td>3</td>
</tr>
<tr>
<td>Strength of Materials (ME 202, 203)</td>
<td></td>
<td></td>
<td>3</td>
</tr>
<tr>
<td>General Inorganic Chemistry (Chem 324, 325)</td>
<td>4</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>+ Electives</td>
<td></td>
<td>5</td>
<td>9</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>17</td>
<td>18</td>
<td>18</td>
</tr>
</tbody>
</table>

## Senior

<table>
<thead>
<tr>
<th>Course</th>
<th>F</th>
<th>W</th>
<th>S</th>
</tr>
</thead>
<tbody>
<tr>
<td>Farm Building Design (AE 433)</td>
<td>3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Senior Project (AE 461, 462)</td>
<td>2</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>Undergraduate Seminar (AE 463)</td>
<td></td>
<td></td>
<td>2</td>
</tr>
<tr>
<td>American Government (Pol Sc 301)</td>
<td></td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Growth of American Democracy (Hist 304)</td>
<td></td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>U.S. in World Affairs (Hist 305)</td>
<td></td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>General Psychology (Psy 202)</td>
<td></td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>* Literature or Philosophy</td>
<td></td>
<td></td>
<td>3</td>
</tr>
<tr>
<td>* Social Science Elective</td>
<td></td>
<td></td>
<td>3</td>
</tr>
<tr>
<td>+ Electives</td>
<td>7</td>
<td>9</td>
<td>10</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>18</td>
<td>17</td>
<td>18</td>
</tr>
</tbody>
</table>

*At least 13 units shall be selected with the approval of the adviser. An additional 10 units must be selected from courses in the Agriculture Division.

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

CURRICULUM IN MECHANIZED AGRICULTURE

<table>
<thead>
<tr>
<th>Freshman</th>
<th>F</th>
<th>W</th>
<th>S</th>
</tr>
</thead>
<tbody>
<tr>
<td>Introduction to Agricultural Engineering (AE 100)</td>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Agricultural Mechanics (AE 128)</td>
<td></td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>Tractors and Machinery (AE 141, 142, 143)</td>
<td>2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Agricultural Mathematics (Math 102, 103)</td>
<td>3</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>College Algebra for Agriculture (Math 114)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Freshman Composition (Eng 104, 105)</td>
<td></td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>Health Education (PE 107)</td>
<td></td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>Engineering Drafting (ME 151, 152, 153)</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Manufacturing Processes (MFGP 151, 141, 142)</td>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Manufacturing Processes (WM 141, 142)</td>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Metallic Arc Welding (WM 155)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Plant Production</td>
<td>4</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Soils (SS 121)</td>
<td></td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>Animal Production</td>
<td></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></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sophomore</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Farm Building Construction (AE 231)</td>
<td>3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Agricultural Power (AE 234, 235)</td>
<td>3</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Engineering Surveying (AE 237, 238)</td>
<td></td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>Irrigation (AE 340)</td>
<td></td>
<td></td>
<td>4</td>
</tr>
<tr>
<td>Trigonometry for Agriculture (Math 115)</td>
<td>3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>College Physics (Phys 121, 122, 123)</td>
<td>4</td>
<td>4</td>
<td>4</td>
</tr>
<tr>
<td>General Botany (Bot 121)</td>
<td></td>
<td></td>
<td>4</td>
</tr>
<tr>
<td>Technical Writing (Eng 219)</td>
<td>3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Public Speaking (Sp 201)</td>
<td></td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>Soil Conservation (SS 202)</td>
<td></td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Metallic Arc Welding (WM 156)</td>
<td></td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Elements of Welded Structures (WM 254)</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>† Electives</td>
<td></td>
<td></td>
<td>2</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Junior</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Principles of Agricultural Machinery (AE 322)</td>
<td>3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Agricultural Products Handling (AE 323)</td>
<td>3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Farm Building Planning (AE 332)</td>
<td></td>
<td></td>
<td>3</td>
</tr>
<tr>
<td>Farm Equipment Projects (AE 344)</td>
<td></td>
<td></td>
<td>3</td>
</tr>
<tr>
<td>General Inorganic Chemistry (Chem 324, 325)</td>
<td>4</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>Organic Chemistry (Chem 326)</td>
<td></td>
<td></td>
<td>4</td>
</tr>
<tr>
<td>General Psychology (Psy 202)</td>
<td></td>
<td></td>
<td>3</td>
</tr>
<tr>
<td>* Literature or Philosophy</td>
<td></td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>Business Law Survey (Bus 301)</td>
<td></td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Principles of Economics (Ec 201)</td>
<td></td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Farm Records (FM 321)</td>
<td></td>
<td></td>
<td>3</td>
</tr>
<tr>
<td>† Electives</td>
<td></td>
<td>7</td>
<td>5</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>16</td>
<td>17</td>
<td>17</td>
</tr>
</tbody>
</table>

† 15 units of electives must be selected from courses in the Agriculture Division.
California State Polytechnic College

Senior F W S

<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>Farm Equipment Industry Management (AE 321)</td>
<td>4</td>
</tr>
<tr>
<td>Rural Electrification (AE 324, 325)</td>
<td></td>
</tr>
<tr>
<td>Senior Project (AE 461, 462)</td>
<td>2</td>
</tr>
<tr>
<td>Undergraduate Seminar (AE 463)</td>
<td>2</td>
</tr>
<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></td>
</tr>
<tr>
<td>* Literature, Philosophy</td>
<td>3</td>
</tr>
<tr>
<td>Agricultural Business Sales and Service (ABM 201)</td>
<td>3</td>
</tr>
<tr>
<td>Agricultural Business Credit and Finance (ABM 203)</td>
<td>3</td>
</tr>
<tr>
<td>+ Electives</td>
<td>4 6 5</td>
</tr>
<tr>
<td></td>
<td>16 17 16</td>
</tr>
</tbody>
</table>

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)

Selection and evaluation of production equipment associated with the student's major. Study of specifications and plans. Construction of production equipment; fences, gates and mobile equipment. Students register for this course by sections according to their specific majors. 1 lecture, 1 laboratory. Prerequisite: AE 121

AE 128 Agricultural Mechanics (2)

Selection of materials for farm 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)

A general course in the fundamentals of conservation irrigation on the farm; resources inventorying; methods of application; farm irrigation; distribution system planning and construction; simple design and construction of farm irrigation structures; field practice in system layout, construction, and operation. 1 lecture, 1 laboratory. Prerequisite: SS 121

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. 1 lecture, 1 laboratory. Prerequisite: Math 102

AE 133 Farm 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 Farm Electrification (2)

A general course in the fundamentals of electric wiring and code regulations; selection, installation and maintenance of electric motors as used in agriculture. For Agriculture Division students other than degree majors in Agricultural Engineering. 1 lecture, 1 laboratory. Prerequisite: Math 103

* See general education list. Include at least one literature course.
† 15 units of electives shall be selected from courses in the Agriculture Division.
Agriculture Division

AE 138  Farm Engines (2)
Fundamental principles of gasoline and diesel engines and their accessories. Tuneup, adjustment, minor overhaul, and servicing. Fuels and lubricants. For Agriculture Division students other than Agricultural Engineering. 1 lecture, 1 laboratory. Prerequisite: AE 141

AE 141  Tractors and Machinery (2)
Field and shop practice in the operation, service, adjustment, and function of the component parts of the modern farm tractor, including wheel and track types with gasoline and diesel power units. A field introduction to primary and secondary tillage equipment, hydraulic systems, hitching, weight transfer principles, and economics of power management. 1 lecture, 1 laboratory.

AE 142  Tractors and Machinery (2)
Selection and management of farm power and machinery. Operation, adjustment, and maintenance of primary and secondary tillage implements; seeding, planting, and fertilizing implements; pest and weed control equipment. Emphasis on design characteristics, adaptability, and versatility factors. 1 lecture, 1 laboratory. Prerequisite: AE 141, Math 102 or 117

AE 143  Tractors and Machinery (2)
Selection, operation, adjustment, and maintenance of haying, harvesting and crop handling equipment. Emphasis on design characteristics, adaptability, and versatility factors. Study of machine efficiencies. Problems on farm power and machinery management. 1 lecture, 1 laboratory. Prerequisite: AE 142

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  Farm 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  Farm Building Construction (3)
Development of practical skills in farm carpentry and light construction. Selection of materials. Farm buildings repaired, constructed, or modified during laboratory periods. 1 lecture, 2 laboratories. Prerequisite: AE 121 or AE 128

AE 234  Agricultural Power (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 141

AE 235  Agricultural Power (3)
Principles and applications of gasoline, diesel, and LPG engines to agriculture. Service, tune up, trouble shooting and repair of these engines and their accessories. 2 lectures, 1 laboratory. Prerequisite: AE 234 or 138

AE 236  Principles of Irrigation (4)
Plant-soil-water relationships. Measurement of water. Methods of application of irrigation water. Drainage. Water organizations and water law. For Agricultural Engineers. 3 lectures, 1 laboratory. Prerequisite: Math 118, AE 237

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 or 117.
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 243 Gasoline Engine Diagnosis (2)
Use of modern gasoline engine testing equipment in the evaluation and analysis of performance variables such as: detonation, pre-ignition, air-fuel ratio, combustion efficiency and fuel economy. 1 lecture, 1 laboratory.

AE 244 Diesel Engine Diagnosis (2)
Use of modern diesel engine testing equipment in the evaluation and analysis of performance variables such as: detonation, pre-ignition, air-fuel ratio, combustion efficiency and fuel economy. 1 lecture, 1 laboratory.

AE 312 Hydraulics (4)
Static and dynamic characteristics of liquids in open and closed channels. 3 lectures, 1 laboratory. Prerequisite: Phys 132, Math 202

AE 315 Hydrology (3)
Collection, organization, and use of precipitation, evaporation, and runoff data. Principles of flood routing, stream flow, and ground water conservation. The hydrograph. 3 lectures. Prerequisite: SS 121

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 143; AE 138 or 235

AE 321 Farm 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 143

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 143, 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 117, junior standing or consent of instructor.

AE 324 Rural Electrification (3)
Principles of wiring farm 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 Rural Electrification (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 (3)

The design of surface and sprinkler irrigation systems. Land grading calculations for optimum grades and minimum soil moving consistent with soil conditions and costs. 2 lectures, 1 laboratory. Prerequisite: AE 236

AE 332 Farm Building Planning (3)

Functional planning of farm 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 336 Agricultural Power (3)

Thermodynamic principles as applied to internal combustion engines. Theory of combustion. Fuels and lubricants. Power and its measurement. Factors affecting horsepower output and engine efficiency. Power transmission. Automotive electrical systems. 2 lectures, 1 laboratory. Prerequisite: AE 335, Phys 133

AE 338 Process Instrumentation and Control (3)

Types and application of transducers, receivers, recorders and automatic controls in agriculture and agricultural processing. 2 lectures, 1 laboratory. Prerequisite: AE 323, junior standing or consent of instructor.

AE 340 Irrigation (4)

Fundamental principles and practices of irrigation. Soil-moisture relationships water measurement, methods of irrigation, crop requirements, farm irrigation structures, pumps and pumping, and problems of the irrigation farmer. 3 lectures, 1 laboratory. Prerequisite: Math 103, SS 121

AE 344 Farm Equipment Projects (3)

Principles, materials and construction of specialized agricultural equipment. 1 lecture, 2 laboratories. Prerequisite: AE 122 or 128; WM 254

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 distribution and supply found in irrigation districts or large farms. The influence of soils and crops in determining water deliveries. Rates of water use, open and closed conduits, pumps, reservoirs, costs and economics of efficient water delivery and use. 3 lectures, 1 laboratory. Prerequisite: AE 312, AE 331

AE 421 Agricultural Machine Design (3)

Design and construction of specialized farm equipment. 1 lecture, 2 laboratories. Prerequisite: ME 153, MFGP 142, WM 142, Phys 202, ME 203

AE 422 Equipment Engineering (3)

Analysis and use of fundamental machine elements and their application to agricultural machinery. 2 lectures, 1 laboratory. Prerequisite: AE 322, Phys 202

AE 433 Farm Building Design (3)

Design of typical farm buildings with emphasis on wood and metal construction. Stress solutions of trusses by analytic and graphical methods. Analysis of snow, wind, seismic, and material loading on farm structures. 2 lectures, 1 laboratory. Prerequisite: ME 203 and AE 332

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)

The engineering factors in the design of drainage system for agricultural and urban areas. 2 lectures, 1 laboratory. Prerequisite: AE 312 or AE 340
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: SS 202, AE 312

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

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

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 train 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.

Concentration of study will be directed to one of three areas: Production, Management, or Science-Teaching.

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 Agriculture Division which describes this program. Detailed curriculum information is available from the department head.

**CURRICULUM IN ANIMAL HUSBANDRY**

<table>
<thead>
<tr>
<th>Freshman</th>
<th>F</th>
<th>W</th>
<th>S</th>
</tr>
</thead>
<tbody>
<tr>
<td>Feeds and Feeding (AH 101, 102)</td>
<td>2</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Market Beef Production (AH 121)</td>
<td></td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>Elements of Swine Production (AH 122)</td>
<td>4</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Elements of Sheep Production (AH 123)</td>
<td>4</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Agricultural Mechanics (AE 121, 122)</td>
<td>2</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>Freshman Composition (Eng 104, 105)</td>
<td>3</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>Agricultural Mathematics (Math 102, 103)</td>
<td>3</td>
<td></td>
<td>3</td>
</tr>
<tr>
<td>Physical Education (PE 141)</td>
<td></td>
<td>½</td>
<td>½</td>
</tr>
<tr>
<td>General Zoology (Zoo 131, 132)</td>
<td>4</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>Health Education (PE 107)</td>
<td></td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>* Electives and courses to complete major</td>
<td>4</td>
<td></td>
<td>1</td>
</tr>
</tbody>
</table>

**Total: 16 ½, 16 ½, 16 ½**

*At least 18 units shall be chosen with the approval of the adviser in one of the concentration areas of Production, Management, or Science-Teaching.
### Sophomore

<table>
<thead>
<tr>
<th>Course</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sheep Husbandry (AH 221)</td>
<td>4</td>
</tr>
<tr>
<td>Commercial Beef Production (AH 222)</td>
<td>4</td>
</tr>
<tr>
<td>Swine Husbandry (AH 223)</td>
<td>4</td>
</tr>
<tr>
<td>Tractors and Machinery (AE 141, 142, 143)</td>
<td>2</td>
</tr>
<tr>
<td>Anatomy and Physiology (VS 123)</td>
<td>3</td>
</tr>
<tr>
<td>Forage Crops (CP 123)</td>
<td>4</td>
</tr>
<tr>
<td>Soils (SS 121)</td>
<td>4</td>
</tr>
<tr>
<td>Public Speaking (Sp 201)</td>
<td>2</td>
</tr>
<tr>
<td>Principles of Economics (Ec 201)</td>
<td>3</td>
</tr>
<tr>
<td>Sports Education (PE 241)</td>
<td>½</td>
</tr>
<tr>
<td>General Bacteriology (Bact 221)</td>
<td>4</td>
</tr>
<tr>
<td>General Botany (Bot 121)</td>
<td>4</td>
</tr>
<tr>
<td>* Electives and courses to complete major</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>2</td>
</tr>
</tbody>
</table>

**Sophomore Total:** 15½

### Junior

<table>
<thead>
<tr>
<th>Course</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>Animal Breeding (AH 304)</td>
<td>4</td>
</tr>
<tr>
<td>Beef Husbandry (AH 323)</td>
<td>4</td>
</tr>
<tr>
<td>Livestock Hygiene and Sanitation (VS 202)</td>
<td>3</td>
</tr>
<tr>
<td>Animal Parasitology (VS 203)</td>
<td>3</td>
</tr>
<tr>
<td>Range Management (AH 229)</td>
<td>4</td>
</tr>
<tr>
<td>Farm Records (FM 321)</td>
<td>3</td>
</tr>
<tr>
<td>Principles of Farm Management (FM 322)</td>
<td>4</td>
</tr>
<tr>
<td>† Social Science Elective</td>
<td>3</td>
</tr>
<tr>
<td>Genetics (Bio 303)</td>
<td>3</td>
</tr>
<tr>
<td>General Inorganic Chemistry (Chem 324, 325)</td>
<td>4</td>
</tr>
<tr>
<td>Organic Chemistry (Chem 326)</td>
<td>4</td>
</tr>
<tr>
<td>* Electives and courses to complete major</td>
<td>3</td>
</tr>
</tbody>
</table>

**Junior Total:** 17

### Senior

<table>
<thead>
<tr>
<th>Course</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>Animal Nutrition (AH 402)</td>
<td>4</td>
</tr>
<tr>
<td>Senior Project (AH 461, 462)</td>
<td>2</td>
</tr>
<tr>
<td>Undergraduate Seminar (AH 463)</td>
<td>2</td>
</tr>
<tr>
<td>** Literature, Philosophy</td>
<td>3</td>
</tr>
<tr>
<td>†† Management Elective</td>
<td>3</td>
</tr>
<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>General Psychology (Psy 202)</td>
<td>3</td>
</tr>
<tr>
<td>Agricultural Biochemistry (Chem 328)</td>
<td>4</td>
</tr>
<tr>
<td>* Electives and courses to complete major</td>
<td>6</td>
</tr>
</tbody>
</table>

**Senior Total:** 17

### DESCRIBES OF COURSES IN ANIMAL HUSBANDRY

**AH 100 Introduction to Animal Husbandry (1)**

Introductory course for animal husbandry students. Importance of animal production to the state and national economy. Areas of production. Animal husbandry as a career; technical areas and job opportunities. Orientation to student livestock project program in animal husbandry. 1 lecture.

**AH 101 Feeds and Feeding (2)**

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

---

* At least 18 units shall be chosen with the approval of the adviser in one of the concentration areas of Production, Management, or Science-Teaching.
** See General Education list. Include at least one course in literature.
†† To be selected from the General Education list.
†† To be selected from any 300-400 series course in ABM or FM.
Agriculture Division

AH 102 Feeds and Feeding (3)
The digestion and utilization of feeds; feeding standards and computation of standard rations for livestock; economy in feeding, and purchasing feeds by nutritive values; important vitamins and minerals and feed sources thereof. 2 lectures, 1 laboratory. Prerequisite: AH 101

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.

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. Horseback riding both bareback and under saddle. Basic equitation for students with no previous experience. Students will be expected to provide for the maintenance of stock. 1 lecture, 2 laboratories.

AH 221 Sheep Husbandry (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 Production (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 Husbandry (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 (2)
Application of visual appraisal techniques to the selection of beef cattle, sheep, swine and horses. 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 Production (3)

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 304  Animal Breeding (4)
Physiology of reproduction, application of genetics to animal breeding. Systems of mating animals, the use of inbreeding, crossbreeding, and selection as it applies to farm animals. 3 lectures, 1 laboratory. 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 102, 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 (3)
Range survey, inventory, analysis and development of plans for effective improvement and utilization of rangeland. 2 lectures, 1 laboratory. Prerequisite: AH 229

AH 333  Horse Husbandry (3)
Horse breeding farm management. Care of stallion, mares, and offspring. Feeding and breeding schedules. Records and office procedure. Bloodlines, systems of mating. Extended equitation and fundamentals of horsemanship. 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 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 102, Chem 328

AH 434, 435  Specialized Horse Enterprises (3) (3)
Training and gentling, driving and ground work with young horses and use of advanced equipment for extended training. Training of the high schooled horse, pleasure horse, jumping horse, and stock horse, with related skills in cattle work. Advanced equitation. Students required to provide for maintenance of stock. 1 lecture, 2 laboratories.

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

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

A student in the Crops Production major may elect to specialize in either Agronomy or Vegetable Crops in the junior and senior years. Placement opportunities include sales and service in seeds, fertilizer, weed and pest control, production fieldmen, and in shipping and processing. Private or corporate crop production is a major employment opportunity as is governmental employment in Agronomy, Horticulture, Agricultural Inspection and Crop Grading.

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. Fresh fruit handling and quality control receive major attention.

Graduates from both majors have entered the vocational agricultural teaching and the agricultural extension service fields.

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

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.

**CURRICULUM IN CROPS PRODUCTION**

<table>
<thead>
<tr>
<th>Course</th>
<th>F</th>
<th>W</th>
<th>S</th>
</tr>
</thead>
<tbody>
<tr>
<td>Introduction to Farm Crops (CP 101)</td>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Farm Crops of California (CP 121)</td>
<td>4</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Row Crops (CP 122)</td>
<td></td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>Combine Harvest Crops (CP 126)</td>
<td></td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>Agricultural Mechanics (AE 121)</td>
<td></td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>Tractors and Machinery (AE 141)</td>
<td></td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>General Botany (Bot 121, 122)</td>
<td></td>
<td>4</td>
<td>4</td>
</tr>
<tr>
<td>General Entomology (Ent 126)</td>
<td></td>
<td></td>
<td>4</td>
</tr>
<tr>
<td>Freshman Composition (Eng 104, 105)</td>
<td>3</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Agricultural Mathematics (Math 102, 103)</td>
<td></td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>Health Education (PE 107)</td>
<td></td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>Physical Education (PE 141)</td>
<td>½</td>
<td>½</td>
<td>½</td>
</tr>
<tr>
<td>Electives</td>
<td>3</td>
<td></td>
<td>4</td>
</tr>
</tbody>
</table>

Total: 17½ 16½ 17¹⁄₂
## Agriculture Division

### Sophomore

<table>
<thead>
<tr>
<th>Course</th>
<th>F</th>
<th>W</th>
<th>S</th>
</tr>
</thead>
<tbody>
<tr>
<td>Commercial Seed Production and Processing (CP 231)</td>
<td>4</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>Vegetable Crops Production (VC 232)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Weed Control (CP 221)</td>
<td>4</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Agricultural Surveying (AE 131)</td>
<td>2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Tractors and Machinery (AE 142, 143)</td>
<td>2</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>Soils (SS 121)</td>
<td></td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>Soil Management (SS 122)</td>
<td></td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Fertilizers (SS 221)</td>
<td></td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Public Speaking (Sp 201)</td>
<td>2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>General Psychology (Psy 202)</td>
<td>3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Principles of Economics (Ec 201)</td>
<td>3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Irrigation Practices (AE 130)</td>
<td>2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sports Education (PE 241)</td>
<td>½</td>
<td>½</td>
<td>½</td>
</tr>
<tr>
<td>General Bacteriology (Bact 221)</td>
<td>4</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Plant Pathology (Bot 323)</td>
<td></td>
<td>4</td>
<td></td>
</tr>
<tr>
<td></td>
<td>15½</td>
<td>17½</td>
<td>15½</td>
</tr>
</tbody>
</table>

### Junior

<table>
<thead>
<tr>
<th>Course</th>
<th>F</th>
<th>W</th>
<th>S</th>
</tr>
</thead>
<tbody>
<tr>
<td>Crop Disease and Pest Control (CP 321)</td>
<td>3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Crop Technology (CP 322)</td>
<td>4</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Farm Records (FM 321)</td>
<td>3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Principles of Farm Management (FM 322)</td>
<td>4</td>
<td></td>
<td></td>
</tr>
<tr>
<td>General Inorganic Chemistry (Chem 324, 325)</td>
<td>4</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Organic Chemistry (Chem 326)</td>
<td>4</td>
<td></td>
<td></td>
</tr>
<tr>
<td>American Government (Pol Sc 301)</td>
<td>3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Growth of American Democracy (Hist 304)</td>
<td>3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>U.S. in World Affairs (Hist 305)</td>
<td></td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Social Sciences Elective</td>
<td></td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>* Electives and courses to complete major</td>
<td>3</td>
<td>2</td>
<td>6</td>
</tr>
<tr>
<td></td>
<td>16</td>
<td>17</td>
<td>16</td>
</tr>
</tbody>
</table>

### Senior

<table>
<thead>
<tr>
<th>Course</th>
<th>F</th>
<th>W</th>
<th>S</th>
</tr>
</thead>
<tbody>
<tr>
<td>Plant Breeding (CP 304)</td>
<td>4</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Senior Project (CP 461, 462)</td>
<td>2</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>Undergraduate Seminar (CP 463)</td>
<td></td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>Genetics (Bio 303)</td>
<td></td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>** Management Elective</td>
<td></td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Agricultural Biochemistry (Chem 328)</td>
<td>4</td>
<td></td>
<td></td>
</tr>
<tr>
<td>** Literature, Philosophy</td>
<td></td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>California Fruit Growing (FP 230)</td>
<td>4</td>
<td></td>
<td></td>
</tr>
<tr>
<td>* Electives and courses to complete major</td>
<td>8</td>
<td>5</td>
<td>7</td>
</tr>
<tr>
<td></td>
<td>17</td>
<td>16</td>
<td>16</td>
</tr>
</tbody>
</table>

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

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

† To be selected from the General Education list.

‡ To be selected from any 300-400 series course in ABM or FM.
## CURRICULUM IN FRUIT PRODUCTION

### Freshman

<table>
<thead>
<tr>
<th>Course</th>
<th>F</th>
<th>W</th>
<th>S</th>
</tr>
</thead>
<tbody>
<tr>
<td>Introduction to Farm Crops (CP 101)</td>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pomology (FP 131, 132, 133)</td>
<td>4</td>
<td>4</td>
<td>4</td>
</tr>
<tr>
<td>Agricultural Mechanics (AE 121)</td>
<td>2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Tractors and Machinery (AE 141)</td>
<td></td>
<td></td>
<td>2</td>
</tr>
<tr>
<td>Freshman Composition (Eng 104, 105)</td>
<td>3</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Agricultural Mathematics (Math 102, 103)</td>
<td>3</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Health Education (PE 107)</td>
<td>2</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>General Botany (Bot 121, 122)</td>
<td>4</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>General Entomology (Ent 126)</td>
<td></td>
<td></td>
<td>4</td>
</tr>
<tr>
<td>Electives</td>
<td>3</td>
<td>4</td>
<td></td>
</tr>
</tbody>
</table>

### Sophomore

<table>
<thead>
<tr>
<th>Course</th>
<th>F</th>
<th>W</th>
<th>S</th>
</tr>
</thead>
<tbody>
<tr>
<td>Viticulture (FP 231)</td>
<td>4</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fruit Plant Propagation (FP 232)</td>
<td></td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>Agricultural Surveying (AE 131)</td>
<td>2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Tractors and Machinery (AE 142)</td>
<td></td>
<td></td>
<td>2</td>
</tr>
<tr>
<td>Weed Control (CP 221)</td>
<td>4</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Soils (SS 121)</td>
<td></td>
<td></td>
<td>4</td>
</tr>
<tr>
<td>Soil Management (SS 122)</td>
<td></td>
<td></td>
<td>4</td>
</tr>
<tr>
<td>Public Speaking (Sp 201)</td>
<td>2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Principles of Economics (Ec 201)</td>
<td></td>
<td></td>
<td>3</td>
</tr>
<tr>
<td>Social Sciences Elective</td>
<td></td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Sports Education (PE 241)</td>
<td>½</td>
<td>½</td>
<td>½</td>
</tr>
<tr>
<td>General Bacteriology (Bact 221)</td>
<td>4</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Plant Pathology (Bot 323)</td>
<td></td>
<td></td>
<td>4</td>
</tr>
<tr>
<td>Irrigation Practices (AE 130)</td>
<td></td>
<td></td>
<td>2</td>
</tr>
<tr>
<td>Electives</td>
<td>2</td>
<td>2</td>
<td>3</td>
</tr>
</tbody>
</table>

### Junior

<table>
<thead>
<tr>
<th>Course</th>
<th>F</th>
<th>W</th>
<th>S</th>
</tr>
</thead>
<tbody>
<tr>
<td>Citrus and Avocado Fruit Production (FP 332)</td>
<td>4</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Orchard Disease and Pest Control (FP 334)</td>
<td></td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>Farm Records (FM 321)</td>
<td>3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Principles of Farm Management (FM 322)</td>
<td>3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Genetics (Bio 303)</td>
<td></td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>General Inorganic Chemistry (Chem 324, 325)</td>
<td>4</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>Organic Chemistry (Chem 326)</td>
<td></td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>General Psychology (Psy 202)</td>
<td></td>
<td></td>
<td>3</td>
</tr>
<tr>
<td>Fertilizers (SS 221)</td>
<td>2</td>
<td>6</td>
<td>4</td>
</tr>
</tbody>
</table>

### Notes

* To be selected from the General Education list.
** FP 331 may be substituted.
### DESCRIPrIONS OF COURSES IN CROPS PRODUCTION

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Name</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>CP 100</td>
<td>General Agriculture Pest Control (4)</td>
<td></td>
</tr>
<tr>
<td>CP 101</td>
<td>Introduction to Farm Crops (1)</td>
<td></td>
</tr>
<tr>
<td>CP 121</td>
<td>Farm Crops of California (4)</td>
<td></td>
</tr>
<tr>
<td>CP 122</td>
<td>Row Crops (4)</td>
<td></td>
</tr>
<tr>
<td>CP 123</td>
<td>Forage Crops (4)</td>
<td></td>
</tr>
<tr>
<td>CP 126</td>
<td>Combine Harvest Crops (4)</td>
<td></td>
</tr>
<tr>
<td>CP 221</td>
<td>Weed Control (4)</td>
<td></td>
</tr>
</tbody>
</table>

**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.

**Introduction to Farm Crops (1)**

Introductory course for freshmen crops majors. Statistical importance of crop production in California and the major production areas. Job opportunities. Orientation to the crops curricula and to the project enterprise program. 1 lecture.

**Farm Crops of California (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.

**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 121 or VC 230

**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

**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 121 or VC 230

**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

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

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

CP 231 Commercial Seed Production and Processing (4)
Production and processing of certified and commercial seed including seed analysis, germination, quality control, cleaning and storage techniques, and seed laws. 3 lectures, 1 laboratory. Prerequisite: CP 122 or CP 126

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 321 Crop Pest Control (4)
Natural and cultural methods of combating insects, disease, rodent and bird pests of important crops including chemicals as sprays, dusts, fumigants, and poisons. 3 lectures, 1 laboratory. Prerequisite: Bot 323, Ent 126

CP 322 Crop Technology (4)
Grades and laboratory tests for quality of California cereal and vegetable crops. The effects of harvesting, storage, and quality control on market value and processing. 3 lectures, 1 laboratory. Prerequisite: CP 122 and CP 126

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 121 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.
Agriculture Division

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 121 or 230

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

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 121

VC 324 Harvesting, Packaging and Marketing Vegetable Crops (4)
Harvesting methods and procedures; current handling and packaging techniques; containers; storage; and grades and grading for fresh market vegetables. 3 lectures, 1 laboratory. Prerequisite: VC 232

VC 326 Vegetables for Processing (4)
Production principles and methods; cultural and harvesting practices as applied to vegetable crops grown primarily for processing. Emphasis will be on planting schedules, field sampling, maturity tests, and forecasting crop maturity. 3 lectures, 1 laboratory. Prerequisite: CP 121, 122 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 121, 122 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 reference to pollination of commercial crops. Honey processing and marketing. Bee inspection and disease detection. 2 lectures, 1 laboratory.

FP 131 Pomology (4)
History and outlook for California fruit growing. Apple, peach, pear and prune production practices. Field laboratories in orchard management practices, tree and fruit identification, harvesting, grading and packaging of college orchard products. 3 lectures, 1 laboratory.

FP 132 Pomology (4)
Planting and planning the deciduous orchard. Apricot, cherry, fig, olive and plum production practices with special emphasis on pruning trees and grapevines. 3 lectures, 1 laboratory. Prerequisite: FP 131
FP 133 Pomology (4)
Production practices common to deciduous nut crops produced in California. Normal spring cultural problems including thinning and spraying. Small fruit culture. 3 lectures, 1 laboratory. Prerequisite: FP 132

FP 230 California Fruit Growing (4)
Production practices, areas of production, suitable varieties, harvest and processing of important deciduous and subtropical fruit crops. Methods of propagation and training. 3 lectures, 1 laboratory.

FP 231 Viticulture (4)
A comprehensive study of grape growing utilizing the college plantings for field practice in planting, training and maintaining the vineyard. Varietal identification and use. 3 lectures, 1 laboratory.

FP 232 Fruit Plant Propagation (4)
Propagation by seed, cuttings, layering, grafting, and budding. Rootstocks for deciduous fruits, commercial nursery practices. 3 lectures, 1 laboratory. Prerequisite: FP 133 or 230

FP 239 Home Fruit and Vegetable Production (3)
Growing, handling and evaluating fruits and vegetables common to demonstration and Estate plantings. Varietal characteristics and climatic adaptation. 2 lectures, 1 laboratory.

FP 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 334 Orchard Disease and Pest Control (4)
Studies and field identification of diseases and insect pests of deciduous fruit trees. Field application of control materials. Operation of modern spraying and dusting equipment. 3 lectures, 1 laboratory. Prerequisite: FP 133 or 230

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, 234

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**

<table>
<thead>
<tr>
<th>Course</th>
<th>F</th>
<th>W</th>
<th>S</th>
</tr>
</thead>
<tbody>
<tr>
<td>Elements of Dairying (DH 121)</td>
<td>4</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Dairy Feeds and Feeding (DH 101)</td>
<td>2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Feeding Dairy Cattle (DH 102)</td>
<td>2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Market Milk (DM 133)</td>
<td></td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>Freshman Composition (Eng 104, 105)</td>
<td>3</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Agricultural Math (Math 102, 103)</td>
<td>3</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>General Zoology (Zoo 131)</td>
<td>4</td>
<td></td>
<td></td>
</tr>
<tr>
<td>General Botany (Bot 121)</td>
<td></td>
<td></td>
<td>4</td>
</tr>
<tr>
<td>Health Education (PE 107)</td>
<td></td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>Physical Education (PE 141)</td>
<td>½</td>
<td>½</td>
<td>½</td>
</tr>
<tr>
<td>*Fine or Practical Arts.</td>
<td>2</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>Electives and courses to complete major</td>
<td>2</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>17½</td>
<td>16½</td>
<td>16½</td>
</tr>
</tbody>
</table>

* To be selected from General Education list. Include at least one course in literature.
<table>
<thead>
<tr>
<th>Year</th>
<th>Course Description</th>
<th>F</th>
<th>W</th>
<th>S</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sophomore</td>
<td>Milk Production (DH 221)</td>
<td>4</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Dairy Products Judging (DM 233)</td>
<td></td>
<td>2</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Principles of Economics (Ec 201)</td>
<td></td>
<td>3</td>
<td></td>
</tr>
<tr>
<td></td>
<td>* Social Science</td>
<td>3</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Public Speaking (Sp 201)</td>
<td></td>
<td>2</td>
<td></td>
</tr>
<tr>
<td></td>
<td>* Literature, philosophy</td>
<td>3</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td></td>
<td>General Bacteriology (Bact 221)</td>
<td></td>
<td>4</td>
<td></td>
</tr>
<tr>
<td></td>
<td>General Psychology (Psy 202)</td>
<td></td>
<td>3</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Sports Education (PE 241)</td>
<td></td>
<td>½</td>
<td>½</td>
</tr>
<tr>
<td></td>
<td>Electives and courses to complete major</td>
<td>6</td>
<td>11</td>
<td>6</td>
</tr>
<tr>
<td></td>
<td></td>
<td>17½</td>
<td>16½</td>
<td>16½</td>
</tr>
<tr>
<td>Junior</td>
<td>Dairy Inspection (DM 332)</td>
<td>2</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Dairy Product Merchandising (DM 303)</td>
<td></td>
<td>2</td>
<td></td>
</tr>
<tr>
<td></td>
<td>General Inorganic Chemistry (Chem 324, 325)</td>
<td>4</td>
<td>4</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>Organic Chemistry (Chem 326)</td>
<td></td>
<td>4</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>Report Writing (Eng 301)</td>
<td></td>
<td>3</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>American Government (Pol Sc 301)</td>
<td>3</td>
<td>3</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>Electives and courses to complete major</td>
<td>10</td>
<td>10</td>
<td>7</td>
</tr>
<tr>
<td></td>
<td></td>
<td>17</td>
<td>16</td>
<td>16</td>
</tr>
<tr>
<td>Senior</td>
<td>Senior Project (DH 461, 462)</td>
<td>2</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>Undergraduate Seminar (DH 463)</td>
<td></td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>Agricultural Biochemistry (Chem 328)</td>
<td>4</td>
<td>4</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td>Growth of American Democracy (Hist 304)</td>
<td></td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>U. S. in World Affairs (Hist 305)</td>
<td></td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>† Management elective</td>
<td>3</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>Electives and courses to complete major</td>
<td>10</td>
<td>8</td>
<td>11</td>
</tr>
<tr>
<td></td>
<td></td>
<td>16</td>
<td>16</td>
<td>16</td>
</tr>
</tbody>
</table>

**HUSBANDRY OPTION (ADD COURSES BELOW TO BASIC CURRICULUM)**

<table>
<thead>
<tr>
<th>Year</th>
<th>Course Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Freshman</td>
<td>DH 142 Dairy Cattle Judging (2)</td>
</tr>
<tr>
<td>Sophomore</td>
<td>DH 222 Commercial Dairy Herd Management (4)</td>
</tr>
<tr>
<td></td>
<td>SS 121 Soils (4)</td>
</tr>
<tr>
<td></td>
<td>VS 123 Anatomy and Physiology (3)</td>
</tr>
<tr>
<td></td>
<td>VS 202 Livestock Hygiene and Sanitation (3)</td>
</tr>
<tr>
<td>Junior</td>
<td>DH 301 Advanced Dairy Cattle Feeding (2)</td>
</tr>
<tr>
<td></td>
<td>DH 323 History of Dairy Breeds and Pedigrees (4)</td>
</tr>
<tr>
<td></td>
<td>DB 325 Genetics (4)</td>
</tr>
<tr>
<td></td>
<td>FM 321 Farm Records (3)</td>
</tr>
<tr>
<td>Senior</td>
<td>DH 422 Breed and Selection of Dairy Cattle (4)</td>
</tr>
<tr>
<td></td>
<td>AH 402 Animal Nutrition (4)</td>
</tr>
<tr>
<td></td>
<td>FM 322 Farm Management (4)</td>
</tr>
</tbody>
</table>

**MANUFACTURING OPTION (ADD COURSES BELOW TO BASIC CURRICULUM)**

<table>
<thead>
<tr>
<th>Year</th>
<th>Course Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Freshman</td>
<td>DH 132 Ice Cream Making (4)</td>
</tr>
<tr>
<td>Sophomore</td>
<td>DM 232 Cheese Making (4)</td>
</tr>
<tr>
<td></td>
<td>DM 236 Butter Making (4)</td>
</tr>
<tr>
<td></td>
<td>Bact 322 Dairy Bacteriology (4)</td>
</tr>
<tr>
<td>Junior</td>
<td>DM 331 Condensed and Dry Milk (4)</td>
</tr>
<tr>
<td></td>
<td>FM 304 Agricultural Marketing (3)</td>
</tr>
<tr>
<td></td>
<td>IR 311 Industrial Management (3)</td>
</tr>
<tr>
<td>Senior</td>
<td>DM 431 Dairy Plant Management (4)</td>
</tr>
<tr>
<td></td>
<td>Actg 221 Principles of Accounting (4)</td>
</tr>
<tr>
<td></td>
<td>Actg 222 Principles of Accounting (4)</td>
</tr>
</tbody>
</table>

* To be selected from General Education list. Include at least one course in literature.
† 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 a minimum of supervision. Projects typical of problems which graduates must solve in their fields of employment. Project results are presented in a formal report. Minimum 120 hours total time.

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

<table>
<thead>
<tr>
<th>Level</th>
<th>Course</th>
<th>F</th>
<th>W</th>
<th>S</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Freshman</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Introduction to Farm Management (FM 104, 105, 106)</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>Agricultural Mechanics (AE 121, 122)</td>
<td>2</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Agricultural Mathematics (Math 102, 103)</td>
<td>3</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Freshman Composition (Eng 104, 105)</td>
<td>3</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Public Speaking (Sp 201)</td>
<td>2</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Physical Education (PE 141)</td>
<td>½</td>
<td>½</td>
<td>½</td>
</tr>
<tr>
<td></td>
<td>Health Education (PE 107)</td>
<td>2</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>General Botany (Bot 121)</td>
<td>4</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>General Zoology (Zoo 131)</td>
<td>4</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Electives</td>
<td>6</td>
<td>3</td>
<td>8</td>
</tr>
<tr>
<td></td>
<td></td>
<td>16½</td>
<td>16½</td>
<td>16½</td>
</tr>
<tr>
<td><strong>Sophomore</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Agricultural Economic Analysis (FM 203)</td>
<td></td>
<td></td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>Agricultural Marketing (FM 304)</td>
<td></td>
<td>3</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Agricultural Resources (FM 305)</td>
<td></td>
<td></td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>Farm Records (FM 321)</td>
<td></td>
<td>3</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Soils (SS 121)</td>
<td></td>
<td>4</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Soils Management (SS 122)</td>
<td></td>
<td>4</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Principles of Economics (Ec 201, 202)</td>
<td></td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>Literature, Philosophy</td>
<td></td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>Report Writing (Eng 301)</td>
<td></td>
<td>3</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Basic Accounting (Actg 131, 132)</td>
<td>3</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Sports Education (PE 241)</td>
<td></td>
<td>½</td>
<td>½</td>
</tr>
<tr>
<td></td>
<td>Electives</td>
<td>1</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td></td>
<td>16½</td>
<td>16½</td>
<td>16½</td>
</tr>
</tbody>
</table>

*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.
Agriculture Division

Junior

<table>
<thead>
<tr>
<th>Course</th>
<th>F</th>
<th>W</th>
<th>S</th>
</tr>
</thead>
<tbody>
<tr>
<td>Farm Credit (FM 310)</td>
<td></td>
<td></td>
<td>3</td>
</tr>
<tr>
<td>Principles of Farm Management (FM 322)</td>
<td></td>
<td></td>
<td>4</td>
</tr>
<tr>
<td>Types of Farm Operation in California (FM 325)</td>
<td></td>
<td></td>
<td>3</td>
</tr>
<tr>
<td>Farm Appraisal (FM 326)</td>
<td></td>
<td></td>
<td>3</td>
</tr>
<tr>
<td>Crop Management Problems (FM 421)</td>
<td></td>
<td></td>
<td>3</td>
</tr>
<tr>
<td>General Psychology (Psy 202)</td>
<td></td>
<td></td>
<td>3</td>
</tr>
<tr>
<td>General Inorganic Chemistry (Chem 324, 325)</td>
<td></td>
<td></td>
<td>4</td>
</tr>
<tr>
<td>Organic Chemistry (Chem 326)</td>
<td></td>
<td></td>
<td>4</td>
</tr>
<tr>
<td>Descriptive Statistics (Math 211)</td>
<td></td>
<td></td>
<td>3</td>
</tr>
<tr>
<td>Statistical Methods (Math 212)</td>
<td></td>
<td></td>
<td>3</td>
</tr>
<tr>
<td>Business Law Survey (Bus 301)</td>
<td></td>
<td></td>
<td>3</td>
</tr>
<tr>
<td>Electives</td>
<td>3</td>
<td>4</td>
<td>3</td>
</tr>
</tbody>
</table>

Senior

<table>
<thead>
<tr>
<th>Course</th>
<th>F</th>
<th>W</th>
<th>S</th>
</tr>
</thead>
<tbody>
<tr>
<td>Agricultural Prices and Policy (FM 403)</td>
<td></td>
<td></td>
<td>3</td>
</tr>
<tr>
<td>Farm Management Problems (FM 424, or FM 425, or FM 426)</td>
<td></td>
<td></td>
<td>3</td>
</tr>
<tr>
<td>Large Farm Accounting (FM 431)</td>
<td></td>
<td></td>
<td>3</td>
</tr>
<tr>
<td>Senior Project (FM 461, 462)</td>
<td></td>
<td></td>
<td>2</td>
</tr>
<tr>
<td>Undergraduate Seminar (FM 463)</td>
<td></td>
<td></td>
<td>2</td>
</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>U.S. in World Affairs (Hist 305)</td>
<td></td>
<td></td>
<td>3</td>
</tr>
<tr>
<td>Electives</td>
<td>6</td>
<td>8</td>
<td>11</td>
</tr>
</tbody>
</table>

17 17 16

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 201, 202 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 202

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

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

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

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 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, reports and forecasting, governmental price control programs, price characteristics and problems of specific agricultural commodities. 3 lectures. Prerequisite: Ec 201

FM 406 Advanced Agricultural Economic Analysis (3)
Basic mathematical concepts; marginal analysis; maximization, minimization and basic differential calculus, linear programming 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.

**Operations**

The Operations Option emphasizes applied and theoretical knowledge of processing plant operations with related courses in equipment and engineering.

**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**

<table>
<thead>
<tr>
<th>Freshman</th>
<th>F</th>
<th>W</th>
<th>S</th>
</tr>
</thead>
<tbody>
<tr>
<td>Survey of Food Industry (FI 101)</td>
<td>2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Food Processing Machinery (FI 122)</td>
<td></td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Elements of Food Processing (FI 123)</td>
<td></td>
<td></td>
<td>3</td>
</tr>
<tr>
<td>Freshman Composition (Eng 104, 105)</td>
<td></td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Introduction to Literature (Eng 207)</td>
<td></td>
<td></td>
<td>2</td>
</tr>
<tr>
<td>Basic Mathematics for General Education (Math 100, 200)</td>
<td>3</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Introductory Physics (Phys 104)</td>
<td></td>
<td></td>
<td>4</td>
</tr>
<tr>
<td>Agricultural Mechanics (AE 121 or AE 128)</td>
<td>2</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>Electives and courses to complete major</td>
<td>6</td>
<td>7</td>
<td>7</td>
</tr>
<tr>
<td></td>
<td>16½</td>
<td>16½</td>
<td>16½</td>
</tr>
</tbody>
</table>
### Agriculture Division

#### Sophomore

<table>
<thead>
<tr>
<th>Course</th>
<th>F</th>
<th>W</th>
<th>S</th>
</tr>
</thead>
<tbody>
<tr>
<td>Food Processing Operations (FI 221, 222, 223)</td>
<td>3</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>Sanitation and Waste Disposal (FI 232)</td>
<td></td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Processed Food Inspection (FI 233)</td>
<td></td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Mathematics of Business (Math 215)</td>
<td></td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>Boilers and Steam Equipment in Agriculture (AC 237)</td>
<td></td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>Refrigeration in Agriculture (AC 238, 239)</td>
<td></td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>Basic Accounting (Acctg 131, 132)</td>
<td></td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Principles of Economics (Ec 201)</td>
<td></td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Public Speaking (Sp 201)</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>Electives and courses to complete major</td>
<td>2</td>
<td>6</td>
<td>5</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>16½</td>
<td>17½</td>
<td>16½</td>
</tr>
</tbody>
</table>

#### Junior

<table>
<thead>
<tr>
<th>Course</th>
<th>F</th>
<th>W</th>
<th>S</th>
</tr>
</thead>
<tbody>
<tr>
<td>Food Plant Quality Control (FI 321)</td>
<td>3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Statistical Quality Control (FI 332)</td>
<td></td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Packaging (FI 432)</td>
<td></td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>General Inorganic Chemistry (Chem 324, 325)</td>
<td>4</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>Organic Chemistry (Chem 326)</td>
<td></td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>General Bacteriology (Bact 221)</td>
<td></td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>General Psychology (Psy 202)</td>
<td></td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Health Education (PE 107)</td>
<td></td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>Industrial Relations (IR 312)</td>
<td></td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Electives and courses to complete major</td>
<td>6</td>
<td>4</td>
<td>6</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>16</td>
<td>16</td>
<td>17</td>
</tr>
</tbody>
</table>

#### Senior

<table>
<thead>
<tr>
<th>Course</th>
<th>F</th>
<th>W</th>
<th>S</th>
</tr>
</thead>
<tbody>
<tr>
<td>Food Production Control (FI 333)</td>
<td></td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>Senior Project (FI 461, 462)</td>
<td>2</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>Undergraduate Seminar (FI 463)</td>
<td></td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>Agricultural Biochemistry (Chem 328)</td>
<td></td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>American Government (Pol Sc 301)</td>
<td></td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Growth of American Democracy (Hist 304)</td>
<td></td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>U. S. in World Affairs (Hist 305)</td>
<td></td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Report Writing (Eng 301)</td>
<td></td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>* Literature or Philosophy</td>
<td>3</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Electives and courses to complete major</td>
<td>4</td>
<td>6</td>
<td>7</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>16</td>
<td>17</td>
<td>16</td>
</tr>
</tbody>
</table>

---

**MANAGEMENT OPTION**

(ADD COURSES BELOW TO BASIC CURRICULUM)

**Freshman**

<table>
<thead>
<tr>
<th>Course</th>
<th>F</th>
<th>W</th>
<th>S</th>
</tr>
</thead>
<tbody>
<tr>
<td>FP 230 California Fruit Growing (4)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>VC 230 General Vegetable Crops (4)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ABM 103 Ag Business Organization</td>
<td>(3)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Sophomore**

<table>
<thead>
<tr>
<th>Course</th>
<th>F</th>
<th>W</th>
<th>S</th>
</tr>
</thead>
<tbody>
<tr>
<td>ABM 203 Ag Business Credit and Finance</td>
<td>(3)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>MSM 204 Marketing Principles...</td>
<td>(3)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>DM 230 General Dairy Manufacturing</td>
<td>(4)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Junior**

<table>
<thead>
<tr>
<th>Course</th>
<th>F</th>
<th>W</th>
<th>S</th>
</tr>
</thead>
<tbody>
<tr>
<td>AE 323 Ag Products Handling...</td>
<td>(3)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Actg 223 Cost Accounting and Analysis</td>
<td>(4)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>or</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ABM 322 Advanced Ag Business Management</td>
<td>(4)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Senior**

<table>
<thead>
<tr>
<th>Course</th>
<th>F</th>
<th>W</th>
<th>S</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bus 301 Business Law Survey...</td>
<td>(3)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>FI 421 Advanced Food Processing</td>
<td>(4)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*To be selected from the General Education list.
OPERATIONS OPTION (ADD COURSES BELOW TO BASIC CURRICULUM)

Freshman
FP 230 California Fruit Growing (4)
VC 230 General Vegetable Crops (4)
ME 151-2-3 Engineering Drafting (3)
or
AE 133 Farm Drafting (2)
WM 141-2 Manufacturing Processes (2)
MFGP 151-2 Manufacturing Processes (2)

Sophomore
* Phys 121-2-3 College Physics (12)
DM 230 General Dairy Manufacturing (4)

Junior
AE 323 Ag Products Handling (3)
AE 324 Rural Electrification (3)
IR 311 Industrial Management (3)

Senior
FI 421 Advanced Food Processing (4)

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)

Sophomore
Zoo 131-2 General Zoology (8)
VS 123 Anatomy & Physiology (3)
FI 212 Meat Classification and Grading (2)

Junior
FI 338 Sausage, Smoked and Canned Meats (3)
IR 311 Industrial Management (3)

Senior
FI 431 Meat Technology (4)
VS 310 Zoonosis (2)

DESCRIPTIONS OF COURSES IN FOOD PROCESSING

Fl 101 Survey of Food Industry (2)
Introductory course including size, distribution, major production areas of the food processing industry. 2 lectures.

Fl 122 Food Processing Machinery (3)
Processing equipment selection, use, maintenance and repair. 2 lectures, 1 laboratory.

Fl 123 Elements of Food Processing (3)
Principles of food preservation including canning, freezing, dehydration and fermentation. 2 lectures, 1 laboratory.

Fl 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.

Fl 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.

Fl 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: Fl 210

* Phys 121 to be substituted for Phys 104.
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

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.

The organization, management and operation of a food plant sanitation and waste disposal program. 2 lectures, 1 laboratory.

Fundamentals, principles and procedures for inspecting processed foods based upon federal and state grades. Laboratory work in grading various products. 2 lectures, 1 laboratory.

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

The application of statistical methods in quality control programs and evaluation of operations. 2 lectures, 1 laboratory. Prerequisite: FI 221, 222, or 223

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.

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

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.

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. 3 lectures, 1 laboratory. Prerequisite: Junior standing and permission of instructor.

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.

Study of packaging materials, packages and packaging methods applicable to a variety of processed foods. 2 lectures, 1 laboratory.
FI 461, 462 Senior Project (2) (2)
Selection and completion of a project under a minimum of supervision. Projects typical of problems which graduates must solve in their fields of employment. Project results are presented in a formal report. Minimum 120 hours total time.

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 Agriculture Division which describes this program. Detailed curriculum information is available from the department head.

### CURRICULUM IN ORNAMENTAL HORTICULTURE

<table>
<thead>
<tr>
<th></th>
<th>F</th>
<th>W</th>
<th>S</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nursery Practice (OH 121)</td>
<td>4</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ornamental Shrubs (OH 122)</td>
<td></td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>Floriculture (OH 123)</td>
<td></td>
<td></td>
<td>4</td>
</tr>
<tr>
<td>Landscape Drafting (OH 124)</td>
<td></td>
<td></td>
<td>2</td>
</tr>
<tr>
<td>Orientation to Ornamental Horticulture (OH 100)</td>
<td></td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Agricultural Mechanics (AE 121, 122)</td>
<td></td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>Freshman Composition (Eng 104, 105, 106)</td>
<td>3</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>Agricultural Mathematics (Math 102, 103)</td>
<td></td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>Health Education (PE 107)</td>
<td></td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>Physical Education (PE 141)</td>
<td></td>
<td>½</td>
<td>½</td>
</tr>
<tr>
<td>General Botany (Bot 121, 123)</td>
<td></td>
<td>4</td>
<td>4</td>
</tr>
<tr>
<td>Herbaceous Landscape Plants (OH 126)</td>
<td></td>
<td></td>
<td>4</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>16½</td>
<td>16½</td>
<td>16½</td>
</tr>
</tbody>
</table>
### Sophomore

<table>
<thead>
<tr>
<th>Course</th>
<th>F</th>
<th>W</th>
<th>S</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ornamental Trees (OH 221)</td>
<td>4</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Principles of Landscape Design (OH 223)</td>
<td></td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>Plant Propagation (OH 233)</td>
<td></td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>General Entomology (Ent 126)</td>
<td></td>
<td></td>
<td>4</td>
</tr>
<tr>
<td>Soils (SS 121)</td>
<td></td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>Agricultural Surveying (AE 131)</td>
<td></td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>Tractors and Machinery (AE 141)</td>
<td></td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>Public Speaking (Sp 201)</td>
<td></td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Principles of Economics (Ec 201)</td>
<td></td>
<td>½</td>
<td>½</td>
</tr>
<tr>
<td>Sports Education (PE 241)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>General Psychology (Psy 202)</td>
<td></td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Plant Pathology (Bot 323)</td>
<td></td>
<td></td>
<td>4</td>
</tr>
<tr>
<td>General Bacteriology (Bact 221)</td>
<td></td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>* Electives</td>
<td>2</td>
<td>4</td>
<td>2</td>
</tr>
<tr>
<td>**</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>16½</td>
<td>16½</td>
<td></td>
<td>16½</td>
</tr>
</tbody>
</table>

### Junior

<table>
<thead>
<tr>
<th>Course</th>
<th>F</th>
<th>W</th>
<th>S</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fertilizers (SS 221)</td>
<td></td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Basic Accounting (Actg 131, 132)</td>
<td></td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>American Government (Pol Sc 301)</td>
<td></td>
<td></td>
<td>3</td>
</tr>
<tr>
<td>General Inorganic Chemistry (Chem 324, 325)</td>
<td></td>
<td>4</td>
<td>4</td>
</tr>
<tr>
<td>Organic Chemistry (Chem 326)</td>
<td></td>
<td></td>
<td>4</td>
</tr>
<tr>
<td>Genetics (Bio 303)</td>
<td></td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Business Law Survey (Bus 301)</td>
<td></td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>* Electives</td>
<td>7</td>
<td>7</td>
<td>6</td>
</tr>
<tr>
<td>**</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>17</td>
<td>17</td>
<td>17</td>
<td>16</td>
</tr>
</tbody>
</table>

### Senior

<table>
<thead>
<tr>
<th>Course</th>
<th>F</th>
<th>W</th>
<th>S</th>
</tr>
</thead>
<tbody>
<tr>
<td>Diseases and Pests (OH 327)</td>
<td>3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Native Plant Materials (Bot 238)</td>
<td></td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Arboriculture (OH 421)</td>
<td></td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>Senior Project (OH 461, 462)</td>
<td></td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>Undergraduate Seminar (OH 463)</td>
<td></td>
<td></td>
<td>2</td>
</tr>
<tr>
<td>§ Plant Breeding (CP 304)</td>
<td></td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Agricultural Biochemistry (Chem 328)</td>
<td></td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>** Management Elective</td>
<td></td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>§§ Literature, Philosophy</td>
<td></td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>Growth of American Democracy (Hist 304)</td>
<td></td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>U.S. in World Affairs (Hist 305)</td>
<td></td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Fruit Crops (FP 230, 322, or 332)</td>
<td></td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>* Electives</td>
<td>3</td>
<td></td>
<td>5</td>
</tr>
<tr>
<td>**</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>17</td>
<td>16</td>
<td>16</td>
<td>16</td>
</tr>
</tbody>
</table>

### 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 the General Education list.
§ Plant physiology (Bot 322) may substitute for this requirement.
§§ See General Education list. Include at least one course in literature.
OH 123 Floriculture (4)
The operating of greenhouses and other forcing structures. A study of the relationship of light, heat, temperature, and moisture to plant growth. 3 lectures, 1 laboratory. Prerequisite: OH 121

OH 124 Landscape Drafting (2)
Drafting techniques and standards progressing from tracings to light construction working drawings. 1 lecture, 1 laboratory.

OH 125 Flower Arrangement (4)
A study of the principles of flower arrangement and corsage making. 2 lectures, 2 laboratories.

OH 126 Herbaceous Landscape Plants (4)
The identification, habits of growth, and landscaping uses of ornamental annuals and herbaceous perennials commonly grown for California landscaping. 3 lectures, 1 laboratory. Prerequisite: OH 121, 122

OH 220 Home Landscaping (3)
Landscape design of urban and rural homes. Garden maintenance problems of landscaped properties. For non-horticulture majors. 2 lectures, 1 laboratory.

OH 221 Ornamental Trees (4)
Broadleaf trees grown and used in California. Identification, habits of growth, cultural requirements, and landscape use. 3 lectures, 1 laboratory.

OH 223 Principles of Landscape Design (4)
Basic principles of design related to landscape problems. 2 lectures, 2 laboratories. Prerequisite: OH 124

OH 225 Flower Judging (3)
Procedure and practice in score card grading of cut flower and pot plant classes. Commercial grades will be used as well as specimens generally grown by the amateur gardener. 1 lecture, 2 laboratories. Prerequisite: OH 121

OH 227 Flower Shop Management (4)
Practices and problems in the management of the retail flower shop with emphasis upon shop layout, window display, telegraph delivery services, buying, selling, and personnel relations. 2 lectures, 2 laboratories. Prerequisite: OH 125

OH 228 Advanced Flower Arrangement (4)
Advanced styling of floral designs including: wedding flowers, funeral designs, advanced corsages, hospital arrangements and baskets for all occasions. 2 lectures, 2 laboratories. Prerequisite: OH 227

OH 230 Ornamental Gardening (3)
For non-horticulture majors. A general course in ornamental horticulture with emphasis upon plant production. Includes budding, potting, seed sowing, transplanting, pest control, and the planting of lawns, trees, shrubs, and flower beds. 2 lectures, 1 laboratory.

OH 233 Plant Propagation (4)
Principles of asexual propagation. Budding, cutting, layering, division, and separation. 3 lectures, 1 laboratory. Prerequisite: OH 123

OH 321 Suburban Home Planning (4)
Principles of landscape design for residential properties. Designing of several small home properties. 2 lectures, 2 laboratories. Prerequisite: OH 122, 124, 221
OH 322  Landscape Design (4)
Principles of landscape design of public properties and the application of these principles in solving of landscape design problems. 2 lectures, 2 laboratories. Prerequisite: OH 223

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 (3)
A detailed study of diseases and pests of ornamental plants, their effect on plants, their prevention and control. 2 lectures, 1 laboratory. Prerequisite: OH 122, Ent 126, Bot 223

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 rooting, and making hardwood cuttings. Construction and operation of forcing structures. 3 lectures, 1 laboratory. Prerequisite: OH 233

OH 400  Special Problems for Advanced Undergraduates (1-2)
Individual or group investigation, research, studies, or surveys of selected problems. Total credit limited to 4 units, with a maximum of 2 units per quarter. Prerequisite: Permission of department head

OH 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 337

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

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 Agriculture Division which describes this program. Detailed curriculum information is available from the department head.

### CURRICULUM IN POULTRY INDUSTRY

<table>
<thead>
<tr>
<th>Course</th>
<th>F</th>
<th>W</th>
<th>S</th>
</tr>
</thead>
<tbody>
<tr>
<td>Poultry Industry Development (PI 121)</td>
<td>4</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Replacement Programs &amp; Broiler Production (PI 122)</td>
<td>4</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Poultry Feeding &amp; Nutrition (PI 123)</td>
<td></td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>Agricultural Mechanics (AE 121, 122)</td>
<td></td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>Feeds and Feeding (AH 101)</td>
<td></td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>Freshman Composition (Eng 104, 105, 106)</td>
<td>3</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>Agricultural Mathematics (Math 102, 103)</td>
<td></td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Health Education (PE 107)</td>
<td></td>
<td></td>
<td>2</td>
</tr>
<tr>
<td>Physical Education (PE 141)</td>
<td>½</td>
<td>½</td>
<td>½</td>
</tr>
<tr>
<td>General Zoology (Zoo 131, 132)</td>
<td>4</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>General Botany (Bot 121)</td>
<td></td>
<td></td>
<td>4</td>
</tr>
<tr>
<td>Electives</td>
<td></td>
<td></td>
<td>2</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>16 ½</strong></td>
<td><strong>16 ½</strong></td>
<td><strong>17 ½</strong></td>
</tr>
</tbody>
</table>
Agriculture Division

Sophomore

<table>
<thead>
<tr>
<th>Course Description</th>
<th>F</th>
<th>W</th>
<th>S</th>
</tr>
</thead>
<tbody>
<tr>
<td>Poultry Selection and Egg Production (PI 221)</td>
<td>2</td>
<td>3</td>
<td>2</td>
</tr>
<tr>
<td>Poultry Production Processing &amp; Marketing (PI 222)</td>
<td>2</td>
<td>3</td>
<td>2</td>
</tr>
<tr>
<td>Poultry Incubation (PI 223)</td>
<td>2</td>
<td>3</td>
<td>2</td>
</tr>
<tr>
<td>Poultry Plant Design &amp; Equipment (PI 233)</td>
<td>2</td>
<td>3</td>
<td>2</td>
</tr>
<tr>
<td>Agricultural Engineering</td>
<td>2</td>
<td>3</td>
<td>2</td>
</tr>
<tr>
<td>Poultry Anatomy and Physiology (PI 231)</td>
<td>3</td>
<td>4</td>
<td>4</td>
</tr>
<tr>
<td>Soils (SS 121)</td>
<td>2</td>
<td>3</td>
<td>2</td>
</tr>
<tr>
<td>Public Speaking (Sp 201)</td>
<td>2</td>
<td>3</td>
<td>2</td>
</tr>
<tr>
<td>Principles of Economics (Ec 201)</td>
<td>3</td>
<td>4</td>
<td>4</td>
</tr>
<tr>
<td>Social Sciences Elective</td>
<td>3</td>
<td>4</td>
<td>4</td>
</tr>
<tr>
<td>Sports Education (PE 241)</td>
<td>1/2</td>
<td>1/2</td>
<td>1/2</td>
</tr>
<tr>
<td>General Bacteriology (Bact 221)</td>
<td>3</td>
<td>4</td>
<td>4</td>
</tr>
<tr>
<td>Genetics (Bio 303)</td>
<td>3</td>
<td>4</td>
<td>4</td>
</tr>
<tr>
<td>General Psychology (Psy 202)</td>
<td>3</td>
<td>4</td>
<td>4</td>
</tr>
<tr>
<td>Business Management</td>
<td>3</td>
<td>4</td>
<td>4</td>
</tr>
<tr>
<td>Electives</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>Total</td>
<td>161/2</td>
<td>171/2</td>
<td>151/2</td>
</tr>
</tbody>
</table>

Junior

<table>
<thead>
<tr>
<th>Course Description</th>
<th>F</th>
<th>W</th>
<th>S</th>
</tr>
</thead>
<tbody>
<tr>
<td>Applied Poultry Breeding (PI 321)</td>
<td>3</td>
<td>4</td>
<td>4</td>
</tr>
<tr>
<td>Hatchery Business Organization (PI 322)</td>
<td>3</td>
<td>4</td>
<td>4</td>
</tr>
<tr>
<td>Poultry Hygiene and Flock Health (PI 303)</td>
<td>3</td>
<td>4</td>
<td>4</td>
</tr>
<tr>
<td>Agricultural Engineering</td>
<td>3</td>
<td>4</td>
<td>4</td>
</tr>
<tr>
<td>Literature, Philosophy</td>
<td>3</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>American Government (Pol Sc 301)</td>
<td>3</td>
<td>4</td>
<td>4</td>
</tr>
<tr>
<td>Growth of American Democracy (Hist 304)</td>
<td>3</td>
<td>4</td>
<td>4</td>
</tr>
<tr>
<td>General Inorganic Chemistry (Chem 324, 325)</td>
<td>3</td>
<td>4</td>
<td>4</td>
</tr>
<tr>
<td>Organic Chemistry (Chem 326)</td>
<td>3</td>
<td>4</td>
<td>4</td>
</tr>
<tr>
<td>Electives</td>
<td>3</td>
<td>4</td>
<td>4</td>
</tr>
<tr>
<td>Total</td>
<td>16</td>
<td>17</td>
<td>16</td>
</tr>
</tbody>
</table>

Senior

<table>
<thead>
<tr>
<th>Course Description</th>
<th>F</th>
<th>W</th>
<th>S</th>
</tr>
</thead>
<tbody>
<tr>
<td>Advanced Poultry Enterprise Supervision (PI 402)</td>
<td>3</td>
<td>4</td>
<td>4</td>
</tr>
<tr>
<td>Turkey Industry (PI 421)</td>
<td>3</td>
<td>4</td>
<td>4</td>
</tr>
<tr>
<td>Senior Project (PI 461, 462)</td>
<td>2</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>Undergraduate Seminar (PI 463)</td>
<td>2</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>Animal Nutrition (AH 402)</td>
<td>3</td>
<td>4</td>
<td>4</td>
</tr>
<tr>
<td>Management Elective</td>
<td>3</td>
<td>4</td>
<td>4</td>
</tr>
<tr>
<td>U. S. in World Affairs (Hist 305)</td>
<td>3</td>
<td>4</td>
<td>4</td>
</tr>
<tr>
<td>Agricultural Biochemistry (Chem 328)</td>
<td>3</td>
<td>4</td>
<td>4</td>
</tr>
<tr>
<td>Electives</td>
<td>11</td>
<td>5</td>
<td>7</td>
</tr>
<tr>
<td>Total</td>
<td>16</td>
<td>17</td>
<td>16</td>
</tr>
</tbody>
</table>

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.

** See General Education list. Include at least one course in literature.
† To be selected from the General Education list.
‡ To be selected from any 300-400 series course in ABM or FM.
§ To be selected from AE 131, 133, 134, 141, 231.
## To be selected from Bus 301, 310, IR 118, 311, 312.
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 lec-
ture, 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. Prereq-
usite: Bact 221, PI 231

PI 320 Poultry Consumer Education (2)
Buyer's guide for poultry products. Consumer grade standards of eggs and poul-
try meat. Surveys of live and market classes of poultry. Testing eggs and egg
products. The use of embryos and baby chicks for demonstration and teaching
in the classroom. 1 lecture, one 2-hour activity.

PI 321 Applied Poultry Breeding (3)
Genetic applications in the development of commercial poultry stocks for specific
productive designs. Application of commercial breeding techniques for flock im-
provement. 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 distribu-
tion 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 a minimum of supervision. Projects typical of problems which graduates must solve in their fields of employment. Project results are presented in a formal report: Minimum 120 hours total time.

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.
The objectives of this department are to prepare students for employment in the fields of Soil Science and to provide instruction in soil science courses for students in other departments of the College:

Courses in soil science have been developed with lecture, laboratory, and field coverage to provide fundamental knowledge of the subject and its application in agricultural production.

Completion of the four-year curriculum entitles the graduate to a bachelor of science degree in soil science. This curriculum has been designed to prepare individuals for employment in positions that require a wide knowledge of agriculture, such as vocational agricultural teachers, soil conservationists, land appraisers, fertilizer distributors, farm advisers, farm managers, or farm operators; and, highly specialized positions, such as that of soil surveyors, laboratory technicians, college instructors, and soil specialists.

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 soil management practices on the college farm are utilized to the fullest possible extent in the study of methods for putting soil knowledge to work. Practices of outstanding value on nearby ranches and those being carried on by public agencies are also widely utilized.

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

### CURRICULUM IN SOIL SCIENCE

<table>
<thead>
<tr>
<th>Freshman</th>
<th>F</th>
<th>W</th>
<th>S</th>
</tr>
</thead>
<tbody>
<tr>
<td>Soils (SS 121)</td>
<td>4</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Soil Management (SS 122)</td>
<td>4</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Soil Materials (SS 123)</td>
<td>3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Crop Production (CP 121 or 122 or 230 or VC 230)</td>
<td>4</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Animal Production (AH 230 or DH 230 or PI 230)</td>
<td>4</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Agricultural Mechanics (AE 121 or 122 or 141)</td>
<td>2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Freshman Composition (Eng 104, 105)</td>
<td>3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Agricultural Mathematics (Math 102, 103)</td>
<td>3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>General Botany (Bot 121, 122)</td>
<td>4</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Health Education (PE 107)</td>
<td>2</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>Electives</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>15½</td>
<td>16½</td>
<td>15½</td>
</tr>
</tbody>
</table>
### Sophomore

<table>
<thead>
<tr>
<th>Course</th>
<th>F</th>
<th>W</th>
<th>S</th>
</tr>
</thead>
<tbody>
<tr>
<td>Soil Conservation (SS 202)</td>
<td></td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Fertilizers (SS 221)</td>
<td></td>
<td></td>
<td>4</td>
</tr>
<tr>
<td>Range Management (AH 229)</td>
<td></td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Fruit Production (FP 131 or 132 or 230 or 332)</td>
<td></td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>Nursery Practices (OH 220 or 230)</td>
<td></td>
<td></td>
<td>3</td>
</tr>
<tr>
<td>Agricultural Surveying (AE 131)</td>
<td></td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>Mathematics (Math 100, 200 or 117 or 118)</td>
<td></td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>General Inorganic Chemistry (Chem 324, 325)</td>
<td></td>
<td>4</td>
<td>4</td>
</tr>
<tr>
<td>Organic Chemistry (Chem 326)</td>
<td></td>
<td></td>
<td>4</td>
</tr>
<tr>
<td>Principles of Economics (Ec 201)</td>
<td></td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>** Social Sciences Elective</td>
<td></td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>American Government (Pol Sc 301)</td>
<td></td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Growth of American Democracy (Hist 304)</td>
<td></td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Sports Education (PE 241)</td>
<td>½</td>
<td>½</td>
<td>½</td>
</tr>
<tr>
<td>Electives</td>
<td></td>
<td></td>
<td>2</td>
</tr>
</tbody>
</table>

**Total Units:** 17½ 17½ 17½

### Junior

<table>
<thead>
<tr>
<th>Course</th>
<th>F</th>
<th>W</th>
<th>S</th>
</tr>
</thead>
<tbody>
<tr>
<td>Soil Classification (SS 321)</td>
<td></td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>Soil Fertility (SS 322)</td>
<td></td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Land Use Planning (SS 433)</td>
<td></td>
<td></td>
<td>3</td>
</tr>
<tr>
<td>Farm Records (FM 321) or Basic Accounting (Actg 131)</td>
<td></td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Farm Management (FM 322)</td>
<td></td>
<td></td>
<td>4</td>
</tr>
<tr>
<td>Agricultural Biochemistry (Chem 328)</td>
<td></td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>General Bacteriology (Bact 221)</td>
<td></td>
<td></td>
<td>4</td>
</tr>
<tr>
<td>General Entomology (Ent 126)</td>
<td></td>
<td></td>
<td>3</td>
</tr>
<tr>
<td>U. S. in World Affairs (Hist 305)</td>
<td></td>
<td></td>
<td>3</td>
</tr>
<tr>
<td>Public Speaking (Sp 201)</td>
<td></td>
<td></td>
<td>2</td>
</tr>
<tr>
<td>Introduction to Literature (Eng 207)</td>
<td></td>
<td></td>
<td>2</td>
</tr>
<tr>
<td>* Electives</td>
<td>3</td>
<td>5</td>
<td>6</td>
</tr>
</tbody>
</table>

**Senior**

**Total Units:** 16 17 17

### Senior

<table>
<thead>
<tr>
<th>Course</th>
<th>F</th>
<th>W</th>
<th>S</th>
</tr>
</thead>
<tbody>
<tr>
<td>Soil Microbiology (SS 422)</td>
<td></td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Soil Chemistry (SS 423)</td>
<td></td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Soil Physics (SS 432)</td>
<td></td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>Senior Project (SS 461, 462)</td>
<td>2</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>Undergraduate Seminar (SS 463)</td>
<td></td>
<td></td>
<td>3</td>
</tr>
<tr>
<td>General Psychology (Psy 202)</td>
<td></td>
<td></td>
<td>3</td>
</tr>
<tr>
<td>Introduction to Philosophy (Phil 201)</td>
<td></td>
<td></td>
<td>3</td>
</tr>
<tr>
<td>** Literature</td>
<td></td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>† Management Elective</td>
<td></td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>* Electives</td>
<td>4</td>
<td>5</td>
<td>7</td>
</tr>
</tbody>
</table>

**Total Units:** 16 17 15

### 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

* Of the total elective units a minimum of 12 shall be chosen with the approval of the adviser.
** To be selected from the General Education list.
*** Bot 223 may be substituted.
† To be selected from any 300-400 series course in ABM or FM.
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.

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 a minimum of supervision. Projects typical of problems which graduates must solve in their fields of employment. Project results are presented in a formal report. Minimum 120 hours total time.
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 wood land. 2 lectures, 1 laboratory.
Veterinary science courses are offered to supplement the major work provided in the animal science departments of the Agricultural Division. 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
Strength of Materials Laboratory, Mechanical Engineering

Preparing to Run Test in Aero Stress Analysis Laboratory

Pneumatic Application of Concrete in Architectural Experimental Yard
THE ENGINEERING DIVISION
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>Freshman</th>
<th>F</th>
<th>W</th>
<th>S</th>
</tr>
</thead>
<tbody>
<tr>
<td>Power Plants (Aero 124)</td>
<td>3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Materials and Fabrication (Aero 125)</td>
<td></td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Aeronautical Laboratory (Aero 126)</td>
<td></td>
<td></td>
<td>3</td>
</tr>
<tr>
<td>Manufacturing Processes</td>
<td>2</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>Elements of Electronics (EL 101, 102)</td>
<td>2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Electronics Laboratory (EL 141, 142)</td>
<td>1</td>
<td></td>
<td>1</td>
</tr>
<tr>
<td>Mathematics for Engineers (Math 117)</td>
<td>5</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Analytic Geometry and Calculus (Math 118, 201)</td>
<td>5</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Engineering Drafting (ME 141, 142)</td>
<td>2</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>General Physics (Phys 131, 132)</td>
<td>4</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>Freshman Composition (Eng 104)</td>
<td>3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Health Education (PE 107)</td>
<td>2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Physical Education (PE 141)</td>
<td>½</td>
<td>½</td>
<td>½</td>
</tr>
</tbody>
</table>

* Manufacturing Processes AC 141, MFGP 141, MFGP 142, IE 141, WM 141, WM 142.
Sophomore

<table>
<thead>
<tr>
<th>Course</th>
<th>F</th>
<th>W</th>
<th>S</th>
</tr>
</thead>
<tbody>
<tr>
<td>Engineering Problems—Digital Computers (Aero 250)</td>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Engineering Problems—Analog Computers (Aero 252)</td>
<td></td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Fluid Mechanics Laboratory (Aero 253)</td>
<td></td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Strength of Materials (Aero 205, 206)</td>
<td>3</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Strength of Materials Laboratory (Aero 229)</td>
<td></td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Fluid Mechanics of Flight (Aero 203)</td>
<td></td>
<td></td>
<td>3</td>
</tr>
<tr>
<td>General Physics (Phys 133)</td>
<td></td>
<td></td>
<td>4</td>
</tr>
<tr>
<td>Analytic Geometry and Calculus (Math 202, 203)</td>
<td>3</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Freshman Composition (Eng 105, 106)</td>
<td></td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>Differential Equations (Math 316)</td>
<td></td>
<td></td>
<td>3</td>
</tr>
<tr>
<td>Engineering Statics (Phys 201)</td>
<td></td>
<td></td>
<td>3</td>
</tr>
<tr>
<td>Engineering Dynamics (Phys 202)</td>
<td></td>
<td></td>
<td>3</td>
</tr>
<tr>
<td>Introductory Circuit Analysis (EL 213)</td>
<td></td>
<td></td>
<td>3</td>
</tr>
<tr>
<td>Electronics Laboratory (EL 253)</td>
<td></td>
<td></td>
<td>1</td>
</tr>
<tr>
<td>Introduction to Literature (Eng 207)</td>
<td></td>
<td></td>
<td>2</td>
</tr>
<tr>
<td>Applied Biology (Bio 110)</td>
<td></td>
<td></td>
<td>3</td>
</tr>
<tr>
<td>Sports Education (PE 241)</td>
<td>½</td>
<td>½</td>
<td>½</td>
</tr>
<tr>
<td>Electives</td>
<td>3</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td></td>
<td>17½</td>
<td>18½</td>
<td>17½</td>
</tr>
</tbody>
</table>

Junior

<table>
<thead>
<tr>
<th>Course</th>
<th>F</th>
<th>W</th>
<th>S</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gas Thermodynamics (Aero 301)</td>
<td>3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Gas Dynamics (Aero 302)</td>
<td></td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Aerodynamics (Aero 303)</td>
<td></td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Stress Analysis (Aero 324, 325)</td>
<td>4</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>Differential Equations (Math 317)</td>
<td></td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>Electromechanics (EL 311)</td>
<td>3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Electromechanics Laboratory (EL 351)</td>
<td></td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Analog Computer Techniques (Aero 322)</td>
<td></td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>General Chemistry (Chem 321, 322)</td>
<td></td>
<td>4</td>
<td>4</td>
</tr>
<tr>
<td>Detail Design (Aero 344, 345)</td>
<td></td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>Principles of Economics (Ec 201)</td>
<td></td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>American Government (Pol Sc 301)</td>
<td></td>
<td></td>
<td>3</td>
</tr>
<tr>
<td>†Literature or Philosophy</td>
<td></td>
<td></td>
<td>3</td>
</tr>
<tr>
<td>General Psychology (Psy 202)</td>
<td></td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>Aircraft Performance Laboratory (Aero 346)</td>
<td></td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>Missile Performance Laboratory (Aero 349)</td>
<td></td>
<td></td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>18</td>
<td>19</td>
<td>17</td>
</tr>
</tbody>
</table>

Senior

<table>
<thead>
<tr>
<th>Course</th>
<th>F</th>
<th>W</th>
<th>S</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mechanical Vibrations in Flight (Aero 410)</td>
<td>4</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Propulsion Systems (Aero 401, 402)</td>
<td></td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>Supersonic Aerodynamics (Aero 404)</td>
<td>3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Aerodynamics of Stability and Control (Aero 415)</td>
<td></td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Missile and Aircraft Design Laboratory (Aero 444, 445, 446)</td>
<td>2</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>*Senior Electives</td>
<td>3</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Senior Project (Aero 461, 462)</td>
<td>2</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>Undergraduate Seminar (Aero 463)</td>
<td></td>
<td></td>
<td>2</td>
</tr>
<tr>
<td>**Industrial Management (IR 311)</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>U. S. in World Affairs (Hist 305)</td>
<td></td>
<td></td>
<td>3</td>
</tr>
<tr>
<td>Electives</td>
<td>3</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td></td>
<td>17</td>
<td>16</td>
<td>17</td>
</tr>
</tbody>
</table>

* Senior Aero electives:
  6 units to be selected from the following sequences:
  Aero 412, 413; Aero 457, 458; Aero 403, 408; Aero 409, 411; Aero 409, 416.

** Industrial Relations (IR 312) may be substituted.
† To be selected from the General Education list.
**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. 3 lectures.

**Aero 124 Power Plants (3)**

**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 117

**Aero 203 Fluid Mechanics of Flight (3)**
The properties and characteristics of fluids. Fluid statics and dynamics. Energy flow. Dimensional analysis. Laminar and turbulent flow in systems. 3 lectures. Prerequisite: Math 201, Phys 131

**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: Phys 201

**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 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 201

**Aero 252 Engineering Problems—Analog Computers (1)**
Solution of selected engineering problems by means of analog computers. 1 laboratory. Prerequisite: Math 201
Aero 253  Fluid Mechanics Laboratory (1)
The study of the flow of fluids in systems and elementary wind tunnel testing at subsonic speeds. 1 laboratory. Concurrent: Aero 203

Aero 301  Gas Thermodynamics (3)
Fundamental thermodynamic relationships among gas pressure, temperature, specific volume, enthalpy and entropy. Cycle applications to aircraft and missile propulsive units. 3 lectures. Prerequisite: Aero 203, Phys 132

Aero 302  Gas Dynamics (3)
Properties of subsonic, transonic and supersonic flow characteristics of normal and oblique shock waves, expansion waves. Pressure on surfaces in a supersonic airstream by approximate and exact methods. 3 lectures. Prerequisite: Aero 301

Aero 303  Aerodynamics (3)
The atmosphere, airspeed determinations, types of fluid flow, fluid friction, airfoil theory, wing theory, induced drag, parasite drag, power, propeller theory. 3 lectures. Prerequisite: Aero 302

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 203, Aero 206

Aero 344, 345  Detail Design (2) (2)
Detail and assembly drawings of aircraft and missile components in accordance with standards and practices of the aerospace industry. Design practice in sheet metal, forging, casting and machining problems. Elementary strength calculations and use of industry manuals, handbooks, and material specifications. 2 laboratories. Prerequisite: ME 142, Aero 206

Aero 346  Aircraft Performance Laboratory (2)
Determination of performance characteristics of subsonic and supersonic aircraft by means of analytical and graphical methods. 2 laboratories. Prerequisite: Aero 302. Concurrent: Aero 303

Aero 349  Missile Performance Laboratory (2)
Determination of performance characteristics of missiles and space vehicles, trajectory analysis and re-entry problems by analytical and graphical methods. 2 laboratories. Prerequisite: Aero 302. Concurrent: Aero 303

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 302
Aero 403  Rocket Propulsion (3)

Aero 404  Supersonic Aerodynamics (3)
Two-dimensional analysis of supersonic flow, flow in a duct, normal shocks, Prandtl-Meyer expansion and oblique shock. Thin airfoils, transonic conditions. Supersonic wind tunnels, test methods. 3 lectures. Prerequisite: Aero 303

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 402, 415

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 316

Aero 411  Rotary Wing Aircraft (3)
Introduction to the analysis of rotating wing aircraft. Hovering, vertical and translational flights. Types of flight control mechanisms. Performance, stability and control of the complete aircraft. 3 lectures. Prerequisite: Aero 303

Aero 412  Space Technology (3)

Aero 413  Space Technology (3)

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 404

Aero 416  Aerodynamics of Performance (3)
Performance analysis of propeller driven and jet powered aircraft. Drag buildup from theory and experimental data. Variation in performance with change of aircraft configuration and propulsive units. 3 lectures. Prerequisite: Aero 404
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.

Aero 444, 445, 446  Missile and Aircraft Design Laboratory (2) (2) (2)
Preliminary layout of a typical transport aircraft and a space vehicle using the design and calculation techniques developed in Aero 346. Design of selected component structures and the preparation of the necessary drawings. 2 laboratories. Prerequisite: Aero 346

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.

Aero 463  Undergraduate Seminar (2)
Individual preparation, oral presentation, and group discussion of subjects of professional and/or technical scope. 2 lectures. Prerequisite: Senior standing.
AIR CONDITIONING AND REFRIGERATION ENGINEERING DEPARTMENT

Department Head, James M. McGrath
Ray Allen, Rodney G. Keif, William J. Phakides, Theodore G. Graves

The Air Conditioning and Refrigeration Engineering curriculum prepares students for those phases of engineering characteristic of the broad air conditioning industry. These phases deal 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.

The program of the Air Conditioning and Refrigeration Engineering Department places emphasis on both analysis and design. Supplementary to both is the basic work in drafting, shops, and laboratory. The department has modern, well-equipped laboratories and classrooms in which the work is organized to parallel closely the work done by engineers in the industry.

Graduates obtain employment primarily with consulting engineers, manufacturers, contractors, and governmental agencies.

Field trips are taken each year to the Los Angeles and San Francisco areas to study outstanding construction and engineering projects.

A student branch of the American Society of Heating, Refrigeration, and Air Conditioning Engineers offers an active program of professional and social activity.

CURRICULUM IN AIR CONDITIONING AND REFRIGERATION ENGINEERING

<table>
<thead>
<tr>
<th>Freshman</th>
<th>F</th>
<th>W</th>
<th>S</th>
</tr>
</thead>
<tbody>
<tr>
<td>Air Conditioning Drafting (AC 121, 122, 123)</td>
<td>2</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>Elements of Electronics (EL 101, 102)</td>
<td>2</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>Electronics Laboratory (EL 141, 142)</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>* Manufacturing Processes</td>
<td>2</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>Mathematics for Engineers (Math 117)</td>
<td>5</td>
<td>5</td>
<td>5</td>
</tr>
<tr>
<td>Analytic Geometry and Calculus (Math 118, 201)</td>
<td>3</td>
<td>4</td>
<td>4</td>
</tr>
<tr>
<td>General Physics (Phys 131, 132)</td>
<td>3</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>Duct Construction (AC 124)</td>
<td>3</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>Plumbing System Design (AC 131, 132, 133)</td>
<td>2</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>Applied Biology (Bio 110)</td>
<td>3</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>Physical Education (PE 141)</td>
<td>½</td>
<td>½</td>
<td>½</td>
</tr>
</tbody>
</table>

17½ 18½ 16½

<table>
<thead>
<tr>
<th>Sophomore</th>
<th>F</th>
<th>W</th>
<th>S</th>
</tr>
</thead>
<tbody>
<tr>
<td>Heating and Ventilating (AC 201, 202)</td>
<td>3</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>Thermal Laboratory (AC 241, 242)</td>
<td>2</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>Engineering Problems—Digital Computers (AC 250)</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Freshman Composition (Eng 104, 105)</td>
<td>3</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>Public Speaking (Sp 201)</td>
<td>3</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>Introduction to Literature (Eng 207)</td>
<td>2</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>Engineering Statics (Phys 201)</td>
<td>3</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>Engineering Dynamics (Phys 202)</td>
<td>4</td>
<td>4</td>
<td>4</td>
</tr>
<tr>
<td>General Physics (Phys 133)</td>
<td>4</td>
<td>4</td>
<td>4</td>
</tr>
<tr>
<td>General Chemistry (Chem 321, 322)</td>
<td>3</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>Analytic Geometry and Calculus (Math 202, 203)</td>
<td>3</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>Differential Equations (Math 316)</td>
<td>3</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>Strength of Materials (ME 202)</td>
<td>2</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>Health Education (PE 107)</td>
<td>½</td>
<td>½</td>
<td>½</td>
</tr>
<tr>
<td>Sports Education (PE 241)</td>
<td>½</td>
<td>½</td>
<td>½</td>
</tr>
</tbody>
</table>

18½ 18½ 17½

* Manufacturing Processes AC 141, MFGP 141, MFPG 142, IE 141, WM 141, WM 142.
Junior

Thermodynamics of Refrigeration (AC 301, 302, 303) 3 3 3
Noise and Vibration Control (AC 307, 308) 2 2 2
Thermal and Fluid Laboratory (AC 331, 332, 333) 2 2 2
System Design (AC 341, 342, 343) 2 2 2
Electrical Engineering (EE 207, 208) 3 3
Electrical Engineering Laboratory (EE 251, 252) 1 1
Electronic Engineering (EL 321) 3
Electronic Engineering Laboratory (EL 354) 1
General Chemistry (Chem 323) 4
Heat Transfer (AC 313) 3
Fluid Flow (ME 311) 3 2
Electives

Senior

Advanced Heat and Vapor Transfer (AC 401) 3 3
Advanced Fluid Flow (AC 402) 3
Control Systems (AC 403) 2
Air Conditioning System Design (AC 441, 442, 443) 3 3 3
Senior Project (AC 461, 462) 2 2
Undergraduate Seminar (AC 463) 2
General Psychology (Psy 202) 3
American Government (Pol Sc 301) 3
Growth of American Democracy (Hist 304) 3
U.S. in World Affairs (Hist 305) 3
Principles of Economics (Ec 201) 3
Business Law Survey (Bus 301) 3
† Literature or Philosophy 3
Electives 4 4 2

17 16 16

DESIGNATIONS OF COURSES IN AIR CONDITIONING

AC 118 Orientation (2)
A survey of the applications of refrigeration and air conditioning, and a study of the qualifications required for various positions in the industry. 2 lectures.

AC 121, 122, 123 Air Conditioning Drafting (2) (2) (2)
Principles and practice of mechanical and architectural drafting applied to the installation of equipment, piping, and sheet metal. 1 lecture, 1 laboratory.

AC 124 Duct Construction (3)
Materials and techniques of low and high velocity duct construction. 1 lecture, 2 laboratories. Prerequisite: AC 121

AC 131, 132, 133 Plumbing System Design (2) (2) (2)
Materials, principles, and techniques used in designing and installing water and waste systems, fire protection, sprinkler systems, and gas service for commercial and industrial buildings; study of building, safety, and health codes. 1 lecture, 1 laboratory.

AC 141 Manufacturing Processes (1)
Light gauge metal fabrication by spinning, rolling, bending, stretching, drawing; joining by soldering, riveting, and adhesives. 1 laboratory.

AC 201, 202 Heating and Ventilating (3) (3)
The study of heating and ventilating equipment and its application to industrial and public buildings. 3 lectures. Prerequisite: Phys 132. Concurrent: Chem 321, 322

† To be selected from the General Education list.
AC 237  Boilers and Steam Equipment in Agriculture (2)

The operation and maintenance of steam equipment as applied to the agricultural industry. Course designed for students of the Agriculture Division. 2 lectures.

AC 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 of the Agriculture Division. 2 lectures, winter; 1 lecture, 1 laboratory, spring.

AC 240  Additional Engineering Laboratory (1-2)

Elective project work. Total credit limited to 4 units with not more than 2 units in any one quarter. 1 or 2 laboratories. Prerequisite: AC 124

AC 241, 242  Thermal Laboratory (2) (2)

Operation and maintenance of refrigeration systems. Instrument familiarization and calibration. Fundamental tests related to the heating, refrigeration, and air conditioning field. Performance test. 1 lecture, 1 laboratory. Prerequisite: Phys 132. Concurrent: AC 201, 202

AC 250  Engineering Problems—Digital Computers (1)

Solution of selected engineering problems by means of digital computers. 1 laboratory. Prerequisite: Math 201

AC 301, 302, 303  Thermodynamics of Refrigeration (3) (3) (3)

Basic Thermodynamics. Equations of state, laws, processes, and cycles including Rankine, Brayton, Compressor, Otto, and Diesel. Thermodynamic analysis of the following refrigeration systems and their components: Single stage vapor, multiple stage cascade, multiple stage compound, air, steam jet, and absorption. Refrigeration controls. Low temperature refrigeration. 3 lectures. Prerequisite: AC 202, Phys 133, Chem 322

AC 306  Survey of Heating and Air Conditioning (3)

Basic principles concerning comfort, health, load calculations and the space required for pipes, ducts, and equipment. Course designed for engineering majors other than air conditioning and refrigeration majors. 3 lectures.

AC 307, 308  Noise and Vibration Control (2) (2)

Noise and vibration through various media, simple and damped harmonic motion, elastic bases, architectural acoustics, noise and vibration prevention and attenuation in air conditioning systems. 2 lectures. Prerequisite: Phys 133, Math 203

AC 313  Heat Transfer (3)

Basic principles of heat transfer, radiation, conduction during steady state conditions, convection with gases and liquids, boiling and condensing of fluids during forced and gravity flow conditions. 3 lectures. Prerequisite: ME 311

AC 324, 325  Air Pollution and Its Measurement (3) (3)

Particulate matter and its analysis; vapors and gases and their analyses; photochemical smog; odors; radioactivity; the effect of air pollution on human health; the effect of air pollution on vegetation and farm animals. 2 lectures, 1 laboratory. Prerequisite: Chem 323

AC 331, 332, 333  Thermal and Fluid Laboratory (2) (2) (2)

Laboratory tests in controls, thermodynamics, fluid flow, heat transfer and vibration. Performance testing of refrigeration systems, evaporators, condensers, fans, air washers, boilers, grilles, etc. 1 lecture, 1 laboratory, fall and winter; 2 laboratories, spring. Prerequisite: AC 202, 242. Concurrent: AC 301, 302, 303

AC 341, 342, 343  System Design (2) (2) (2)

Individual project work in planning of commercial and industrial heating and refrigeration systems. 2 laboratories. Prerequisite: AC 202. Concurrent: AC 307, 308
AC 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.

AC 401 Advanced Heat and Vapor Transfer (3)

Transient heat flow, thermal storage, and cooling load, the mass transfer principle applied to combined heat and vapor transfer, selection of heat and vapor transfer equipment. 3 lectures. Prerequisite: AC 313

AC 402 Advanced Fluid Flow (3)

Centrifugal equipment design and performance loss coefficients for high velocity flow, the design of high velocity air conduits as applied to aeronautical, marine or public building air conditioning systems. 3 lectures. Prerequisite: ME 311

AC 403 Control Systems (2)

Circuit and thermodynamic analysis of electrical, electronic and pneumatic controls in air conditioning and refrigeration systems. 2 lectures. Prerequisite: AC 442

AC 411 Air Pollution Control (3)

Air purification within structures, smog control, and the filtration of radioactive fall-out. An elective course primarily for air conditioning, architectural and mechanical juniors or seniors. 3 lectures. Prerequisite: Phys 133, Chem 323

AC 421, 422, 423 Air Pollution Control Methods (3) (3) (3)

Study of equipment designed to reduce the pollutants entering the atmosphere including: electric precipitators, bag houses, activated charcoal absorbers, double chamber incinerators, cyclonic separators, catalytic combustion units, automotive devices, etc. 2 lectures, 1 laboratory. Prerequisite: AC 325

AC 441, 442, 443 Air Conditioning System Design (3) (3) (3)

Individual project work in planning of commercial and industrial air conditioning systems. 1 lecture, 2 laboratories. Prerequisite: AC 343. Concurrent: AC 401

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

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

AC 463 Undergraduate Seminar (2)

Special studies and technical developments in the field. Individual reports on important research in the refrigeration and air conditioning field. 2 lectures. Prerequisite: Senior standing.

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.
The Architecture and Architectural Engineering Department prepares graduates for careers in architecture and closely allied fields.

The educational preparation for the professional practice of architecture is a five-year curriculum culminating in the degree of Bachelor of Architecture. The department follows the national practice in this regard. The educational preparation for the professional practice of architectural engineering and related fields is a four-year curriculum culminating in the degree of Bachelor of Science in Architectural Engineering. The curriculum has major emphasis on structural engineering but is broad enough to provide entry into most phases of the construction industry.

The first two years of the curricula for Architecture and Architectural Engineering are identical. The student makes his choice of degree at the beginning of the junior year. He is given careful counseling by the faculty in making his selection. Additional work may be elected which will permit the graduates of both programs to enter the field of city planning.

The department facilities include design laboratories, dark room, calculator room, soils laboratory, stress laboratory, shops, construction yard, and project yard. An outlying area of several acres is available for extensive experimental construction of a semi-permanent nature.

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

### CURRICULUM IN ARCHITECTURE AND ARCHITECTURAL ENGINEERING

<table>
<thead>
<tr>
<th>Course</th>
<th>F</th>
<th>W</th>
<th>S</th>
</tr>
</thead>
<tbody>
<tr>
<td>Introduction to Architectural Design (Arch 111, 132, 143)</td>
<td>2</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>Introduction to Drawing and Perspective (Arch 144)</td>
<td>3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Delineation (Arch 145, 146)</td>
<td></td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>Freehand Drawing (Arch 140)</td>
<td></td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Materials of Construction (Arch 106)</td>
<td></td>
<td></td>
<td>3</td>
</tr>
<tr>
<td>Mathematics for Engineers (Math 117)</td>
<td></td>
<td></td>
<td>5</td>
</tr>
<tr>
<td>Analytic Geometry and Calculus (Math 118, 201)</td>
<td></td>
<td>5</td>
<td>3</td>
</tr>
<tr>
<td>General Physics (Phys 131, 132)</td>
<td></td>
<td></td>
<td>4</td>
</tr>
<tr>
<td>Applied Biology (Bio 110)</td>
<td></td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Freshman Composition (Eng 104, 105)</td>
<td></td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Public Speaking (Sp 201)</td>
<td></td>
<td></td>
<td>2</td>
</tr>
<tr>
<td>Physical Education (PE 141)</td>
<td></td>
<td>½</td>
<td>½</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>17½</td>
<td>16½</td>
<td>16½</td>
</tr>
</tbody>
</table>
### Sophomore

<table>
<thead>
<tr>
<th>Course</th>
<th>Fall</th>
<th>Winter</th>
<th>Spring</th>
</tr>
</thead>
<tbody>
<tr>
<td>Basic Design (Arch 251, 252, 253)</td>
<td>3</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>Architectural Practice (Arch 231, 232, 233)</td>
<td>3</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>Introduction to Urban Environment (Arch 211, 212)</td>
<td>2</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>Strength of Materials (Arch 205, 206)</td>
<td></td>
<td></td>
<td>3</td>
</tr>
<tr>
<td>Engineering Problems-Digital Computers (Arch 250)</td>
<td></td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Analytic Geometry and Calculus (Math 202, 203)</td>
<td></td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>General Physics (Phys 133)</td>
<td></td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>Health Education (PE 107)</td>
<td></td>
<td></td>
<td>2</td>
</tr>
<tr>
<td>Engineering Surveying (AE 237)</td>
<td></td>
<td></td>
<td>2</td>
</tr>
<tr>
<td>Introduction to Literature (Eng 207)</td>
<td></td>
<td></td>
<td>2</td>
</tr>
<tr>
<td>Principles of Economics (Ec 201)</td>
<td></td>
<td></td>
<td>3</td>
</tr>
<tr>
<td>General Chemistry (Chem 321)</td>
<td></td>
<td></td>
<td>4</td>
</tr>
<tr>
<td>Sports Education (PE 241)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>½</td>
<td>½</td>
<td>½</td>
</tr>
<tr>
<td></td>
<td>17½</td>
<td>17½</td>
<td>18½</td>
</tr>
</tbody>
</table>

### CURRICULUM IN ARCHITECTURE

#### Junior

<table>
<thead>
<tr>
<th>Course</th>
<th>Fall</th>
<th>Winter</th>
<th>Spring</th>
</tr>
</thead>
<tbody>
<tr>
<td>Architectural Design (Arch 351, 352, 353)</td>
<td>4</td>
<td>4</td>
<td>4</td>
</tr>
<tr>
<td>Architectural Practice (Arch 341, 342, 343)</td>
<td>2</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>History of Architecture (Arch 317, 318, 319)</td>
<td>2</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>Stress Analysis (Arch 304)</td>
<td></td>
<td></td>
<td>3</td>
</tr>
<tr>
<td>Steel and Timber Structures (Arch 305, 306)</td>
<td></td>
<td></td>
<td>3</td>
</tr>
<tr>
<td>Stress Analysis Laboratory (Arch 344)</td>
<td></td>
<td></td>
<td>1</td>
</tr>
<tr>
<td>City Planning Laboratory (Arch 348, 349)</td>
<td></td>
<td></td>
<td>1</td>
</tr>
<tr>
<td>Electrical Systems Design (EE 324)</td>
<td></td>
<td></td>
<td>3</td>
</tr>
<tr>
<td>Plumbing and Building Sanitation (ME 333)</td>
<td></td>
<td></td>
<td>3</td>
</tr>
<tr>
<td>Heating and Air Conditioning (AC 306)</td>
<td></td>
<td></td>
<td>3</td>
</tr>
<tr>
<td>Electives</td>
<td></td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>18</td>
<td>18</td>
<td>18</td>
</tr>
</tbody>
</table>

#### Senior

<table>
<thead>
<tr>
<th>Course</th>
<th>Fall</th>
<th>Winter</th>
<th>Spring</th>
</tr>
</thead>
<tbody>
<tr>
<td>Architectural Design (Arch 451, 452, 453)</td>
<td>5</td>
<td>5</td>
<td>5</td>
</tr>
<tr>
<td>Professional Practice (Arch 441, 442, 443)</td>
<td>2</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>Concrete and Masonry Structures (Arch 404, 405, 406)</td>
<td>2</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>Undergraduate Seminar (Arch 463)</td>
<td></td>
<td></td>
<td>2</td>
</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>U.S. in World Affairs (Hist 305)</td>
<td></td>
<td></td>
<td>3</td>
</tr>
<tr>
<td>Engineering Economy (IE 414)</td>
<td></td>
<td></td>
<td>3</td>
</tr>
<tr>
<td>*Electives</td>
<td></td>
<td>2</td>
<td>5</td>
</tr>
<tr>
<td></td>
<td>17</td>
<td>17</td>
<td>18</td>
</tr>
</tbody>
</table>

#### Fifth Year

<table>
<thead>
<tr>
<th>Course</th>
<th>Fall</th>
<th>Winter</th>
<th>Spring</th>
</tr>
</thead>
<tbody>
<tr>
<td>Architectural Design (Arch 551, 552, 553)</td>
<td>5</td>
<td>5</td>
<td>5</td>
</tr>
<tr>
<td>Design Project (Arch 571, 572, 573)</td>
<td>2</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>General Psychology (Psy 202)</td>
<td></td>
<td></td>
<td>3</td>
</tr>
<tr>
<td>Business Law Survey (Bus 301)</td>
<td></td>
<td></td>
<td>3</td>
</tr>
<tr>
<td><strong>Literature or Philosophy</strong></td>
<td></td>
<td></td>
<td>3</td>
</tr>
<tr>
<td>*Electives</td>
<td></td>
<td>5</td>
<td>5</td>
</tr>
<tr>
<td></td>
<td>15</td>
<td>15</td>
<td>15</td>
</tr>
</tbody>
</table>

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

** To be selected from the General Education list.
## CURRICULUM IN ARCHITECTURAL ENGINEERING

### Junior

<table>
<thead>
<tr>
<th>Course</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>Design Theory (Arch 314, 315, 316)</td>
<td>3</td>
</tr>
<tr>
<td>Architectural Practice (Arch 341, 342, 343)</td>
<td>2</td>
</tr>
<tr>
<td>Stress Analysis (Arch 304)</td>
<td>3</td>
</tr>
<tr>
<td>Steel and Timber Structures (Arch 305, 306)</td>
<td>3</td>
</tr>
<tr>
<td>Stress Analysis Laboratory (Arch 344)</td>
<td>1</td>
</tr>
<tr>
<td>Electrical Systems Design (EE 324)</td>
<td>3</td>
</tr>
<tr>
<td>Plumbing and Building Sanitation (ME 333)</td>
<td>3</td>
</tr>
<tr>
<td>Heating and Air Conditioning (AC 306)</td>
<td>3</td>
</tr>
<tr>
<td>Differential Equations (Math 316)</td>
<td>3</td>
</tr>
<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>Business Law Survey (Bus 301)</td>
<td>3</td>
</tr>
<tr>
<td>Electives</td>
<td>18</td>
</tr>
</tbody>
</table>

### Senior

<table>
<thead>
<tr>
<th>Course</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>Structural Design (Arch 444, 445, 446)</td>
<td>5</td>
</tr>
<tr>
<td>Design Theory (Arch 401, 402, 403)</td>
<td>2</td>
</tr>
<tr>
<td>General Engineering (Arch 414, 415, 416)</td>
<td>2</td>
</tr>
<tr>
<td>Soil Mechanics and Foundations (Arch 421, 422)</td>
<td>3</td>
</tr>
<tr>
<td>Senior Project (Arch 461, 462)</td>
<td>2</td>
</tr>
<tr>
<td>Undergraduate Seminar (Arch 463)</td>
<td>3</td>
</tr>
<tr>
<td>General Psychology (Psy 202)</td>
<td></td>
</tr>
<tr>
<td><strong>Literature or Philosophy</strong></td>
<td></td>
</tr>
<tr>
<td>Electives</td>
<td>18</td>
</tr>
</tbody>
</table>

**Total: 48 units**

### 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.

**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

**Arch 140 Freehand 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

**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.

**To be selected from the General Education list.**
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 144

Arch 153  Industrial Presentation Techniques (2)

Graphic presentation for industrial engineers. Symbols, techniques, and freehand drawing. Construction drawings and flow diagraming. 2 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 201

Arch 211, 212, 213  Introduction to Urban Environment (2) (2) (2)

History and analysis of events and social factors which have influenced the physical growth of cities. Evolution of city planning as a profession. Community organization and current city planning practices. 2 lectures. Prerequisite: Eng 106

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, 144

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 250  Engineering Problems—Digital Computers (1)

Solution of selected engineering problems by means of digital computers. 1 laboratory. Prerequisite: Math 201

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

Arch 304  Stress Analysis (3)

Stress analysis of statically determinate and indeterminate structures. 3 lectures. Prerequisite: Arch 206

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

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 (3) (3) (3)

For engineering students. Studies in architectural design with emphasis on structural relationships. 3 lectures. Prerequisite: Arch 253

Arch 317, 318, 319  History of Architecture (2) (2) (2)

Periods of architecture; philosophies and conditions which influenced them. 2 lectures. Prerequisite: Eng 106
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. One designated field trip required. 2 laboratories. Prerequisite: Arch 233

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, Chem 321

Arch 348, 349  City Planning Laboratory (1) (1)
Application of city planning theory and principles to classroom and field problems. 1 laboratory. Prerequisite: Arch 212

Arch 351, 352, 353  Architectural Design (4) (4) (4)
Continuation of Arch 253. Development of logical analysis and creative abilities through application of skills to the solution of architectural problems. 4 laboratories. Prerequisite: Arch 206, 233, 253

Arch 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 203; Phys 133

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 316; 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 316; Phys 133; Chem 321

Arch 423  Experimental Stress Analysis (3)
Stress determination by model analysis. Brittle coatings, photoelastic methods and strain gages. 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 laboratories. 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. 5 laboratories. Prerequisite: Arch 306, 343, 344; Math 316
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 a minimum of 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 two-hour meetings. Prerequisite: Arch 462

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 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
The program in Electrical Engineering prepares the student for a career in the technological utilization of electric energy.

With a continuing emphasis on design and creativity, a careful curricular balance of the humanities, social and physical sciences, mathematics, and engineering disciplines is maintained with integration of mechanisms, materials, energy, men and environment.

The electrical engineering courses deal with electric and magnetic fields and waves; machines, energy conversion and transfer; instrumentation; information generation, conversion, transmission and reduction; automatic control and computers.

The freshman year introduces the student to the basic concepts of electrical engineering and gives him training in handling electrical devices and equipment in the shop and laboratory.

Beginning with the sophomore and extending into the senior year, the student advances his understanding of electrical engineering through classroom and laboratory study and gains application experience with devices, networks and systems, progressing from the simple to the complex as his supporting course work attains higher levels of sophistication.

A large portion of the senior year is devoted to individual and independent study, seminars, elective courses and is culminated in a senior project, which is an investigative study or development in an area of special interest to the student. It often results in the design and construction of a useful device (sometimes patentable) or the simulation and study of a problem on a mathematical or physical model such as a computer.

Attention is called to courses EE 104, 154, 204, 205, 244, and 255 which are especially structured to assist junior college transfer students in their transition into the department curriculum.

The life of the student may be enriched by participation 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>Course Description</th>
<th>F</th>
<th>W</th>
<th>S</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fundamentals of Electrical Engineering (EE 101, 102, 103)</td>
<td>2</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>Electric Shop (EE 141)</td>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Electrical Design Graphics (EE 146)</td>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Orientation (EE 151)</td>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Laboratory Techniques (EE 152)</td>
<td></td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Circuits Laboratory (EE 153)</td>
<td></td>
<td></td>
<td>1</td>
</tr>
<tr>
<td>Engineering Drafting (ME 151, 152)</td>
<td>1</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Manufacturing Processes</td>
<td>2</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>Mathematics for Engineers (Math 117)</td>
<td>5</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Analytic Geometry and Calculus (Math 118, 201)</td>
<td>5</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>General Physics (Phys 131, 132)</td>
<td>4</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>Freshman Composition (Eng 104, 105, 106)</td>
<td>3</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>Health Education (PE 107)</td>
<td>2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Physical Education (PE 141)</td>
<td>½</td>
<td>½</td>
<td>½</td>
</tr>
</tbody>
</table>

* AC 141, MFGP 141, MFGP 142, IE 141, WM 141, WM 142.
## SOPHOMORE

<table>
<thead>
<tr>
<th>Course</th>
<th>F</th>
<th>W</th>
<th>S</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fundamentals of Electrical Engineering (EE 201, 202, 203)</td>
<td>3</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>Electric Laboratory (EE 241, 242, 243)</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Electric Shop (EE 253)</td>
<td></td>
<td></td>
<td>1</td>
</tr>
<tr>
<td>Engineering Problems—Digital Computers (EE 250)</td>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Analytic Geometry and Calculus (Math 202, 203)</td>
<td>3</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>Differential Equations (Math 316)</td>
<td></td>
<td>4</td>
<td>4</td>
</tr>
<tr>
<td>General Chemistry (Chem 321, 322)</td>
<td></td>
<td>4</td>
<td>4</td>
</tr>
<tr>
<td>Introduction to Optics and Atomic Physics (Phys 211)</td>
<td></td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Engineering Statics (Phys 201)</td>
<td></td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Engineering Dynamics (Phys 202)</td>
<td></td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Strength of Materials (ME 202, 203)</td>
<td>3</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Introduction to Literature (Eng 207)</td>
<td></td>
<td></td>
<td>2</td>
</tr>
<tr>
<td>Applied Biology (Bio 110)</td>
<td></td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Sports Education (PE 241)</td>
<td></td>
<td>½</td>
<td>½</td>
</tr>
</tbody>
</table>

**Total:** 18 ½

## JUNIOR

<table>
<thead>
<tr>
<th>Course</th>
<th>F</th>
<th>W</th>
<th>S</th>
</tr>
</thead>
<tbody>
<tr>
<td>Distributed Constant Circuits (EE 301)</td>
<td>3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Network Synthesis (EE 302)</td>
<td></td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Transients (EE 303)</td>
<td>3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Circuits Laboratory (EE 342, 343)</td>
<td></td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Energy Conversion (EE 304)</td>
<td></td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>Electromagnetic Machines (EE 305, 306)</td>
<td>3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Electric Machines Laboratory (EE 344, 345, 346)</td>
<td>3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Electronics (EE 314, 315, 316)</td>
<td>3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Electronics Shop (EE 354)</td>
<td></td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Electronics Laboratory (EE 355, 356)</td>
<td></td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Differential Equations (Math 317)</td>
<td></td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>Advanced Engineering Mathematics (Math 319)</td>
<td></td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>American Government (Pol Sc 301)</td>
<td>3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Growth of American Democracy (Hist 304)</td>
<td></td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>U. S. in World Affairs (Hist 305)</td>
<td></td>
<td></td>
<td>3</td>
</tr>
<tr>
<td>Principles of Economics (Ec 201)</td>
<td></td>
<td></td>
<td>3</td>
</tr>
<tr>
<td><strong>Industrial Management (IR 311)</strong></td>
<td></td>
<td>3</td>
<td></td>
</tr>
</tbody>
</table>

**Total:** 18

## SENIOR

<table>
<thead>
<tr>
<th>Course</th>
<th>F</th>
<th>W</th>
<th>S</th>
</tr>
</thead>
<tbody>
<tr>
<td>Control Systems (EE 401)</td>
<td>3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Digital Computers (EE 403)</td>
<td></td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>Digital Computers Laboratory (EE 443)</td>
<td></td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Electrical Engineering Design (EE 422)</td>
<td></td>
<td>5</td>
<td></td>
</tr>
<tr>
<td>Control Systems Laboratory (EE 441)</td>
<td></td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Senior Shop (EE 451)</td>
<td></td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Senior Project (EE 461, 462)</td>
<td>2</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>Undergraduate Seminar (EE 463)</td>
<td></td>
<td></td>
<td>2</td>
</tr>
<tr>
<td>Ethics in Engineering (EE 466)</td>
<td></td>
<td></td>
<td>2</td>
</tr>
<tr>
<td>Thermo-Fluids (ME 301, 302)</td>
<td>3</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Heat Transfer (ME 411)</td>
<td></td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>General Psychology (Psy 202)</td>
<td></td>
<td>3</td>
<td></td>
</tr>
<tr>
<td><strong>Literature or Philosophy</strong></td>
<td></td>
<td>3</td>
<td></td>
</tr>
<tr>
<td><strong>Electives</strong></td>
<td></td>
<td>6</td>
<td>6</td>
</tr>
</tbody>
</table>

**Total:** 17

**Industrial Relations (IR 312)** may be substituted.

† To be selected from the General Education list.
DESCRIPTIONS OF COURSES IN ELECTRICAL ENGINEERING

EE 101 Fundamentals of Electrical Engineering (2)
Backgrounds, unit systems, basic concepts and principles, electrical parameters. 2 lectures. Concurrent: Math 117

EE 102 Fundamentals of Electrical Engineering (2)
Direct current circuit principles. Application of the laws of Kirchhoff, Joule and Ohm to circuits. 2 lectures. Prerequisite: EE 101

EE 103 Fundamentals of Electrical Engineering (2)
Sinusoidal driving functions. The impedance concept. Application of the symbolic method (complex numbers) to the solution of alternating current circuits. 2 lectures. Prerequisite: EE 102

EE 104 Fundamentals of Electrical Engineering (5)
Covers the material in EE 101, 102, 103. For transfers from junior colleges or colleges who have completed one semester of calculus. Not open to regular freshmen. 5 lectures.

EE 122 Electrical Analysis (2)
Elements of electricity; simple electric and magnetic circuits. Electric circuit drawings, codes and wiring. DC and AC machine windings and construction. 1 lecture, 1 laboratory.

EE 141 Electric Shop (1)
Electrical materials, tools, equipment and their use. Modern shop techniques. 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. Prerequisite: ME 152

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 152 Laboratory Techniques (1)
Use of instruments and control devices. Analysis and interpretation of experimental data. Organized self-expression in writing engineering reports. 1 laboratory. Prerequisite: EE 101

EE 153 Circuits Laboratory (1)
Circuit elements in the laboratory. Application of electrical theory to experiment. Experience in recording, analyzing, evaluating, and presenting the results of experimentally determined data. 1 laboratory. Prerequisite: EE 102

EE 154 Electric Laboratory (2)
Covers material in EE 152 and EE 153. For junior college or college transfers who are registered in EE 104. Not open to regular freshmen. 2 laboratories.

EE 201, 202, 203 Fundamentals of Electrical Engineering (3) (3) (3)
Networks. Network theorems. Coupled systems. Polyphase systems. Electric and magnetic fields. Maxwell's equations. Introduction to traveling waves and radiation. 3 lectures. Prerequisite: Math 201

EE 204 Fundamentals of Electrical Engineering (5)
Covers the material in EE 201 and half of EE 202. For junior college or college transfers. 5 lectures. Prerequisite: EE 104 or equivalent.

EE 205 Fundamentals of Electrical Engineering (5)
Covers the material in second half of EE 202 and EE 203. Continuation of EE 204. 5 lectures. Prerequisite: EE 204
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 201, 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 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 241, 242, 243 Electric Laboratory (1) (1) (1)
Calibration and use of electrical measuring instruments. Selected laboratory exercises in electrical engineering. 1 laboratory. Concurrent: EE 201, 202, 203

EE 244 Electric Laboratory (2)
Covers material in EE 241 and 242. For Junior College or College Transfers who are registered in EE 204. 2 laboratories.

EE 245 Electric Laboratory (2)
Covers material in EE 243 and EE 253. For Junior College or College Transfers who are registered in EE 205. 2 laboratories.

EE 250 Engineering Problems—Digital Computers (1)
Solution of selected engineering problems by means of digital computers. 1 laboratory. Prerequisite: Math 201

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 Electric Shop (1)
Construction maintenance, and operation of electrical machines. 1 laboratory. Concurrent: EE 203

EE 301 Distributed Constant Circuits (3)
Traveling wave systems. Power and signal transmission. Propagation constants. 3 lectures. Prerequisite: EE 203, Math 316

EE 302 Network Synthesis (3)

EE 303 Transients (3)
Linear systems analysis in the time domain by operational methods. Laplace transformations. Transfer functions of physical systems. 3 lectures. Prerequisite: EE 203, Math 317

EE 304 Energy Conversion (2)
Magnetically coupled circuits. Energy in the magnetic field. Multiply excited systems. Torque and power. Introduction to rotating machines. 2 lectures. Prerequisite: EE 203
EE 305  Electromagnetic Machines (3)
Generalized and operational machines. Transformers, direct current machines as motors, generators. Operational analysis in the steady-state and transient modes. 3 lectures. Prerequisite: EE 304

EE 306  Electromagnetic Machines (3)
Poly phase, single phase induction machines. Synchronous machines as motors, generators. Generalized and operational analysis. Dynamic analysis. Unbalanced operation. 3 lectures. Prerequisite: EE 305

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: EE 305

EE 314, 315, 316  Electronics (3) (3) (3)
Electron tubes. Transistors. Active networks. 3 lectures. Prerequisite: EE 203

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: EE 203 or EE 208 or EE 223

EE 342, 343  Circuits Laboratory (1) (1)
Study of electric circuits in the laboratory. Distributed constant systems. 1 laboratory. Concurrent: EE 301, 302

EE 344, 345, 346  Electric Machine Laboratory (1) (1) (1)

EE 354  Electronics Shop (1)
Shop technique of constructing systems using electronic devices. 1 laboratory. Concurrent: EE 314

EE 355, 356  Electronics Laboratory (1) (1)
Electron tube characteristics. Transistor characteristics. Study of active networks. 1 laboratory. Concurrent: EE 315, 316

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 401  Control Systems (3)
Fundamentals of automatic feedback control systems. Analysis and introduction to design of linear systems. 3 lectures. Prerequisite: EE 303

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 401 or permission of instructor.

EE 403  Digital Computers (2)
Theory of operation. Design. Application to control of machines and systems. 2 lectures. Prerequisite: EE 316 or permission of instructor.
EE 404  Analog Computers (2)
Introduction to analog techniques. Analog solution of dynamic problems. System simulation on analog computers. Analog computer as an aid in design problems. 2 lectures. Prerequisite: Math 316

EE 407  Power System Analysis (3)
Equivalent circuits. Sequence impedances. Symmetrical components. Faults and sudden loads. 3 lectures.

EE 422  Electrical Engineering Design (5)
Application of engineering analysis to design problems. Creative thinking emphasized. Group and individual assignments. 2 lectures, 3 laboratories. Prerequisite: senior standing in Electrical Engineering.

EE 428  Dynamic Instrumentation (3)
Electrical measurement of non-electrical phenomena. Transducers. Transmission systems. Recorders. Theory and operation. 2 lectures, 1 laboratory. Prerequisite: EE 303, 315

EE 441  Control Systems Laboratory (1)
Advanced servomechanisms laboratory arranged for individual study. 1 laboratory. Concurrent: EE 401

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

EE 443  Digital Computer Laboratory (1)
Laboratory study of digital computer circuits. Memory systems, associated controls. 1 laboratory. Prerequisite: EE 356 or permission of instructor.

EE 444  Analog Computer Laboratory (1)
Solution of typical engineering problems by analog methods. 1 laboratory. Concurrent: EE 404

EE 451  Senior Electrical Engineering Shop (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 a minimum of supervision. Projects typical of problems which graduates must solve in their fields of employment. Project results are presented in a formal report. Minimum 120 hours total time.

EE 463  Undergraduate Seminar (2)
Special studies and recent technical developments in the field. Student presentation of topics, class panel discussion. Survey of recent publications. 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.
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

<table>
<thead>
<tr>
<th>Course</th>
<th>F</th>
<th>W</th>
<th>S</th>
</tr>
</thead>
<tbody>
<tr>
<td>Introductory Electronics (EL 111, 112)</td>
<td>2</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>Experimental Electronics (EL 151, 152)</td>
<td>1</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Electronic Instruments (EL 113)</td>
<td></td>
<td></td>
<td>2</td>
</tr>
<tr>
<td>Electronic Instruments Laboratory (EL 153)</td>
<td></td>
<td></td>
<td>1</td>
</tr>
<tr>
<td>Engineering Drawing (ME 151, 152)</td>
<td>1</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Manufacturing Processes</td>
<td>2</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>Mathematics for Engineers (Math 117)</td>
<td>5</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Analytic Geometry and Calculus (Math 118, 201)</td>
<td>5</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>General Physics (Phys 131, 132)</td>
<td>4</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>Freshman Composition (Eng 104, 105)</td>
<td>3</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Public Speaking (Sp 201)</td>
<td></td>
<td></td>
<td>2</td>
</tr>
<tr>
<td>Introduction to Literature (Eng 207)</td>
<td></td>
<td></td>
<td>2</td>
</tr>
<tr>
<td>Applied Biology (Bio 110)</td>
<td></td>
<td></td>
<td>3</td>
</tr>
<tr>
<td>Health Education (PE 107)</td>
<td></td>
<td></td>
<td>2</td>
</tr>
<tr>
<td>Physical Education (PE 141)</td>
<td>½</td>
<td>½</td>
<td>½</td>
</tr>
</tbody>
</table>

| Total                                           | 17½ | 18½ | 18½ |

## Sophomore

<table>
<thead>
<tr>
<th>Course</th>
<th>F</th>
<th>W</th>
<th>S</th>
</tr>
</thead>
<tbody>
<tr>
<td>Introductory Circuit Analysis (EL 204, 205, 206)</td>
<td>2</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>Introductory Circuits Laboratory (EL 245, 246)</td>
<td>1</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Physical Electronics (EL 207)</td>
<td>3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Electron Devices (EL 208, 209)</td>
<td>3</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>Electron Devices Laboratory (EL 248, 249)</td>
<td>1</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Electronic Project (EL 156)</td>
<td></td>
<td></td>
<td>1</td>
</tr>
<tr>
<td>Graphics in Electronics (EL 146)</td>
<td></td>
<td></td>
<td>1</td>
</tr>
<tr>
<td>Digital Computer Programming (EL 250)</td>
<td></td>
<td></td>
<td>1</td>
</tr>
<tr>
<td>Analytic Geometry and Calculus (Math 202, 203)</td>
<td>3</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Differential Equations (Math 316)</td>
<td></td>
<td></td>
<td>3</td>
</tr>
<tr>
<td>Introduction to Optics and Atomic Physics (Phys 211)</td>
<td>4</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Engineering Statics (Phys 201)</td>
<td></td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Engineering Dynamics (Phys 202)</td>
<td></td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>General Psychology (Psy 202)</td>
<td></td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Literature or Philosophy</td>
<td></td>
<td></td>
<td>3</td>
</tr>
<tr>
<td>Sports Education (PE 241)</td>
<td>½</td>
<td>½</td>
<td>½</td>
</tr>
<tr>
<td>Electives</td>
<td>2</td>
<td></td>
<td>1</td>
</tr>
</tbody>
</table>

| Total                                           | 17½ | 17½ | 17½ |

## Junior

<table>
<thead>
<tr>
<th>Course</th>
<th>F</th>
<th>W</th>
<th>S</th>
</tr>
</thead>
<tbody>
<tr>
<td>Linear Systems Analysis (EL 301, 302, 303)</td>
<td>2</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>Networks Laboratory (EL 341, 342)</td>
<td>1</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Analog Computer Laboratory (EL 343)</td>
<td></td>
<td></td>
<td>1</td>
</tr>
<tr>
<td>Electronic Circuits (EL 304, 305, 306)</td>
<td>3</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>Electronic Circuits Laboratory (EL 344, 345, 346)</td>
<td>1</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Design in Electronics Production (EL 309)</td>
<td></td>
<td></td>
<td>2</td>
</tr>
<tr>
<td>Electric Machines (EE 313)</td>
<td></td>
<td></td>
<td>3</td>
</tr>
<tr>
<td>Thermodynamics (ME 308)</td>
<td></td>
<td></td>
<td>3</td>
</tr>
<tr>
<td>Heat Transfer (ME 309)</td>
<td></td>
<td></td>
<td>3</td>
</tr>
<tr>
<td>Engineering Materials (ME 314)</td>
<td></td>
<td></td>
<td>3</td>
</tr>
<tr>
<td>General Chemistry (Chem 321, 322)</td>
<td>4</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>Principles of Economics (Ec 201)</td>
<td></td>
<td></td>
<td>3</td>
</tr>
<tr>
<td>**Industrial Management (IR 311)</td>
<td></td>
<td></td>
<td>3</td>
</tr>
<tr>
<td>Differential Equations (Math 317)</td>
<td>2</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

| Total                                           | 16 | 17 | 18 |

* AC 141, IE 141, MFGP 141, MFGP 142, WM 141, WM 142.

** Industrial Management (IR 311) may be substituted.

† To be selected from the General Education list.
### California State Polytechnic College

<table>
<thead>
<tr>
<th>Course</th>
<th>F</th>
<th>W</th>
<th>S</th>
</tr>
</thead>
<tbody>
<tr>
<td>Senior</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Microwave Electronics (EL 401, 402, 403)</td>
<td>2</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>Principles of Digital Computers (EL 404)</td>
<td>3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Advanced Amplifier Theory (EL 405)</td>
<td>3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Communication Theory (EL 406)</td>
<td></td>
<td></td>
<td>3</td>
</tr>
<tr>
<td>Electronic Systems Engineering (EL 441, 442, 443)</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Senior Project (EL 461, 462)</td>
<td>2</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>Undergraduate Seminar (EL 463)</td>
<td></td>
<td></td>
<td>2</td>
</tr>
<tr>
<td>Solid State Physics (Phys 412)</td>
<td>3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Solid State Physics Laboratory (Phys 452)</td>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td><em>Approved Senior Courses</em></td>
<td>3</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>American Government (Pol Sc 301)</td>
<td>3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Growth of American Democracy (Hist 304)</td>
<td>3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>U. S. in World Affairs (Hist 305)</td>
<td>3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Electives</td>
<td>3</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>17</td>
<td>18</td>
<td>17</td>
</tr>
</tbody>
</table>

### DESCRIPTIONS OF COURSES IN ELECTRONIC ENGINEERING

**EL 101, 102 Elements of Electronics (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, AC, IE, ME, and WM. 2 lectures.

**EL 111, 112 Introductory Electronics (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 118, Phys 131

**EL 141, 142 Electronics Laboratory (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)**

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

* Network Synthesis (EL 411), Principles of Analog Computers (EL 412), or Control Systems Engineering (EL 413, 414). Other courses may be elected with the approval of the department head.
EL 156 Electronic Project (1)
A directed project in which the student builds, tests and evaluates the performance of some electronic device. Student must purchase own materials. 1 laboratory. Concurrent: EL 153

EL 204, 205, 206 Introductory Circuit Analysis (2) (3) (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 note approach. Network theorems, determinants, duality, phasor and complex-frequency concepts, exponential Fourier analysis. 2 lectures, 3 lectures, 3 lectures. Concurrent: EL 207 with EL 204

EL 207 Physical Electronics (3)
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. Prerequisite: Phys 132, Math 201

EL 208, 209 Electron Devices (3) (2)
Physical analytical study of some semiconductors, vacuum and gas devices with primary emphasis on diodes and three element devices. Device parameters and small signal equivalent circuit analysis. Graphical analysis of these devices with resistive loads. 3 lectures, 2 lectures. Prerequisite: EL 204, 207, Phys 211

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 316

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 245, 246 Introductory Circuits Laboratory (1) (1)
Selected laboratory experiments in the subject matter of EL 204, 205, 206. Emphasis placed on laboratory procedure in collecting, correlating, graphing, and evaluating laboratory data. 1 laboratory. Concurrent: EL 205, 206

EL 248, 249 Electron Devices Laboratory (1) (1)
Fundamental experiments investigating the physical and electrical properties of the more common types of semiconductor devices and electron tubes. Emphasis on collecting, correlating, graphing, and evaluating laboratory data. 1 laboratory. Concurrent: EL 208, EL 209

EL 250 Engineering Problems—Digital Computers (1)
Solution of selected engineering problems by means of digital computers. 1 laboratory. Prerequisite: Math 201

EL 253 Circuits Laboratory (1)
Experiments involving the measurement of operational characteristics of basic circuits and devices with emphasis on the methods of measurements. 1 laboratory. Concurrent: EL 213

EL 301, 302, 303 Linear System Analysis (2) (2) (2)
The response of linear electronic, mechanical and electromechanical systems to various excitations using principally Fourier and Laplace transform methods. Analysis and synthesis of one and two port frequency selective networks with fixed and distributed parameters. Butterworth and Chebyshev polynomials. Stability in feedback systems. 2 lectures. Prerequisite: EL 206
<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Description</th>
<th>Credits</th>
<th>Prerequisites</th>
<th>Co-requisite</th>
</tr>
</thead>
<tbody>
<tr>
<td>EL 304</td>
<td>Electronic Circuits (3)</td>
<td>Analytical study of pulse, digital and timing circuits employing modern electronic devices; gating circuits, scalers, linear time bases and multivibrators. Piecewise linear analysis emphasized.</td>
<td>3</td>
<td>EL 206, 209, Math 316</td>
<td></td>
</tr>
<tr>
<td>EL 305</td>
<td>Electronic Circuits (3)</td>
<td>Analytical study of active electronic circuits for the amplification of voltage, current and power at audio and radio frequencies. Cascade stages. Feedback.</td>
<td>3</td>
<td>EL 301, 304, Math 317</td>
<td></td>
</tr>
<tr>
<td>EL 306</td>
<td>Electronic Circuits (3)</td>
<td>Analytical study of oscillator, modulator, frequency-changer and demodulator circuits for amplitude, frequency and phase modulation systems. Application to communication and instrumentation systems.</td>
<td>3</td>
<td>EL 302, 305</td>
<td></td>
</tr>
<tr>
<td>EL 309</td>
<td>Design in Electronic Production (2)</td>
<td>Introduction to a broad scope of topics of concern in design. Analysis of some of the basic mechanical, electronic and thermal problems in the packaging of electronic equipment with special consideration given to reliability, maintainability, and design for extreme environments.</td>
<td>2</td>
<td>EL 305, ME 308</td>
<td></td>
</tr>
<tr>
<td>EL 313</td>
<td>Analog Computer Techniques (3)</td>
<td>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.</td>
<td>2</td>
<td>Math 203</td>
<td></td>
</tr>
<tr>
<td>EL 314</td>
<td>Digital Computer Techniques (3)</td>
<td>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.</td>
<td>2</td>
<td>Consent of instructor</td>
<td></td>
</tr>
<tr>
<td>EL 321</td>
<td>Electronic Engineering (3)</td>
<td>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.</td>
<td>3</td>
<td>EE 207, 208</td>
<td></td>
</tr>
<tr>
<td>EL 322</td>
<td>Applied Electronics (3)</td>
<td>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.</td>
<td>3</td>
<td>EL 321, 354</td>
<td></td>
</tr>
<tr>
<td>EL 341, 342</td>
<td>Networks Laboratory (1) (1)</td>
<td>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</td>
<td>1</td>
<td>EL 301, 302</td>
<td></td>
</tr>
<tr>
<td>EL 343</td>
<td>Analog Computer Laboratory (1)</td>
<td>Laboratory study of analog computers and auxiliary equipment. Solution of engineering problems and simulation of physical systems on the analog computer. 1 laboratory.</td>
<td>1</td>
<td>EL 304</td>
<td></td>
</tr>
</tbody>
</table>
EL 344  Electronic Circuits Laboratory (1)
Laboratory analysis of pulse, digital and timing circuits with major emphasis given to solid state circuitry. Pulse-forming techniques. 1 laboratory. Concurrent: EL 304

EL 345  Electronic Circuits Laboratory (1)
Laboratory analysis of audio and video frequency, voltage and current amplifiers using transistors and electron tubes. Performance testing of amplifiers using EIA-IEEE Standard Procedures. 1 laboratory. Concurrent: EL 305

EL 346  Electronic Circuits Laboratory (1)
Laboratory analysis of power and tuned amplifiers using transistors and electron tubes. Study of modulated waves and frequency conversion. 1 laboratory. Concurrent: EL 306

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, 402, 403  Microwave Electronics (2) (2) (2)
Development of Maxwell's equations and the wave equation with emphasis on physical concepts. Application to guided waves and radiating structures. Properties of microwave components. Principles and techniques of measurements. Fundamentals of transit-time and quantum electronic devices for the generation of microwaves. 2 lectures. Prerequisite: EL 303, 306

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 subsystems such as counters, adders and registers. 3 lectures. Prerequisite: EL 306

EL 405  Advanced Amplifier Theory (3)
Analysis and synthesis of amplifier networks using solid state and electron tube active elements. Transient analysis of high speed, high gain amplifiers. Pole-zero analysis of bandpass amplifiers. Noise analysis. 3 lectures. Prerequisite: EL 303, EL 306

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. Solid state and electron tube circuitry. 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 303
EL 412 Principles of Analog Computers (2)
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. 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 303

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 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 a minimum of supervision. Project results are presented in a formal report. Minimum 120 hours total time.

EL 463 Undergraduate Seminar (2)
Discussion of new developments in the fields of communications and industrial electronics, with particular reference to fields of employment. Job analysis. 2 lectures.
INDUSTRIAL ENGINEERING DEPARTMENT

Department Head, Millard J. Fotter
George W. Cockriel
Roy W. Gustafson
George E. Hoffman
Paul E. Scheffer

Industrial Engineering is concerned with the design of engineering systems and management systems. With relation to engineering systems, industrial engineering is the science of utilizing and coordinating men, equipment and materials to attain a desired quantity and quality of output at a specified time and at the most favorable cost. With relation to management systems, it is the science of effective utilization of the human resources of an enterprise, accomplished through the design of integrated systems by the application of management principles and techniques.

The industrial engineer has responsibility in matters of design of systems which may be involved in areas of labor management, cost reduction and control, quality control, methods, planning, plant layout and data processing. He works closely with, and must understand the employee and the operating problems of management. This curriculum prepares graduates for positions in all phases of the system design in these areas of job activities.

The curriculum, leading to the Bachelor of Science Degree, combines a thorough understanding of the fundamentals of engineering with a broad background in manufacturing processes, statistics, accounting, economics, social sciences and management principles.

Excellent industrial engineering laboratories are available in the areas of Work Measurement, Systems and Procedures, Manufacturing Management, Manufacturing Processes, Metrology, and Quality Control.

CURRICULUM IN INDUSTRIAL ENGINEERING

<table>
<thead>
<tr>
<th>Freshman</th>
<th>F</th>
<th>W</th>
<th>S</th>
</tr>
</thead>
<tbody>
<tr>
<td>Introduction to Industrial Engineering (IE 101)</td>
<td>2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Engineering Analysis (IE 121)</td>
<td>2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Systems Analysis (IE 132)</td>
<td>3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Elements of Electronics (EL 101, 102)</td>
<td>2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Electronics Laboratory (EL 141, 142)</td>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>* Manufacturing Processes</td>
<td>3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Engineering Drafting (ME 151, 152, 143)</td>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>General Psychology (Psy 202)</td>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mathematics for Engineers (Math 117)</td>
<td>5</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Analytic Geometry and Calculus (Math 118, 201)</td>
<td>5</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Freshman Composition (Eng 104, 105, 106)</td>
<td>3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Health Education (PE 107)</td>
<td>3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Physical Education (PE 141)</td>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>½</td>
<td>½</td>
<td>½</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Sophomore</th>
<th>F</th>
<th>W</th>
<th>S</th>
</tr>
</thead>
<tbody>
<tr>
<td>Manufacturing Engineering Laboratory (IE 241, 242, 243)</td>
<td>2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Work Methods and Measurement (IE 236)</td>
<td>2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Engineering Problems—Digital Computer (IE 250)</td>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Analytic Geometry and Calculus (Math 202, 203)</td>
<td>3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Differential Equations (Math 316)</td>
<td>3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>General Physics (Phys 131, 132, 133)</td>
<td>4</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Engineering Statics (Phys 201)</td>
<td>3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Engineering Dynamics (Phys 202)</td>
<td>3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Principles of Economics (Ec 201)</td>
<td>3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Principles of Accounting (Actg 221, 222)</td>
<td>4</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sports Education (PE 241)</td>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Electives</td>
<td>½</td>
<td>½</td>
<td>½</td>
</tr>
</tbody>
</table>

|                                                                     | 17½ | 18½ | 18½ |

* AC 141, MFGP 141, MFGP 142, IE 141, WM 141, WM 142.
<table>
<thead>
<tr>
<th>Junior</th>
<th>F</th>
<th>W</th>
<th>S</th>
</tr>
</thead>
<tbody>
<tr>
<td>Predetermined Time Standards (IE 324)</td>
<td>2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Industrial Presentation Techniques (Arch 153)</td>
<td>2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Manufacturing Planning: Process Planning (IE 341)</td>
<td>2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Manufacturing Planning: Plant Layout (IE 342)</td>
<td>2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Engineering Economy (IE 312)</td>
<td>3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Production Control (IE 304)</td>
<td>2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Production Programming: Operations Research (IE 305)</td>
<td>2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Production Programming: Computer Analysis (IE 335)</td>
<td>2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mathematics of Statistics (Math 321)</td>
<td>3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Statistical Quality Control (IE 336)</td>
<td>3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Strength of Materials (ME 202, 203)</td>
<td>3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Elements of Machine Design (ME 423)</td>
<td>4</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Electrical Engineering (EE 207, 208)</td>
<td>3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Electrical Engineering Laboratory (EE 251, 252)</td>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Electronic Engineering (EL 321)</td>
<td>3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Electronic Engineering Laboratory (EL 354)</td>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Human Engineering (IE 353)</td>
<td>2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Introduction to Literature (Eng 201)</td>
<td>2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>American Government (Pol Sc 301)</td>
<td>3</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>18</td>
<td>17</td>
<td>17</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Senior</th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Sales Engineering (IE 401)</td>
<td>2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Supervision Fundamentals (IE 441, 442, 443)</td>
<td>2</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Manufacturing Management (IE 421, 422)</td>
<td>4</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Senior Project (IE 461, 462)</td>
<td>2</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>Undergraduate Seminar (IE 463)</td>
<td></td>
<td></td>
<td>2</td>
</tr>
<tr>
<td>Business Law Survey (Bus 301)</td>
<td>3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>General Chemistry (Chem 321, 322)</td>
<td>4</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>Literature or Philosophy</td>
<td></td>
<td></td>
<td>3</td>
</tr>
<tr>
<td>Applied Biology (Bio 110)</td>
<td>3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Growth of American Democracy (Hist 304)</td>
<td>3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>U.S. in World Affairs (Hist 305)</td>
<td></td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Electives</td>
<td>2</td>
<td>4</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td>18</td>
<td>17</td>
<td>17</td>
</tr>
</tbody>
</table>

**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.

**IE 121 Engineering Analysis (2)**

Engineering approach to problem solving. Engineering experimentation and reporting. Stochastic and deterministic systems incorporated into open and closed loop systems. 1 lecture, 1 laboratory.

**IE 132 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.

† To be selected from the General Education list.
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, MFGP 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 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 studies in metal casting, metal forming and cutting, and finishing processes. 2 laboratories. Prerequisite: MFGP 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 201

IE 304 Production Control (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 Production Programming: 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 312 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 324 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 331 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 335 Production Programming (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: Math 321

IE 341 Manufacturing Planning: Process Planning (2)
Development of manufacturing planning data for plant layout. A project consisting of research and product development involving detail design, prototype production, production drawings, process charts, and manufacturing planning for the product. 2 laboratories. Prerequisite: IE 236

IE 342 Manufacturing Planning: Plant Layout (2)
Theory, principles, and techniques for effective plant layout applied to the project developed in IE 341. 2 laboratories. Prerequisite: IE 341

IE 353 Human 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, 324

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 in engineering.

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 421 Manufacturing Management (4)
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. 3 lectures, 1 laboratory. Prerequisite: IE 323

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, 441
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 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, 335

IE 441  Supervision Fundamentals (2)

Theory and principles of supervision. Application of fundamental concepts and techniques of supervision provided by assignment in manufacturing laboratories. 1 lecture, 1 laboratory. Prerequisite: IE 236

IE 442, 443  Supervision Fundamentals (1) (1)

Theory and principles of supervision. Application of fundamental concepts and techniques of supervision provided by assignment in manufacturing laboratories. 1 laboratory. Prerequisite: IE 441

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, 335

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

Selection and completion of a project under a minimum of supervision. Projects typical of problems which graduates must solve in their fields of employment. Project results are presented in a formal report. Minimum 120 hours 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 Manufacturing Processes Department offers course work basic to engineering and manufacturing operations. The objective is to provide an understanding of the machining aspects of manufacturing processes through the medium of actual shop experiences. Consideration is given to material selection, allowances and tolerances, appropriate tooling, appropriate process selection, and the limitations and capabilities of various types of machine tools.

The department is well equipped with machine tools and heat-treating equipment as well as the requisite jigs, fixtures, and precision instruments.

DESCRIPTIONS OF COURSES IN MANUFACTURING PROCESSES

MFGP 141 Manufacturing Processes (1)
Studies of the processes of turning, boring, and external thread cutting. 1 laboratory.

MFGP 142 Manufacturing Processes (1)
Studies of the processes of milling and plane surfacing. 1 laboratory.

MFGP 151 Manufacturing Processes (1)
Fundamentals of basic layout methods, bench and drill press operations, use of hand tools, tool grinding, and metal properties. 1 laboratory.

MFGP 152 Manufacturing Processes (1)
Fundamentals of precise measurement and layout, metal properties, and drilling operations. 1 laboratory.

MFGP 153 Manufacturing Processes (1)
Studies of advanced processes of turning, cutting, boring, and tool preparation. 1 laboratory. Prerequisite: MFGP 141

MFGP 154 Manufacturing Processes (1)
Studies of advanced processes of milling and contoured and angular surfacing. 1 laboratory. Prerequisite: MFGP 142

MFGP 155 Manufacturing Processes (1)
Studies of grinding processes, both cylindrical and surface. 1 laboratory. Prerequisite: MFGP 141, 142

MFGP 240 Machine Shop (1-2)
Advanced individual instruction on all machine tools. Construction and repair of laboratory equipment. Total credit limited to four units. 1 or 2 laboratories. Prerequisite: MFGP 153, 154

MFGP 331, 332, 333 Tool Engineering (3) (3) (3)
Construction of production tools including jigs, fixtures, punch press tools, plastic molds, diecasting dies, and inspection devices. Field trips to manufacturing centers. 1 lecture, 2 laboratories. Prerequisite: MFGP 153, 155

MFGP 421, 422, 423 Tool Design (3) (3) (3)
Design of manufacturing tools such as jigs, fixtures, and dies. Materials, tolerance balancing, and toolroom methods as design factors. Field trips to manufacturing centers. 2 lectures, 1 laboratory. Prerequisite: ME 203 or Aero 206
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 grounding 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**

<table>
<thead>
<tr>
<th>Course</th>
<th>F</th>
<th>W</th>
<th>S</th>
</tr>
</thead>
<tbody>
<tr>
<td>Freshman</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mechanical Systems (ME 131, 132)</td>
<td>3</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Mechanical Engineering Laboratory (ME 144, 145, 146)</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Mathematics for Engineers (Math 117)</td>
<td>5</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Analytic Geometry and Calculus (Math 118, 201)</td>
<td>5</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>* Manufacturing Processes</td>
<td>2</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>Engineering Drafting (ME 141, 142, 143)</td>
<td>2</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>General Physics (Phys 131, 132)</td>
<td>4</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>Elements of Electronics (EL 101, 102)</td>
<td>2</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>Electronics Laboratory (EL 141, 142)</td>
<td>1</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Freshman Composition (Eng 104)</td>
<td></td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Physical Education (PE 141)</td>
<td>½</td>
<td>½</td>
<td>½</td>
</tr>
<tr>
<td>Health Education (PE 107)</td>
<td>2</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>18½</td>
<td>17½</td>
<td>18½</td>
</tr>
</tbody>
</table>

* AC 141, MFGP 141, MFGP 142, IE 141; WM 141, WM 142.
<table>
<thead>
<tr>
<th>Semester</th>
<th>Course Name</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sophomore</td>
<td>Engineering Mechanics (ME 211, 212)</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>Strength of Materials (ME 202, 203)</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>Engineering Problems—Digital Computers (ME 250)</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>Advanced Metal Joining Processes (WM 251, 252)</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>Manufacturing Processes (MFGP 152-3, 154, 155)</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>Metallurgy for Engineers (WM 306)</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>General Chemistry (Chem 321, 322)</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td>Analytic Geometry and Calculus (Math 202, 203)</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>Differential Equations (Math 316)</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>General Physics (Phys 133)</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td>American Government (Pol Sc 301)</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>Freshman Composition (Eng 105)</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>Public Speaking (Sp 201)</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>Sports Education (PE 241)</td>
<td>½</td>
</tr>
<tr>
<td></td>
<td><strong>Total</strong></td>
<td><strong>16½</strong></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Junior</td>
<td>Kinematics (ME 324)</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td>Mechanical Design (ME 427, 428)</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>Thermo-Fluids (ME 301, 302, 303)</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>Fluid Mechanics (ME 313)</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>Fluids Laboratory (ME 345)</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>Mechanical Equipment of Buildings (ME 331)</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>Strength of Materials Laboratory (ME 249)</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>Electrical Engineering (EE 207, 208)</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>Electrical Engineering Laboratory (EE 251, 252)</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>Electronic Engineering (EL 321)</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>Electronic Engineering Laboratory (EL 354)</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>Differential Equations (Math 317)</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>Applied Biology (Bio 110)</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>Principles of Economics (Ec 201)</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>Introduction to Literature (Eng 207)</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>Industrial Management (IR 311)</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td><strong>Total</strong></td>
<td><strong>17</strong></td>
</tr>
<tr>
<td>Senior</td>
<td>Senior Project (ME 461, 462)</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>Undergraduate Seminar (ME 463)</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>Mechanical Vibrations (ME 416)</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td>Contracts and Specifications (ME 406)</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>Mechanical Design (ME 429)</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>Thermo-Heat Transfer (ME 304)</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>Thermodynamics Laboratory (ME 343)</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>Growth of American Democracy (Hist 304)</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>U. S. in World Affairs (Hist 305)</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>Psychology (Psy 202)</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>Literature or Philosophy</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>Electives</td>
<td>9</td>
</tr>
<tr>
<td></td>
<td><strong>Total</strong></td>
<td><strong>17</strong></td>
</tr>
</tbody>
</table>

* One of the following sequences must be included: Tool Design (MFGP 421, 422, 423), 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).

† Industrial Relations (IR 312) may be substituted.

‡ To be selected from the General Education list.
DESCRIPTIONS OF COURSES IN MECHANICAL ENGINEERING

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: Phys 201 or 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 151, Math 201
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: Math 201

ME 249, 302, 303  Thermo-Fluids (3) (3) (3)
   First and second laws of thermodynamics, fluid statics and dynamics, incompres-
   sible and compressible flow, flow measurement, mixing concepts, combustion. 3 lec-
   tures. Prerequisite: ME 212. Concurrent: Math 316

ME 304  Thermo-Heat Transfer (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 ther-
   modynamics; 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. Pre-
   requisite: ME 308

ME 311  Fluid Flow (3)
   Study of the principles that underlie the flow of various fluids. Fluid statics, vis-
   cosity, 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, com-
   pressible flow. Pumps, turbine, fluid power transmission systems, and fluid film
   lubrication. 3 lectures. Prerequisite: Phys 202 or ME 212

ME 313  Fluid Mechanics (3)
   Incompressible network flow, flow in open channels, flow around submerged
   objects, compressible flow, similitude, and fluid machinery. 3 lectures. Prerequisite:
   ME 302

ME 314  Engineering Materials (3)
   Structure, composition, and physical properties of commercially useful materials.
   Brief study of mechanics of materials. Selection of materials for specific applica-
   tions. Heat treatment. Corrosion of metals and alloys; protective coatings. 3 lectures.

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 labora-
   tories. 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 venti-
   lation. 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 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 301

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  Machine Design (4) (4)

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 317, 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 316
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 201,
Phys 202

ME 424, 425  Design of Piping Systems (4) (4)
Functions, requirements, and design of piping systems, including safety and eco-
nomic considerations for power, chemical, and process plants. Welding and other
forms of joint construction, materials specifications, sizing, layout, flexibility, sup-
port, insulation, and cost estimation of water, steam, air, gas, and corrosive and
viscous fluid systems. Philosophy, background, and requirements of principal gov-
erning 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 mechan-
ical engineering such as stress analysis, materials engineering, thermodynamics, heat
transfer, etc. 2 lectures, 1 laboratory. Prerequisite: ME 428

ME 434  Fundamentals of Petroleum Production (2)
Survey of the production of crude petroleum covering exploration, drilling,
pumping, transportation, and storage. Observation of actual field operations and
installations of major-oil companies and oil equipment companies. Nomenclature,
methods, and mechanical equipment. 2 lectures. Prerequisite: ME 146, 302

ME 435  Petroleum Production Development (3)
Mechanical engineering aspects of rotary drilling. Problems attendant to the
rotary rig and its auxiliary equipment. Practical problems dealing with drilling
mud, casing, cementing, directional drilling, and well completion operations. 2
lectures, 1 laboratory. Prerequisite: ME 203

ME 451  Advanced Graphical and Numerical Methods (1)
Graphical and numerical determination of centroids, moments of inertia, moments
and deflections. Graphical integration and differentiation problems. Harmonic an-
alysis. Variable force and acceleration. Energy and mass flow diagrams. Alignment
charts and nomography. 1 laboratory. Prerequisite: ME 427

ME 461, 462  Senior Project (2) (2)
Selection and completion of a project under a minimum of supervision. Projects
typical of problems which graduates must solve in their fields of employment.
Project results are presented in a formal report. Minimum 120 hours total time.
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 presenta-
tion of a topic in his chosen field. 2 meetings. Prerequisite: Senior standing.
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, non-destructive testing, application of materials to specific needs and requirements including process development. Typical position titles are metallurgist, metallographer, materials engineer, welding engineer, non-destructive 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 oxy-acetylene 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, non-destructive 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**

<table>
<thead>
<tr>
<th>Freshman</th>
<th>F</th>
<th>W</th>
<th>S</th>
</tr>
</thead>
<tbody>
<tr>
<td>Properties of Metallic Materials (WM 121, 122, 123)</td>
<td>2</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>* Manufacturing Processes</td>
<td>2</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>Elements of Electronics (EL 101, 102)</td>
<td>2</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>Electronics Laboratory (EL 141, 142)</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Engineering Drafting (ME 151, 152, 153)</td>
<td>5</td>
<td>5</td>
<td>3</td>
</tr>
<tr>
<td>Mathematics for Engineers (Math 117)</td>
<td>3</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>Analytic Geometry and Calculus (Math 118, 201)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Freshman Composition (Eng 104, 105, 106)</td>
<td>2</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>Health Education (PE 107)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>General Chemistry (Chem 321)</td>
<td></td>
<td>4</td>
<td>4</td>
</tr>
<tr>
<td>Applied Biology (Bio 110)</td>
<td></td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>Physical Education (PE 141)</td>
<td>½</td>
<td>½</td>
<td>½</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>16½</strong></td>
<td><strong>18½</strong></td>
<td><strong>18½</strong></td>
</tr>
</tbody>
</table>

* AC 141, MFGP 141, MFGP 142, IE 141, WM 141, WM 142.
## Sophomore

<table>
<thead>
<tr>
<th>Course Description</th>
<th>F</th>
<th>W</th>
<th>S</th>
</tr>
</thead>
<tbody>
<tr>
<td>Physical Metallurgy (WM 221, 222, 223)</td>
<td>4</td>
<td>4</td>
<td>4</td>
</tr>
<tr>
<td>Engineering Problems—Digital Computers (WM 250)</td>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Engineering Statics (Phys 201)</td>
<td>3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Engineering Dynamics (Phys 202)</td>
<td></td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>General Chemistry (Chem 322, 323)</td>
<td>4</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>Analytic Geometry and Calculus (Math 202, 203)</td>
<td>3</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Differential Equations (Math 316)</td>
<td></td>
<td></td>
<td>3</td>
</tr>
<tr>
<td>General Physics (Phys 131, 132, 133)</td>
<td>4</td>
<td>4</td>
<td>4</td>
</tr>
<tr>
<td>Introduction to Literature (Eng 207)</td>
<td></td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>Principles of Economics (Ec 201)</td>
<td></td>
<td></td>
<td>3</td>
</tr>
<tr>
<td>Sports Education (PE 241)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>1/2</td>
</tr>
</tbody>
</table>

**Total Credits:** 17 18 17 16

## Junior

<table>
<thead>
<tr>
<th>Course Description</th>
<th>F</th>
<th>W</th>
<th>S</th>
</tr>
</thead>
<tbody>
<tr>
<td>Theory of Materials (WM 301, 302, 303)</td>
<td>3</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>Metallurgy and Heat Treatment (WM 321, 322)</td>
<td>1</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Fabrication Metallurgy (WM 324, 325, 326)</td>
<td>3</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>Electrical Engineering (EE 207, 208)</td>
<td>3</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Electrical Engineering Laboratory (EE 251, 252)</td>
<td>1</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Electronic Engineering (EL 321)</td>
<td></td>
<td></td>
<td>3</td>
</tr>
<tr>
<td>Electronic Engineering Laboratory (EL 354)</td>
<td></td>
<td></td>
<td>1</td>
</tr>
<tr>
<td>Strength of Materials (ME 202, 203)</td>
<td>3</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Quantitative Analysis (Chem 331)</td>
<td></td>
<td></td>
<td>4</td>
</tr>
<tr>
<td>Heat (Phys 301)</td>
<td></td>
<td></td>
<td>3</td>
</tr>
<tr>
<td>American Government (Pol Sc 301)</td>
<td></td>
<td></td>
<td>3</td>
</tr>
<tr>
<td><strong>Literature or Philosophy</strong></td>
<td></td>
<td></td>
<td>3</td>
</tr>
</tbody>
</table>

**Total Credits:** 18 18 1/2 17 1/2

## Senior

<table>
<thead>
<tr>
<th>Course Description</th>
<th>F</th>
<th>W</th>
<th>S</th>
</tr>
</thead>
<tbody>
<tr>
<td>Advanced Theory of Metals (WM 421, 422, 423)</td>
<td>2</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>Corrosion Control (WM 431)</td>
<td></td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>Senior Project (WM 461, 462)</td>
<td>2</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>Undergraduate Seminar (WM 463)</td>
<td></td>
<td></td>
<td>2</td>
</tr>
<tr>
<td>Growth of American Democracy (Hist 304)</td>
<td></td>
<td></td>
<td>3</td>
</tr>
<tr>
<td>U.S. in World Affairs (Hist 305)</td>
<td></td>
<td></td>
<td>3</td>
</tr>
<tr>
<td>General Psychology (Psy 202)</td>
<td></td>
<td></td>
<td>3</td>
</tr>
<tr>
<td>† Industrial Relations (IR 312)</td>
<td></td>
<td></td>
<td>3</td>
</tr>
<tr>
<td><strong>Senior Elective</strong></td>
<td>4</td>
<td>4</td>
<td>4</td>
</tr>
<tr>
<td>Electives</td>
<td>4</td>
<td>6</td>
<td>3</td>
</tr>
</tbody>
</table>

**Total Credits:** 17 17 17

### DESCRIPTIONS OF COURSES IN WELDING AND METALLURGICAL ENGINEERING

**WM 121, 122, 123 Properties of Metallic Materials (2) (2) (2)**


**WM 141 Manufacturing Processes (1)**


* One of the following sequences must be included:
  - Advanced Metallurgy (WM 424, 425, 426)
  - Welding Engineering (WM 434, 435, 436)

** To be selected from the General Education list.

† Industrial Management (IR 311) may be substituted.
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 155

WM 221, 222, 223 Physical Metallurgy (4) (4) (4)
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. 3 lectures, 1 laboratory.

WM 240 Additional Metallurgy Laboratory (1-2)
Total credit limited to 4 units, with not more than 2 units in any one quarter. 1 or 2 laboratories.

WM 250 Engineering Problems—Digital Computers (1)
Solution of selected engineering problems by means of digital computers. 1 laboratory. Prerequisite: Math 201

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 203, Phys 133, 201, Chem 322; or permission of instructor.

WM 306 Metallurgy for Engineers (3)
The structure of matter, physical properties and mechanical properties of metals. Selection, treatment, and use of metals. Steel, cast iron, stainless steels, nonferrous metals and alloys for high temperature service. Principles of fabrication metallurgy. For all engineering majors except Metallurgical Engineering. 3 lectures. Prerequisite: WM 142

WM 321, 322 Metallography and Heat Treatment (1) (1)
Metallographic and photomicrographic techniques. Microscopic studies of metal structures as related to heat treatment and metal fabrication processes. Ferrous and nonferrous metals. Identification of constituents and phases. Grain size and case depth determinations. 1 laboratory. Prerequisite: WM 223, Chem 321
WM 324, 325, 326  Fabrication Metallurgy (3) (3) (3)
Theory and application of castings to metal product manufacturing. Casting, heat treatment, and metallurgy of welding. Ferrous and nonferrous alloys. Atmospheres, bright annealing, brazing, carbon restoration. Failure investigation. Application of non-destructive testing, X-ray, magnetic particle, ultrasonic, eddy current techniques. 2 lectures, 1 laboratory. Prerequisite: WM 223

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 Metals (2) (2) (2)
Atomic structure of metals; X-ray diffraction; theory of alloying; imperfections and dislocations in metals; alloy strengthening, plastic deformation, strain hardening, recovery and recrystallization; fracture, creep, fatigue. 1 lecture, 1 laboratory. Prerequisite: WM 303 or permission of instructor.

WM 424, 425, 426  Advanced Metallurgy (4) (4) (4)
Theoretical physical metallurgy; tool and complex alloy steels; creep; fatigue; investigations on actual service failures; advanced work in metallography and photomicrography. 2 lectures, 2 laboratories. Prerequisite: Senior standing.

WM 431  Corrosion Control (2)
Fundamentals of the science of corrosion and its control at atmospheric and elevated temperatures. 1 lecture, 1 laboratory. Prerequisite: Chem 331, WM 303

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

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 APPLIED ARTS DIVISION
Child Care Laboratory in Home Economics Building

Technical Arts Students Study Compressor in Construction Equipment Course

At the Technical Journalism Copy Desk
THE APPLIED ARTS DIVISION

The Applied Arts Division has four principal functions: it provides for its own major curricula, it prepares teachers who are seeking teaching credentials, it provides courses supplemental to the major and courses required as general education in all curricula, and it is a service division providing for students in agriculture, applied arts, applied sciences, and engineering courses related to and directly supporting the area of the major.

A supplementary function is to administer the activities of the Audio-Visual Department which provides services and production functions for the entire College.

The curricula included in the Applied Arts Division are: Business Administration, English, Home Economics, Physical Education, Printing Engineering and Management, Technical Arts, and Technical Journalism. The Music Department although not offering a major provides services for the entire student body.
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 Agriculture, Engineering, Applied Sciences and Applied Arts Divisions 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 relates to product management as well as the marketing aspects of the business.
## CURRICULUM IN BUSINESS ADMINISTRATION

### Freshman *

<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)</td>
<td>3</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Public Speaking (Sp 201)</td>
<td></td>
<td></td>
<td>2</td>
</tr>
<tr>
<td>Introduction to Literature (Eng 207)</td>
<td></td>
<td></td>
<td>2</td>
</tr>
<tr>
<td>Physical Education (PE 141)</td>
<td>½</td>
<td>½</td>
<td>½</td>
</tr>
<tr>
<td>Health Education (PE 107)</td>
<td></td>
<td></td>
<td>2</td>
</tr>
<tr>
<td><strong>Natural Sciences</strong></td>
<td>7</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>Basic Mathematics for General Education (Math 200)</td>
<td></td>
<td></td>
<td>3</td>
</tr>
<tr>
<td>Finite Mathematics for Business (Math 210)</td>
<td></td>
<td></td>
<td>3</td>
</tr>
<tr>
<td>The Business Enterprise (Bus 101)</td>
<td></td>
<td></td>
<td>4</td>
</tr>
<tr>
<td>Business Reports (Bus 103)</td>
<td></td>
<td></td>
<td>3</td>
</tr>
<tr>
<td>The Labor Movement in the United States (IR 111)</td>
<td></td>
<td></td>
<td>3</td>
</tr>
<tr>
<td>Human Relations (IR 118)</td>
<td></td>
<td></td>
<td>3</td>
</tr>
<tr>
<td>Electives</td>
<td>4</td>
<td></td>
<td>2</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>16½</td>
<td>16½</td>
<td>16½</td>
</tr>
</tbody>
</table>

### Sophomore

<table>
<thead>
<tr>
<th>Course</th>
<th>F</th>
<th>W</th>
<th>S</th>
</tr>
</thead>
<tbody>
<tr>
<td>Advanced Public Speaking (Sp 202)</td>
<td>2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sports Education (PE 241)</td>
<td></td>
<td>½</td>
<td>½</td>
</tr>
<tr>
<td>Introduction to Philosophy (Phil 201)</td>
<td></td>
<td></td>
<td>3</td>
</tr>
<tr>
<td>Principles of Management (Bus 201)</td>
<td></td>
<td></td>
<td>3</td>
</tr>
<tr>
<td><strong>Natural Sciences</strong></td>
<td>4</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>Mathematics of Business (Math 215)</td>
<td></td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Descriptive Statistics (Math 211)</td>
<td></td>
<td></td>
<td>3</td>
</tr>
<tr>
<td>Statistical Methods (Math 212)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Principles of Economics (Ec 201, 202, 203)</td>
<td></td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>Principles of Accounting (Actg 221, 222)</td>
<td></td>
<td>4</td>
<td>4</td>
</tr>
<tr>
<td>Cost Accounting and Analysis (Actg 223)</td>
<td></td>
<td></td>
<td>4</td>
</tr>
<tr>
<td>Business and Its Environment (Bus 202)</td>
<td></td>
<td></td>
<td>3</td>
</tr>
<tr>
<td>Marketing Principles (MSM 204)</td>
<td></td>
<td></td>
<td>3</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>17½</td>
<td>16½</td>
<td>16½</td>
</tr>
</tbody>
</table>

### Junior

<table>
<thead>
<tr>
<th>Course</th>
<th>F</th>
<th>W</th>
<th>S</th>
</tr>
</thead>
<tbody>
<tr>
<td>Logic (Phil 202)</td>
<td>3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ethics (Phil 204)</td>
<td></td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>General Psychology (Psy 202)</td>
<td></td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Political and Economic Geography (Geog 315)</td>
<td></td>
<td></td>
<td>3</td>
</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>U. S. in World Affairs (Hist 305)</td>
<td></td>
<td></td>
<td>3</td>
</tr>
<tr>
<td>Business Law (Bus 307, 308, 309)</td>
<td></td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>Money, Credit and Banking (Bus 337)</td>
<td></td>
<td></td>
<td>3</td>
</tr>
<tr>
<td>Financial Management (FPM 342, 343)</td>
<td></td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>Machine Techniques in Business (Bus 320)</td>
<td></td>
<td></td>
<td>2</td>
</tr>
<tr>
<td><strong>Electives and courses to complete major</strong></td>
<td>2</td>
<td>3</td>
<td>3</td>
</tr>
</tbody>
</table>

| **Total**                                   | 17 | 17 | 15 |

* 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.
** 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. 2 lectures, 2 two-hour laboratories. 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 222

** 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 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.

** 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.**
Applied Arts Division

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 104 Office Organization and Operation (3)

Basic office procedures and practices. Knowledges and techniques necessary to work in or manage a business office. 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

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 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 Business Applications of Data Processing (3)
Applications of the latest techniques in the use of modern methods of handling numbers. Use of data processing in various phases of business operations. 2 lectures, 1 two-hour laboratory.

Bus 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

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 406 Business Fluctuations and Forecasting (3)
An examination of the causes and measurement of business fluctuations. Techniques of forecasting. 3 lectures. Prerequisite: Bus 202, Math 212

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 Quantitative Methods and Controls in Business (3)
Basic principles of methodology 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: Bus 413 or consent of instructor.

Bus 418 Management, Unions, and the Public (3)
The relationships which exist 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 419 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. Development and understanding of line, line and staff, and functional organizational operations. Authority and responsibility, departmentation, and centralization and decentralization of management. 3 lectures. Prerequisite: Senior standing or consent of instructor.
Bus 461, 462Senior Project (2) (2)
Selection and completion of a project under a minimum of supervision. Projects
typical of problems which graduates must solve in their fields of employment. For-
mal 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 prepara-
tion 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; invest-
ments, insurance, and housing; agencies that help the consumer. 3 lectures.

Ec 201 Principles of Economics (3)
Basic institutional arrangements in the American economy. 3 lectures. Pre-
requisite: Sophomore standing. Successful completion of freshman English rec-
ommended.

Ec 202 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 201

Ec 203 Principles of Economics (3)
Application of economic principles in an increasingly complex world. 3 lectures.
Prerequisite: Ec 202

Ec 304 Comparative Economic Systems (3)
Analysis of economic principles and institutions applicable to capitalism, socialism,
and communism. 3 lectures. Prerequisite: Ec 202

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

Ec 401 International Trade (3)
The United States and the world economy; mechanism of exchange; balance of
payments. 3 lectures. Prerequisite: Ec 202

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. 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. Prerequisite: FPM 310

FPM 312 Life and Health Insurance (3)
Analysis of contracts from the viewpoint of the insurance consumer, interpretation of major policy provisions, integration of private policies with social insurance coverages. 3 lectures. Prerequisite: FPM 310

FPM 331 Real Estate Principles and Practices (3)
Nature and scope of the real estate business including transfers of property, financing methods, and property management. 3 lectures. Prerequisite: FPM 310 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 lectures, 1 two-hour laboratory. Prerequisite: FPM 343 or consent of instructor.

FPM 412 Law of Real Property (3)
Legal theory and practice of estates in land. Landlord and tenant relationships, land transactions, mortgages and trust deeds, easements, land use, ownership rights in land and public land law. 3 lectures. Prerequisite: Bus 301 or 307

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 301 Labor in California (3)
Development of trade unions in California and their internal organization, the impact of collective bargaining on the labor markets, labor legislation, trade union contracts, collective bargaining, grievances and arbitration. 3 lectures. Prerequisite: IR 111 or consent of instructor.

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

MSM 204  Marketing Principles (3)
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. 3 lectures. Prerequisite: Sophomore standing.

MSM 205  Physical Distribution (3)
Physical movement of goods from producers to ultimate consumers. Includes channels of distribution to industrial and consumer markets, packaging and packing, warehousing and storage, material handling, transportation, wholesaling and retailing. 3 lectures. Prerequisite: MSM 204

MSM 206  Market-Sales Development (3)
Definition and determination of markets. Matching products and services with market demand. Analysis of products and markets as a guide to presentations to buyers. Service-sales techniques. 3 lectures. Prerequisite: MSM 204

MSM 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: MSM 204 or consent of instructor.

MSM 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: MSM 206

MSM 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: Consent of instructor.
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

**DESCRIPTIONS OF COURSES IN EDUCATION**

**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 305 Guidance Techniques for Teachers and Parents (3)**

Counseling and guidance as an integral part of good education; parent-child relationships; teacher-child relationships; some diagnostic techniques; techniques of parent conference; the community and mental hygiene; community and state resources available to parents and teachers. 3 lectures. Prerequisite: Ed 304

**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. Techniques of parent-teacher conferences, and current trends in reporting pupil progress. Some observation in the public schools. 3 lectures.

Ed 417 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 418 Principles of Adult Education (3)
Purposes, significance, scope and methods of teaching as applied to adult education. 3 lectures.

Ed 424 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 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, instructional methods, and curriculum for the kindergarten-primary grades. Acquisition of appropriate materials, construction of instructional aids, and student demonstration lessons. 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 478 Elementary Curriculum Construction (3)
Advanced approach to the problems of elementary curriculum development. Public relations; people involved in building the curriculum; implementing the purposes of education through the curriculum; child development and the curriculum. 3 lectures. Prerequisite: Ed 331

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 problems associated with the operation of the schools and school systems. Conditions of service and classification. Salary schedules, tenure and retirement. Selection, assignment, and in-service programs for staff members. 3 lectures.

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, salaries and retirement, purchasing and managing of plants, equipment, and supplies. 3 lectures. Prerequisite: Valid general 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 general 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 general 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 general credential.

Ed 514 School Housing (3)
Designing school plants to serve educational purposes; procedures involved in planning school construction; selection and use of school sites; functions of architects, engineers, and contractors; financing school building programs; the law related to school housing; community participation in building programs; the services of the State Department of Education. 3 lectures. Prerequisite: Valid general 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 general 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 general 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 general credential.

Ed 518 Problems in Teaching Reading (3)
For teachers and supervisors in elementary and secondary schools who need information on latest methods of diagnosing individual reading problems. Problems of individuals, classes and schools analyzed. Formulation of plans for improved reading instruction and total school programs based on research information. 3 lectures. Prerequisite: Graduate standing.
California State Polytechnic College

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 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 430, 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 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 Ed 516 and Ed 532 or Ed 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.
Ed 591 Seminar in School Administration (3)

Current problems in school administration; study of recent and current literature bearing on administration; development of problem-solving techniques for administrators. 3 discussion meetings. Prerequisite: Valid general credential.

**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)

The contribution which art can make to the democratic way of life. Consideration of the development of appreciative and creative skills. Emphasis on drawing and graphic work. The development of units and procedures. Problems in developing creative skills in selecting, organizing, guiding, and evaluating individual and group activities. 3 activity periods.

Art 233 Orientation to Crafts (3)

Basic projects with various craft materials such as ceramics, metalwork, textile design, woodwork, and leatherwork. Emphasis on design as presented through materials and their properties. Lectures, discussion, 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, its furnishings and to personal attire. Laboratory problems in the arrangement, selection and evaluation of useful and well designed objects; study of line, color in relation to personal grooming. 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 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 420, 421  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 Agriculture and Engineering (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 1, 2  Reading Improvement (2) (2)
Improvement of basic reading skills. Training in quick, accurate visual and auditory perception. Vocabulary development. Improvement of comprehension through analysis of author's purpose and techniques. 2 lectures.

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 Department of English and Speech serves all divisions 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. For this purpose the department offers a major in English and minors in both English and Speech. To produce teachers well versed in the areas of English commonly taught in the public schools, the major curriculum provides 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. Students who demonstrate considerable deficiency will be assigned to English 4, a preparatory course without credit toward a degree. A passing grade in this course entitles the student to enroll in English 104.

**CURRICULUM IN ENGLISH**

<table>
<thead>
<tr>
<th>Freshman</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>Public Speaking (Sp 201)</td>
<td></td>
<td></td>
<td>2</td>
</tr>
<tr>
<td>Physical Education (PE 141)</td>
<td>½</td>
<td>½</td>
<td></td>
</tr>
<tr>
<td>Health Education (PE 107)</td>
<td>2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Basic Mathematics for General Education (Math 100)</td>
<td></td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>History of Civilization (Hist 101, 102, 103)</td>
<td>3</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>*Natural Science</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>**Electives</td>
<td>3</td>
<td>2</td>
<td>2</td>
</tr>
</tbody>
</table>

Total: 16½

* 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>F</th>
<th>W</th>
<th>S</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sports Education (PE 241)</td>
<td>½</td>
<td>½</td>
<td>½</td>
</tr>
<tr>
<td>*Natural Science</td>
<td>3</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>European Literature (Eng 211)</td>
<td></td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Cultural Anthropology (Ant 201)</td>
<td></td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>General Psychology (Psy 202)</td>
<td></td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>British Literature (Eng 214, 215, 216)</td>
<td>3</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>Shakespeare (Eng 315)</td>
<td>3</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>Electives</td>
<td>7</td>
<td>7</td>
<td>7</td>
</tr>
</tbody>
</table>

| Total                                               | 16½| 16½| 16½|

### Junior

<table>
<thead>
<tr>
<th>Course</th>
<th>F</th>
<th>W</th>
<th>S</th>
</tr>
</thead>
<tbody>
<tr>
<td>American Government (Pol Sc 301)</td>
<td>3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Growth of American Democracy (Hist 304)</td>
<td></td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>American Literature (Eng 311, 312, 313)</td>
<td>3</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>Advanced Composition (Eng 304, 305, 306)</td>
<td>3</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>†Art</td>
<td></td>
<td></td>
<td>3</td>
</tr>
<tr>
<td>Children's Literature (Eng 205) or</td>
<td></td>
<td></td>
<td>3</td>
</tr>
<tr>
<td>Readings for Young Adults (Eng 316)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Oral Interpretation (Sp 305)</td>
<td></td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Senior Project (Eng 461)</td>
<td>8</td>
<td>5</td>
<td>3</td>
</tr>
<tr>
<td>Electives</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

| Total                                               | 17 | 17 | 17 |

### Senior

<table>
<thead>
<tr>
<th>Course</th>
<th>F</th>
<th>W</th>
<th>S</th>
</tr>
</thead>
<tbody>
<tr>
<td>United States in World Affairs (Hist 305)</td>
<td>3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Introduction to Philosophy (Phil 201)</td>
<td></td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Senior Project (Eng 462)</td>
<td></td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>Undergraduate Seminar (Eng 463)</td>
<td></td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>Modern Novel (Eng 415) or Modern Poetry (Eng 416)</td>
<td></td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>or Elizabethan Drama (Eng 419)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>History of the English Language (Eng 303)</td>
<td></td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Modern English Grammar (Eng 302)</td>
<td></td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Significant British Writers (Eng 417) or</td>
<td></td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Significant American Writers (Eng 418)</td>
<td></td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Electives</td>
<td>5</td>
<td>7</td>
<td>8</td>
</tr>
</tbody>
</table>

| Total                                               | 16 | 16 | 16 |

### DESCRIPTIONS OF COURSES IN ENGLISH

**Eng 4 Preparatory English (3)**

For the student who needs additional writing before English 104. Organization of ideas into logical, clear sentences and paragraphs. Taught primarily through intensive writing based on the student's interests and experience. 3 lectures.

**Eng 5 Intensive English for Foreign Students (6)**

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. Two 2-hour lectures, two 2-hour laboratories.

**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 to degree students for degree credit. 3 lectures. Prerequisite: Satisfactory score on placement test or Eng 4

*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.

† See General Education list.
Eng 104 Freshman Composition (3)
Written composition based on language study. Organization of content of sentences, paragraphs, and essays. Forms of exposition. 3 lectures. Prerequisite: Satisfactory score on placement test or Eng 4

Eng 105 Freshman Composition (3)
Continuation of written composition. Use of logic and argumentation. Development of effective style. Use of reference materials and preparation of term paper. 3 lectures. Prerequisite: Eng 104

Eng 106 Freshman Composition (3)
Continuation of written composition with emphasis on the critical paper. Supplementary practice in oral presentation. 3 lectures. Prerequisite: Eng 105

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 Intermediate 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 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 214, 215, 216 British Literature (3) (3) (3)
Selected readings in British literature from the beginning to the mid-20th century. 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  Report Writing  (3)  
Study of the research paper in industry and engineering. Extensive writing experience. 3 lectures. Prerequisite: Eng 105

Eng 302  Modern English Grammar  (3)  
A comparative study of traditional and modern grammars. 3 lectures. Prerequisite: Eng 106

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, 214, 215, 216

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 311, 312, 313  American Literature  (3) (3) (3)  
Directed readings in American writers from Colonial times to the present. 3 lectures. Prerequisite: Eng 105

Eng 315  Shakespeare  (3)  
An introduction to Shakespeare's plays. 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 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 214, 215, 216
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, 214

Eng 461, 462 Senior Project (2) (2)
Selection and completion of a project under minimum 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 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 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 6 units. 1-3 lectures. Prerequisite: Graduate standing in English.

DESCRIPTIONS OF COURSES IN SPEECH

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 201

Sp 214 Introduction to Radio and Television Programming (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 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 221 Stagecraft (3)
Scenery design, construction, painting, lighting, costumes, and make-up. 1 lecture, 2 two-hour laboratories. Prerequisite: Sp 220

Sp 231 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 12 units. 2 three-hour laboratories.
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 202

Sp 302 Speech Correction (2)
Common and typical speech deviations usually found in American speech. Procedures for the improvement and correction of speech. 1 lecture, 1 two-hour laboratory. Prerequisite: Sp 201

Sp 304 Persuasion (2)
Basic theory of persuasive speaking. Preparation and delivery of speeches designed to secure hearer's acceptance of the speaker's views. 1 lecture, 1 two-hour laboratory. Prerequisite: Sp 202

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 202

Sp 321 Acting and Directing (3)
Basic acting and directing techniques, improvisation, characterization, pantomime, and movement. 1 lecture, 2 two-hour laboratories. Prerequisite: Sp 220

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 202

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 302

Sp 403 Discussion Techniques (2)
Role of spoken discourse in the solution of problems. Special emphasis on forms of discussion: panels, forums, and symposiums. 1 lecture, 1 two-hour laboratory. Prerequisite: Sp 304

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.

DESCRIPTION OF COURSES IN FRENCH
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.

DESCRIPTION OF COURSES IN SPANISH
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. 3 lectures. Prerequisite: Span 103 or equivalent.
The objectives of the Home Economics Department are to provide education for persons interested in home economics, in teaching home economics in secondary schools, extension service, home economics journalism, home equipment demonstration work, food administration, and other occupations closely related to home economics.

For those who wish to broaden their general education, the Home Economics Department offers courses which enrich personal and family life through the development of basic concepts and skills. Students are invited to consult with a staff member of the department concerning their special interests in home economics and family life education.

Considerable emphasis is placed upon applied courses in the first two years. These courses are designed to increase the employability of the student after the first two years of study and also afford a substantial basis for successful marriage and family life.

**CURRICULAR OPTIONS**

**General Home Economics**

The General Home Economics option prepares the woman whose chief responsibilities are as a wife and mother. It also leads to positions in home service departments of utility and appliance companies, child care centers, consumer education, and home furnishing establishments.

A Standard Teaching Credential With Specialization in Secondary Teaching may be obtained with additional courses in a fifth year of study. Since studies show that there will be a shortage of home economics teachers in secondary schools for some time, a graduate who holds a teaching credential will have numerous employment opportunities. The student preparing to teach should refer to the section of the catalog which gives information regarding preparation for credentials for public school service and consult with the adviser early in the baccalaureate program.

**Food Administration**

The Food Administration option prepares for the 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 either in therapeutic administrative dietetics or in business administration.

**CURRICULUM IN HOME ECONOMICS**

<table>
<thead>
<tr>
<th>Freshman</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>Physical Education (PE 141)</td>
<td></td>
<td>½</td>
<td>½</td>
</tr>
<tr>
<td>Basic Mathematics for General Education (Math 100)</td>
<td>3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Art in the Home (Art 238)</td>
<td></td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Health Education (PE 107)</td>
<td></td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>Orientation to Home Economics (HE 101)</td>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Family Meals (HE 121)</td>
<td></td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Clothing Selection and Construction (HE 131)</td>
<td>3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Home Furnishings (HE 142)</td>
<td></td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>Family Development (HE 103)</td>
<td></td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Electives and courses to complete major</td>
<td>1</td>
<td>6</td>
<td>13</td>
</tr>
<tr>
<td></td>
<td>16½</td>
<td>17½</td>
<td>16½</td>
</tr>
</tbody>
</table>
### Sophomore

<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>General Psychology (Psy 202)</td>
<td>3</td>
</tr>
<tr>
<td>Sports Education (PE 241)</td>
<td>( \frac{1}{2} )</td>
</tr>
<tr>
<td>Principles of Economics (Ec 201)</td>
<td>3</td>
</tr>
<tr>
<td>Elementary Human Physiology (Zoo 122)</td>
<td>4</td>
</tr>
<tr>
<td>General Bacteriology (Bact 221)</td>
<td>4</td>
</tr>
<tr>
<td>Foods for Special Occasions (HE 221)</td>
<td>2</td>
</tr>
<tr>
<td>Family Clothing (HE 241)</td>
<td>2</td>
</tr>
<tr>
<td>Household Equipment (HE 231)</td>
<td>3</td>
</tr>
<tr>
<td>Sociology of Family Life (Soc 206)</td>
<td>3</td>
</tr>
<tr>
<td>Family and Community Health (HE 222)</td>
<td>2</td>
</tr>
<tr>
<td>The Child and the Family (HE 233)</td>
<td>4</td>
</tr>
<tr>
<td>Electives and courses to complete major</td>
<td>8</td>
</tr>
</tbody>
</table>

**Total Credits:** 16\( \frac{1}{2} \)

### Junior

<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>Literature or Philosophy</td>
<td>3</td>
</tr>
<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>Public Speaking (Sp 201)</td>
<td>2</td>
</tr>
<tr>
<td>Family Nutrition (HE 321)</td>
<td>3</td>
</tr>
<tr>
<td>U. S. In World Affairs (Hist 305)</td>
<td>3</td>
</tr>
<tr>
<td>Senior Project (HE 461)</td>
<td>2</td>
</tr>
<tr>
<td>Electives and courses to complete major</td>
<td>11</td>
</tr>
</tbody>
</table>

**Total Credits:** 17

### Senior

<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>Senior Project (HE 462)</td>
<td>2</td>
</tr>
<tr>
<td>Undergraduate Seminar (HE 463)</td>
<td>2</td>
</tr>
<tr>
<td>Public Relations (Jour 412)</td>
<td>3</td>
</tr>
<tr>
<td>Meal Management (HE 421)</td>
<td>4</td>
</tr>
<tr>
<td>Electives and courses to complete major</td>
<td>11</td>
</tr>
</tbody>
</table>

**Total Credits:** 17

### GENERAL HOME ECONOMICS OPTION (ADD COURSES BELOW TO BASIC CURRICULUM)

#### Freshman

<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>PSc 101-2 General Physical Science</td>
<td>(8)</td>
</tr>
<tr>
<td>Soc Sc 101 Introduction to the Social Sciences</td>
<td>(3)</td>
</tr>
<tr>
<td>HE 123 Personal and Home Management</td>
<td>(3)</td>
</tr>
</tbody>
</table>

#### Junior

<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>Art 321 Applied Color and Design</td>
<td>(3)</td>
</tr>
<tr>
<td>HE 322 Textiles</td>
<td>(3)</td>
</tr>
<tr>
<td>Arch 312 Home Design</td>
<td>(3)</td>
</tr>
<tr>
<td>HE 323 Home Decoration</td>
<td>(2)</td>
</tr>
<tr>
<td>HE 333 Costume Design and Construction</td>
<td>(3)</td>
</tr>
</tbody>
</table>

#### Sophomore

<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>PSc 103 General Physical Science</td>
<td>(4)</td>
</tr>
<tr>
<td>Ec 105 Consumer Economics</td>
<td>(3)</td>
</tr>
</tbody>
</table>

#### Senior

<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>HE 424 Home Management</td>
<td>(3)</td>
</tr>
<tr>
<td>or</td>
<td></td>
</tr>
<tr>
<td>HE 423 Home Management Residence</td>
<td>(4)</td>
</tr>
</tbody>
</table>

*To be selected from the General Education list. Include at least one course in literature.*
**FOOD ADMINISTRATION OPTION (ADD COURSES BELOW TO BASIC CURRICULUM)**

<table>
<thead>
<tr>
<th>Level</th>
<th>Course</th>
</tr>
</thead>
<tbody>
<tr>
<td>Freshman</td>
<td>Chem 324-5 General Inorganic Chemistry</td>
</tr>
<tr>
<td></td>
<td>Chem 326 Organic Chemistry</td>
</tr>
<tr>
<td></td>
<td>Actg 221-2 Principles of Accounting</td>
</tr>
<tr>
<td></td>
<td>Soc Sc 101 Introduction to the Social Sciences</td>
</tr>
<tr>
<td></td>
<td>Bus 104 Office Organization and Operation</td>
</tr>
<tr>
<td></td>
<td>FI 209 Meat Procurement and Use</td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td>Sophomore</td>
<td></td>
</tr>
<tr>
<td></td>
<td>HE 425 Quantity Cookery</td>
</tr>
<tr>
<td></td>
<td>HE 426 Food Production Management</td>
</tr>
<tr>
<td></td>
<td>HE 427 Equipment and Layout</td>
</tr>
<tr>
<td></td>
<td>HE 428 Advanced Nutrition</td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td>Junior</td>
<td>Bact 342 Sanitary Inspection and Control</td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td>Senior</td>
<td></td>
</tr>
</tbody>
</table>

**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** Family Development (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** Family Meals (3)
Preparation of economical, nutritious, and appetizing family meals with particular emphasis on time management for employed homemakers. Study of the association between family meals and family relationships. 2 lectures, 3 one-hour laboratories.

**HE 123** 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 131** Clothing Selection and Construction (3)
Modern precision methods of clothing construction. Inter-relationship of personal appearance with the sociological and psychological development of individuals. 1 lecture, 2 laboratories.

**HE 142** Home Furnishings (2)
Consumer approach to home furnishings through upholstering a unit of furniture and drapery construction. 2 laboratories.

**HE 221** Foods for Special Occasions (2)
Planning, preparing, and serving meals for large family groups, community groups, or special occasions involving groups of medium size. Etiquette of proper table setting and service. 1 lecture, 1 laboratory. Prerequisite: HE 121

**HE 222** Family and Community Health (2)
Problems in maintenance of individual, family and community health related to learnings in psychology, physiology, sociology and economics. Experience in the techniques applicable to the care of the sick and injured in the home. 1 lecture, 1 two-hour laboratory. Prerequisite: Sophomore standing or permission of instructor.

*Of the elective units in the junior year 15 must be chosen with the approval of the adviser in a field of concentration.*
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: PSc 102 or equivalent.

HE 233 The Child and the Family (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. 2 lectures, 2 laboratories. Prerequisite: Psy 202 or Soc 206 or HE 103

HE 241 Family Clothing (2)
Selection and construction of clothing for adults and children. Emphasis upon physiological changes related to design. 2 laboratories. Prerequisite: HE 131 or permission of instructor.

HE 321 Family Nutrition (3)
Chemical composition of foods and their utilization in the body. Relation of adequate diet to physical and mental health of various family members. 2 lectures, 1 two-hour laboratory. Prerequisite: HE 121

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 laboratory. Prerequisite: PSc 103 or equivalent.

HE 323 Home Decoration (2)
Selection and arrangement of furnishings as they relate to expression of personality, architectural design and setting. 1 lecture, 1 laboratory, Prerequisite: HE 322, Art 321, Arch 312

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 332 Finishing Techniques (2)
Finishing old and unpainted furniture and built-ins. Repairing, finishing walls and woodwork in a home. Individual problems. 2 laboratories.

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: Art 321, HE 241, 322

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 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 Meal Management (4)
Experience in menu planning and meal service for groups with emphasis on food buying, catering and management. 2 lectures, 2 laboratories. Prerequisite: HE 321 and permission of instructor.

HE 423 Home Management Residence (4)
Living in home management residence one-half quarter (maximum six weeks), counseling with students in HE 123, analysis of case studies. For teaching credential candidates only. 1 lecture, 3 laboratories. Prerequisite: Senior standing in Home Economics, permission of instructor.

HE 424 Home Management (3)
Philosophy of home management and the factors involved in the management of human and natural resources in the home; the decision-making process of planning, controlling, and evaluating use of resources to attain goals. 3 lecturers. Prerequisite: Senior standing, permission of instructor.

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 321

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 428 Advanced Nutrition (3)
Introduction to therapeutic diets, history of nutrition, and individual exploration in a selected area of recent research. 2 lectures, 1 laboratory. Prerequisite: HE 321, PSc 103 or equivalent.

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

It is necessary that the student have some previous experience with a musical instrument in order to try out for band, brass, string, and woodwind 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 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 Piano—Theory and Performance (1) (1) (1)**


**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 Piano—Theory and Performance (1) (1) (1)

Upper elementary piano grades: Selections as from C.P.E. Bach, J. S. Bach; 18 Little Preludes and Fugues; Clementi Sonatinas (Op. 36), Six Sonatinas by Haydn, Mozart, Beethoven (Fisher), Master Series for the Young. 1 activity.

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 Piano—Theory and Performance (1) (1) (1)

Intermediate piano grades: Selections as Bach Small Preludes and easier two-part Inventions; Clementi and Dussek Sonatinas, Haydn Sonatinas, easier Mozart and Beethoven Sonatas. All diminished and dominant seventh chords in four positions. 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 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 Musical 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
PHYSICAL EDUCATION DEPARTMENT

Department Head, Robert A. Mott

Richard Anderson  Vaughan Hitchcock  Richard J. Purcell
Victor Buccola  Leroy B. Hughes  Mary L. Stallard
Francis S. Chestnut  James J. Jensen  Albert E. Swartz
Sheldon Harden  Edward J. Jorgensen  Mary Lou White
William Hicks  Thomas J. Lee

The major function of the Department of Physical Education 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 gymnasium has a championship basketball court and three intramural basketball courts. It also has a wrestling room, weight training area and a gymnastic room. All these facilities are adjacent to the men's locker and shower room.

The women's program is centered in Crandall Gym which has adequate facilities for basketball, volleyball, badminton, gymnastics. A dance studio 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>Freshman</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>Basic Mathematics for General Education (Math 100, 200)</td>
<td>3</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Health Education (PE 107)</td>
<td></td>
<td></td>
<td>2</td>
</tr>
<tr>
<td>Physical Education (PE 141)</td>
<td>½</td>
<td>½</td>
<td>½</td>
</tr>
<tr>
<td>Safety and First Aid (PE 121)</td>
<td>2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Community Recreation (PE 126)</td>
<td></td>
<td></td>
<td>3</td>
</tr>
<tr>
<td>Swimming and Water Sports (PE 123)</td>
<td></td>
<td></td>
<td>2</td>
</tr>
<tr>
<td>General Physical Science (PSc 101, 102 or equiv.)</td>
<td>4</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>General Zoology (Zoo 131, 132)</td>
<td>4</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>Electives</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>16½</td>
<td>16½</td>
<td>16½</td>
</tr>
<tr>
<td>Sophomore</td>
<td>F</td>
<td>W</td>
<td>S</td>
</tr>
<tr>
<td>-------------------------------</td>
<td>---</td>
<td>---</td>
<td>---</td>
</tr>
<tr>
<td>Principles of Economics (Ec 201)</td>
<td>3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>* Social Science Elective</td>
<td>3</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>General Psychology (Psy 202)</td>
<td></td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Intramural Sports (PE 231, 232, 233)</td>
<td>1</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>General Physical Science (PSc 103 or equiv.)</td>
<td>4</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Public Speaking (Sp 201)</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>Human Anatomy (Zoo 337)</td>
<td>3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Human Physiology (Zoo 338, 339)</td>
<td>3</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Principles of Physical Education (PE 201)</td>
<td>3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Apparatus and Gymnastics (PE 255 or 256)</td>
<td>2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>School and Community Health Education (PE 203)</td>
<td>2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Advanced Public Speaking (Sp 202)</td>
<td></td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>Sociology of Family Life (Soc 206)</td>
<td></td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Electives</td>
<td>5</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td></td>
<td>16½</td>
<td>17½</td>
<td>16½</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Junior (Women)</th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>American Government (Pol Sc 301)</td>
<td>3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Growth of American Democracy (Hist 304)</td>
<td></td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Literature</td>
<td>3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Literature, Art or Music</td>
<td>3</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Educational Psychology (Ed 312)</td>
<td>3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Teaching Progression in Girls' Sports (PE 324, 325, 326)</td>
<td>2</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>Teaching Elementary School Physical Education (PE 332)</td>
<td>3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Physiology of Exercise (PE 303)</td>
<td>2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Camping and Outdoor Education (PE 337)</td>
<td>3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Physical Education Activity (PE 341, 342, 343)</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Kinesiology (PE 302)</td>
<td></td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>Introduction to Dance (PE 334)</td>
<td></td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Electives</td>
<td>4</td>
<td>6</td>
<td></td>
</tr>
<tr>
<td></td>
<td>16</td>
<td>17</td>
<td>17</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Senior (Women)</th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Senior Project (PE 461, 462)</td>
<td>2</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>Undergraduate Seminar (PE 463)</td>
<td></td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>U.S. in World Affairs (Hist 305)</td>
<td>3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Teaching Progression in Dance (PE 446, 447, 448)</td>
<td>2</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>Organization and Administration of Health and Physical Education (PE 401)</td>
<td>3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Tests and Measurements in Physical Education (PE 425)</td>
<td>3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Administration of School Health Education (PE 405)</td>
<td>2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Adaptive Physical Education (PE 406)</td>
<td>6</td>
<td>7</td>
<td>10</td>
</tr>
<tr>
<td>Electives</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>16</td>
<td>16</td>
<td>16</td>
</tr>
</tbody>
</table>

* To be selected from the General Education list.
### Junior (Men)

<table>
<thead>
<tr>
<th>Course Description</th>
<th>F</th>
<th>W</th>
<th>S</th>
</tr>
</thead>
<tbody>
<tr>
<td>American Government (Pol Sc 301)</td>
<td>3</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>Growth of American Democracy (Hist 304)</td>
<td>3</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>Literature</td>
<td>3</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>Literature, Art or Music</td>
<td>3</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>Educational Psychology (Ed 312)</td>
<td>3</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>Football Coaching Theory and Practice (PE 321)</td>
<td>2</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>Track and Field Theory and Practice (PE 333)</td>
<td>2</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>Baseball Theory and Practice (PE 333)</td>
<td>2</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>Teaching Physical Education in Elementary Schools (PE 332)</td>
<td>3</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>Physiology of Exercise (PE 303)</td>
<td>2</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>Techniques of Officiating (PE 331)</td>
<td>2</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>Physical Education Activity (PE 341, 342, 343)</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Kinesiology (PE 302)</td>
<td>2</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>Electives</td>
<td>6</td>
<td>4</td>
<td>4</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>17</td>
<td>16</td>
<td>17</td>
</tr>
</tbody>
</table>

### Senior (Men)

<table>
<thead>
<tr>
<th>Course Description</th>
<th>F</th>
<th>W</th>
<th>S</th>
</tr>
</thead>
<tbody>
<tr>
<td>Senior Project (PE 461, 462)</td>
<td>2</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>Undergraduate Seminar (PE 463)</td>
<td>3</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>U.S. in World Affairs (Hist 305)</td>
<td>3</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>Basketball Theory and Practice (PE 432)</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Minor Sports Theory and Practice (PE 441, 442, 443)</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Organization and Administration of Physical Education (PE 401)</td>
<td>2</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>Tests and Measurements in Physical Education (PE 425)</td>
<td>2</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>Administration of School Health Education (PE 405)</td>
<td>2</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>Athletic Training and Massage (PE 432)</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Adaptive Physical Education (PE 406)</td>
<td>2</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>Electives</td>
<td>7</td>
<td>5</td>
<td>11</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>16</td>
<td>16</td>
<td>16</td>
</tr>
</tbody>
</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.

**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, 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 all who do not pass college swimming test. 2 one-hour periods.
PE 147 Adaptive Activities (1/2)
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 (1/2)
May be substituted for required physical education by those qualified to compete in intercollegiate sports program. 10 hours activity. Total credit limited to 1 1/2 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 231, 232, 233 Intramural Sports (1) (1) (1)
Application of principles underlying programs of intramural sports in secondary schools and community centers. 1 two-hour laboratory.

PE 241 Sports Education (1/2)
Tennis, golf, badminton, squash, handball, archery, volleyball, fencing. Synchronized swimming, advanced swimming, American Red Cross lifesaving. 2 one-hour periods. Total credit limited to 1 1/2 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 (1/2)
May be substituted for required physical education by those qualified to compete in intercollegiate sports program. 10 hours activity. Total credit limited to 1 1/2 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)
Progression and teaching techniques in tumbling and gymnastic stunts. 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.

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 320 Driver Education and Driver Training (3)
Recommended procedures used in training drivers of high school ages. Attitudes and practices; behind-the-wheel teaching techniques. 2 lectures, 1 two-hour laboratory.

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 and techniques of the following sports: Basketball, badminton, archery, tennis, soccer, speedball, hockey, volleyball, golf. 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 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)
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.

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)
Teaching progression in dance: folk, contemporary, and social. 2 two-hour laboratories. Prerequisite: PE 334

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

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 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 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. Directed observations, field experience; class organization, management of games and relays. 3 lectures.
PRINTING ENGINEERING AND MANAGEMENT
DEPARTMENT

Department Head, A. M. Fellows

James H. Babb
Wesley T. Dunn
Lawrence H. Eckrote
C. Herold Gregory

The Printing Department offers a four-year curriculum in printing engineering and management, leading to a Bachelor of Science degree in Applied Arts with a major in Printing Engineering 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 engineering 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 ENGINEERING AND MANAGEMENT

<table>
<thead>
<tr>
<th>Freshman</th>
<th>F</th>
<th>W</th>
<th>S</th>
</tr>
</thead>
<tbody>
<tr>
<td>History of Printing (Pr 101)</td>
<td>2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Proofreading (Pr 102)</td>
<td>2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Graphic Design and Display (Pr 103)</td>
<td></td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Elementary Typography (Pr 121)</td>
<td></td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>Production Problems (Pr 123)</td>
<td></td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Hand-Fed Platen Presswork (Pr 131)</td>
<td></td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Automatic Platen Presswork (Pr 132)</td>
<td></td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Elementary Cylinder Presswork (Pr 133)</td>
<td></td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>Bindery Operations (Pr 151)</td>
<td></td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Editing and Copy Desk (Jour 233)</td>
<td></td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Freshman Composition (Eng 104, 105, 106)</td>
<td>3</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>Mathematics for Engineers (Math 117)</td>
<td></td>
<td>5</td>
<td></td>
</tr>
<tr>
<td>Manufacturing Processes (MFGP 141, 142)</td>
<td>1</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Manufacturing Processes (WM 141)</td>
<td></td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Applied Biology (Bio 110)</td>
<td></td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Physical Education (PE 141)</td>
<td></td>
<td>½</td>
<td>½</td>
</tr>
<tr>
<td>Electives</td>
<td></td>
<td>3</td>
<td></td>
</tr>
<tr>
<td></td>
<td>16½</td>
<td>18½</td>
<td>17½</td>
</tr>
</tbody>
</table>
Sophomore

<table>
<thead>
<tr>
<th>Course</th>
<th>F</th>
<th>W</th>
<th>S</th>
</tr>
</thead>
<tbody>
<tr>
<td>Theory of Color (Pr 201)</td>
<td>3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Intermediate Typography (Pr 221)</td>
<td></td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>Automatic Cylinder Presswork (Pr 232)</td>
<td></td>
<td></td>
<td>3</td>
</tr>
<tr>
<td>Advanced Automatic Cylinder Presswork (Pr 233)</td>
<td></td>
<td></td>
<td>3</td>
</tr>
<tr>
<td>Machine Maintenance (Pr 235, 236)</td>
<td></td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>Composing Machine Operation (Pr 241, 242, 243)</td>
<td>3</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>Public Speaking (Sp 201)</td>
<td></td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>Principles of Economics (Ec 201)</td>
<td></td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>General Psychology (Psy 202)</td>
<td></td>
<td></td>
<td>3</td>
</tr>
<tr>
<td>General Chemistry (Chem 321, 322, 323) or College Physics (Phys 121, 122, 123)</td>
<td>4</td>
<td>4</td>
<td>4</td>
</tr>
<tr>
<td>Health Education (PE 107)</td>
<td></td>
<td></td>
<td>2</td>
</tr>
<tr>
<td>Sports Education (PE 241)</td>
<td>½</td>
<td>½</td>
<td>½</td>
</tr>
<tr>
<td>News Writing (Jour 202)</td>
<td></td>
<td></td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>17½</td>
<td>17½</td>
<td>17½</td>
</tr>
</tbody>
</table>

Junior

<table>
<thead>
<tr>
<th>Course</th>
<th>F</th>
<th>W</th>
<th>S</th>
</tr>
</thead>
<tbody>
<tr>
<td>Composing Machine Operation (Pr 321)</td>
<td>3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cold Type Processes (Pr 322, 323)</td>
<td>3</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>Offset Camera Work (Pr 324)</td>
<td>3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Offset Platemaking (Pr 325)</td>
<td></td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Offset Presswork (Pr 326)</td>
<td></td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Publication Makeup and Markup (Pr 332)</td>
<td></td>
<td></td>
<td>3</td>
</tr>
<tr>
<td>Machine Maintenance (Pr 341)</td>
<td>3</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>Literature (Eng 211, 212 or Eng 311, 312)</td>
<td></td>
<td></td>
<td>3</td>
</tr>
<tr>
<td>American Government (Pol Sc 301)</td>
<td></td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Growth of American Democracy (Hist 304)</td>
<td>3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>U. S. in World Affairs (Hist 305)</td>
<td></td>
<td></td>
<td>3</td>
</tr>
<tr>
<td>Basic Accounting (Actg 131, 132)</td>
<td>3</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>Report Writing (Eng 301)</td>
<td></td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Electives</td>
<td>3</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>18</td>
<td>18</td>
<td>18</td>
</tr>
</tbody>
</table>

Senior

<table>
<thead>
<tr>
<th>Course</th>
<th>F</th>
<th>W</th>
<th>S</th>
</tr>
</thead>
<tbody>
<tr>
<td>Printing Management (Pr 401)</td>
<td>3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Estimating (Pr 411, 412, 413)</td>
<td></td>
<td>3</td>
<td>1</td>
</tr>
<tr>
<td>Production Problems (Pr 421, 422, 423)</td>
<td>3</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>Advanced Typography (Pr 431)</td>
<td></td>
<td></td>
<td>3</td>
</tr>
<tr>
<td>Plant Organization and Layout (Pr 433)</td>
<td></td>
<td></td>
<td>3</td>
</tr>
<tr>
<td>Advanced Offset (Pr 434, 435)</td>
<td>3</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Senior Project (Pr 461, 462)</td>
<td></td>
<td></td>
<td>2</td>
</tr>
<tr>
<td>Undergraduate Seminar (Pr 463)</td>
<td></td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>Business and Its Environment (Bus 202)</td>
<td>2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Marketing Principles (MSM 204)</td>
<td>3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cost Accounting and Analysis (Actg 223)</td>
<td></td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>Industrial Management (IR 311)</td>
<td></td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Industrial Relations (IR 312)</td>
<td></td>
<td>3</td>
<td></td>
</tr>
<tr>
<td></td>
<td>17</td>
<td>18</td>
<td>16</td>
</tr>
</tbody>
</table>

DESCRIPTIONS OF COURSES IN PRINTING ENGINEERING
AND MANAGEMENT

Pr 101 History of Printing (2)

Development of the historical background of printing and lithography from its origin to the time of Gutenberg, continuing through changes in materials and equipment to the highly developed industry of today. Analysis of trade requirements and job opportunities. 2 lectures.
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 123 Introductory Production Problems (3)
Proper use and operation of all printshop equipment. Safety and accident prevention. Familiarization with cost and labor-saving machines and devices. Care and operation of stereotype equipment, including routers, shavers, saws, shell-cast and type-high stereotypes and metallurgy. Color reproduction from stereotype casts. 2 lectures, 1 laboratory. Prerequisite: Pr 121

Pr 131 Hand-fed Platen Presswork (3)
Introduction to platen press. Instruction in care and maintenance, lockup of forms, makeready, and nomenclature of all types of platen presses. Practical experience in feeding and operation of presses. 1 lecture, 2 laboratories.

Pr 132 Automatic Platen Presswork (3)
Operation and maintenance of automatic fed platen presses, proper positioning and lockup of type forms, makeready, and correct use of inks, scoring rules and perforating. 1 lecture, 2 laboratories. Prerequisite: Pr 131

Pr 133 Introduction to Cylinder Press (2)
Study of development and advantages of the cylinder press. Practical hand feeding and care of press, ink, and rollers in actual production of College newspaper and other projects. 1 lecture, 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 232 Automatic Cylinder Presswork (3)
Operation and maintenance of automatic cylinder presses, with investigation of makeready, ink, paper and other press problems. Study of color and process printing. 1 lecture, 2 laboratories. Prerequisite: Pr 122, 133

Pr 233 Advanced Automatic Cylinder Presswork (3)
Continuation of Pr 232 with emphasis on production, maintenance and color process printing. 1 lecture, 2 laboratories. Prerequisite: Pr 232
Pr 235 Composing Room Maintenance (2)
Introduction to mechanism, maintenance, and repair of composing room equipment. Linotype, Intertype, Elrod, Ludlow, saws, surfacing machines and mitering equipment. Development of maintenance and service charts. Field trips, pictures and study of plant maintenance. 1 lecture, 1 laboratory. Prerequisite: Pr 241

Pr 236 Composing Room Maintenance (2)
Continuation of Pr 235. Advanced methods of maintenance and repair. Lockup, electric and gas pot adjustments, Intertype and Linotype. Study of heating elements and modern heat-control mechanisms. 1 lecture, 1 laboratory. Prerequisite: Pr 235

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

Pr 241 Composing Machine Operation (3)
Introduction to operation of Intertype and Linotype composing machines. Touch system and proper keyboard operation. Operational adjustments and care of machine. 1 lecture, 2 laboratories. Prerequisite: Pr 121

Pr 242 Composing Machine Operation (3)
Advanced operation and care of composing machines. Use of italics, caps and small caps, ligatures and logotypes. Typography, proper established styles of market ads, classified ads, radio logs. 1 lecture, 2 laboratories. Prerequisite: Pr 241

Pr 243 Composing Machine Operation (3)
Bookwork, magazine, and commercial composition. 1 lecture, 2 laboratories. Prerequisite: Pr 242

Pr 321 Composing Machine Operation (3)
Advanced mechanism and repair, maintenance and operation of quadders, hydroquadders and mixers. Field trips, use of visual aids, and lectures by men from industry. 1 lecture, 2 laboratories. Prerequisite: Pr 243

Pr 322, 323 Cold Type Processes (3) (3)
Introduction to Fotosetter, Varityper, Cox Head-Liner, Protype-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 321

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) (3) (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, 422: 1 lecture, 2 laboratories. Pr 423: 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 project under a minimum of 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 curriculum of the Technical Arts Department prepares graduates for employment in a broad range of professional positions in industrial management, industrial production, industrial marketing or industrial arts. 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 Technical Arts Department’s new facilities provide for instruction and laboratory experiences in drafting, wood technology, electricity, electronics, metal technology, power technology, industrial crafts, and graphic arts.

CURRICULAR OPTIONS

Industrial Sales and Service

The Industrial Sales and Service 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. 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 Arts

The Industrial Arts 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 as they help these people to become familiar with processes of industry.

Students desiring to complete the major with the industrial arts option should consult their departmental adviser.

With an additional fifth year of appropriate college courses, students will be qualified to teach industrial arts in junior and senior high schools. Or, after experience in industry, they may qualify for positions of responsibility with in-plant technical training programs.
## CURRICULUM IN TECHNICAL ARTS

### Freshman

<table>
<thead>
<tr>
<th>Course</th>
<th>F</th>
<th>W</th>
<th>S</th>
</tr>
</thead>
<tbody>
<tr>
<td>Technical Computation (TA 101)</td>
<td>2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Introduction to Technical Arts (TA 111)</td>
<td>2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Engineering Drafting (ME 141, 142)</td>
<td>2</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>Manufacturing Processes (AC 141, IE 141)</td>
<td>2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Industrial Wood Processes (TA 125)</td>
<td>2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Graphic Arts Processes (TA 127)</td>
<td></td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Mathematics for Engineers (Math 117)</td>
<td></td>
<td>5</td>
<td>5</td>
</tr>
<tr>
<td>Analytic Geometry and Calculus (Math 118)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Human Relations (IR 118)</td>
<td>3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Freshman Composition (Eng 104, 105)</td>
<td>3</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Physical Education (PE 141)</td>
<td></td>
<td>8</td>
<td></td>
</tr>
<tr>
<td>Electives and courses to complete major</td>
<td>2</td>
<td>4</td>
<td>8</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>16</td>
<td></td>
<td>16</td>
</tr>
</tbody>
</table>

### Sophomore

<table>
<thead>
<tr>
<th>Course</th>
<th>F</th>
<th>W</th>
<th>S</th>
</tr>
</thead>
<tbody>
<tr>
<td>Industrial Electricity (TA 131, 132)</td>
<td>3</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Industrial Electronics (TA 133)</td>
<td></td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Manufacturing Processes (MFGP 141, 142)</td>
<td>1</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>College Physics (Phys 121, 122, 123)</td>
<td>4</td>
<td>4</td>
<td>4</td>
</tr>
<tr>
<td>Principles of Economics (Ec 201)</td>
<td></td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>American Government (Pol Sc 301)</td>
<td></td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Art in Industry (Art 255)</td>
<td>2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Introduction to Literature (Eng 207)</td>
<td></td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>Applied Biology (Bio 110)</td>
<td></td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Health Education (PE 107)</td>
<td></td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>Electives and courses to complete major</td>
<td>5</td>
<td>6</td>
<td>2</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>17</td>
<td></td>
<td>17</td>
</tr>
</tbody>
</table>

### Junior

<table>
<thead>
<tr>
<th>Course</th>
<th>F</th>
<th>W</th>
<th>S</th>
</tr>
</thead>
<tbody>
<tr>
<td>Power Technology (TA 122, 123)</td>
<td>2</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>Industrial Management (IR 311)</td>
<td>3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Manufacturing Processes (WM 141-142)</td>
<td>2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Technical Sketching (TA 245)</td>
<td></td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>Psychology of Business and Industry (Psy 302)</td>
<td></td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>General Inorganic Chemistry (Chem 324, 325)</td>
<td>4</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>Public Speaking (Sp 201)</td>
<td></td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>Introduction to Philosophy (Phil 201)</td>
<td></td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>General Psychology (Psy 202)</td>
<td></td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Growth of American Democracy (Hist 304)</td>
<td></td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Electives and courses to complete major</td>
<td>5</td>
<td>7</td>
<td>4</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>17</td>
<td>16</td>
<td>16</td>
</tr>
</tbody>
</table>

### Senior

<table>
<thead>
<tr>
<th>Course</th>
<th>F</th>
<th>W</th>
<th>S</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mechanical Systems (TA 323)</td>
<td></td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Modern Industrial Materials (TA 429)</td>
<td></td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>Technical Writing (Eng 219)</td>
<td></td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Senior Project (TA 461, 462)</td>
<td>2</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>Undergraduate Seminar (TA 463)</td>
<td></td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>Audio Visual Methods (AV 432)</td>
<td></td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>U.S. in World Affairs (Hist 305)</td>
<td></td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Electives and courses to complete major</td>
<td>11</td>
<td>11</td>
<td>6</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>15</td>
<td>16</td>
<td>16</td>
</tr>
</tbody>
</table>
### INDUSTRIAL SALES AND SERVICE OPTION (ADD COURSES BELOW TO BASIC CURRICULUM)

<table>
<thead>
<tr>
<th>Freshman</th>
<th>Junior</th>
</tr>
</thead>
<tbody>
<tr>
<td>Actg 131-2 Basic Accounting (6)</td>
<td>TA 331-2-3 Electrical Systems (9)</td>
</tr>
<tr>
<td>MSM 204 Marketing Principles (3)</td>
<td>IR 312 Industrial Relations (3)</td>
</tr>
<tr>
<td>MSM 205 Physical Distribution (3)</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Sophomore</th>
<th>Senior</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bus 301 Business Law Survey (3)</td>
<td>MSM 405 Sales Management (3)</td>
</tr>
<tr>
<td></td>
<td>TA 321-2 Mechanical Systems (6)</td>
</tr>
<tr>
<td></td>
<td>TA 404 Customer Relations (2)</td>
</tr>
<tr>
<td></td>
<td>TA 405 Industrial Marketing (2)</td>
</tr>
</tbody>
</table>

### INDUSTRIAL ARTS OPTION

Students desiring to complete the major with the Industrial Arts Option should consult their departmental adviser.

### DESCRIPTIONS OF COURSES IN TECHNICAL ARTS

**TA 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.

**TA 111 Introduction to Technical Arts (2)**
- Orientation to the objectives of the Technical Arts Department. Investigation of employment opportunities. Development of techniques useful to the student in his study. 2 lectures.

**TA 122, 123 Power Technology (2)**
- Analysis of internal combustion engines, gas turbines and hydraulic motors. Fuels and lubricants. Energy conversion, power transmission and modern utilization. 1 lecture, 1 laboratory. Prerequisite: Phys 123

**TA 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.

**TA 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.

**TA 131 Industrial Electricity (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.

**TA 132 Industrial Electricity (3)**
- Controls and control circuits, A-C circuits. Advanced instrument application. Transformers. Lighting and signal systems. 2 lectures, 1 laboratory. Prerequisite: TA 131

**TA 133 Industrial Electronics (3)**

**TA 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: MFGP 141, 142; WM 141, 142; AC 141; IE 141
Applied Arts Division

TA 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: TA 125

TA 237 Industrial Arts Crafts (3)
Fundamental operations and materials of the industrial crafts. Art metal, textiles, ceramics, plastics, leather, lapidary. Design and construction of useful articles. Related instruction. 3 activities.

TA 238 Graphic Arts Technology (3)
Applications of design and layout, composition, presswork, cold type, binding, silk screen, lithography, intaglio, duplicating processes. 3 activities. Prerequisite: TA 127

TA 245 Technical Sketching (2)
Freehand sketching of industrial products using perspective, isometric oblique and orthographic projection. Shading. Basic design. 2 activities. Prerequisite: ME 142

TA 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 118, Phys 122, TA 123

TA 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: TA 321

TA 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.

TA 324 Modern Industrial Finishes (2)
Characteristics and applications of finishes to modern industrial products. Brushing, dipping, spraying, baking, plating, etching. 2 laboratories.

TA 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.)

TA 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.

TA 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.

TA 331 Electrical Systems (3)
Advanced study of electrical applications. Power generation and distribution. Applications of motors, motive power, electrical installations. 2 lectures, 1 laboratory. Prerequisite: TA 132, Math 118
TA 332 Electrical Systems (3)
Industrial applications of electrical and electronic elements. Dielectric and induction heating, welding, ultrasonics, X-rays, photo electricity, data display, magnetics, industrial radio and industrial television. 2 lectures, 1 laboratory. Prerequisite: Phys 123, TA 133, 331

TA 333 Electrical Systems (3)
Fundamentals of control systems, analog computers, electronic data processing machines and digital control of machines. Emphasis on applications. 2 lectures, 1 laboratory. Prerequisite: TA 332

TA 342 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 laboratories.

TA 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: TA 233

TA 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: TA 245

TA 346 Industrial Arts 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 the industrial arts. 2 laboratories. Prerequisite: Art 255

TA 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: TA 237, Art 255

TA 349 Ceramics (2)
Introduction to ceramic materials and processes; design, slip, slab and coil forming, surface enrichment, glazing and forming; related instruction, industrial applications. 2 laboratories.

TA 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.

TA 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: TA 123, 236

TA 355 Furniture Design and Construction (3)
Application of design principles; selection of suitable wood and finish; application of modern production processes. 3 laboratories. Prerequisites: TA 354, Art 255

TA 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: TA 236
TA 357, 358, 359 Graphic Arts (3)
Advanced investigation of the broad area of graphic arts, including hand and
machine composition, presswork, intaglio, offset lithography, silk screen, block
printing, binding, photography, platemaking, spirit and stencil duplicating; related
instruction on paper, inks, design. 3 laboratories. Prerequisite: TA 238

TA 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.

TA 401 Curriculum and Methods (2)
Underlying philosophy and practices in the preparation of courses of study and
other instructional materials for industrial arts courses. 2 lectures. Prerequisite:
TA 330

TA 404 Customer Relations (2)
Customer contacts; personal relationships, ethics, legal relationships, service con-
tracts, communication channels. 2 lectures. Prerequisite: MSM 204. Senior standing.

TA 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: MSM 204. Senior standing.

TA 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 main-
tenance. 1 lecture, 1 laboratory. Prerequisite: TA 122, 123, 131

TA 426 Advanced Power Technology (3)
Mechanical aspects of suspension systems, steering and braking, and other control
systems of powered mobile equipment. Applications of electronics in internal
combustion engines. Advanced study of the applications of hydraulics in the trans-
mision of power. 3 activities. Prerequisite: TA 123

TA 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.

TA 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: TA
323, 343, Phys 123

TA 446 Wood Production Processes (2)
Study of mass-production techniques; design, production planning, jigs and fix-
tures, interchangeable parts, assembly line. Design and construction of projects suit-
able for industrial arts wood courses. 2 laboratories. Prerequisite: TA 236, 323

TA 461, 462 Senior Project (2) (2)
Selection and completion of a project under a minimum of supervision. Project
results are presented in a formal report. Minimum 120 hours total time.

TA 463 Undergraduate Seminar (2)
Preparation, oral presentation and discussion by students of papers on related
professional topics. 2 lectures.
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 TECHNICAL JOURNALISM

### Freshman

<table>
<thead>
<tr>
<th>Course</th>
<th>F</th>
<th>W</th>
<th>S</th>
</tr>
</thead>
<tbody>
<tr>
<td>Journalism Orientation (Jour 118)</td>
<td>2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Freshman Composition (Eng 104, 105, 106)</td>
<td>3</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>Introduction to Literature (Eng 207)</td>
<td></td>
<td></td>
<td>2</td>
</tr>
<tr>
<td>Physical Education (PE 141)</td>
<td>½</td>
<td>½</td>
<td>½</td>
</tr>
<tr>
<td>Mathematics (Math 102, 103 or Math 100, 200)</td>
<td></td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>General Biology (Bio 101, 102, 103 or equiv.)</td>
<td></td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>Elementary Photography (Jour 221)</td>
<td></td>
<td></td>
<td>3</td>
</tr>
<tr>
<td>Photojournalism (Jour 222)</td>
<td></td>
<td></td>
<td>2</td>
</tr>
<tr>
<td>Proofreading (Pr 102)</td>
<td>6</td>
<td>5</td>
<td>3</td>
</tr>
<tr>
<td>§ Electives</td>
<td>17½</td>
<td>17½</td>
<td>16½</td>
</tr>
</tbody>
</table>

### Sophomore

<table>
<thead>
<tr>
<th>Course</th>
<th>F</th>
<th>W</th>
<th>S</th>
</tr>
</thead>
<tbody>
<tr>
<td>Principles of Economics (Ec 201, 202)</td>
<td>3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sports Education (PE 241)</td>
<td></td>
<td>½</td>
<td>½</td>
</tr>
<tr>
<td>American Literature (Eng 311, 312, 313)</td>
<td></td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>General Physical Science (PSc 101, 102, 103 or equiv.)</td>
<td></td>
<td>4</td>
<td>4</td>
</tr>
<tr>
<td>Introductory Journalism (Jour 201)</td>
<td>3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>News Writing (Jour 202)</td>
<td></td>
<td></td>
<td>3</td>
</tr>
<tr>
<td>Reporting I (Jour 203)</td>
<td></td>
<td></td>
<td>3</td>
</tr>
<tr>
<td>Introduction to Sociology (Soc 105)</td>
<td></td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>§ Electives</td>
<td>16½</td>
<td></td>
<td>16½</td>
</tr>
</tbody>
</table>

### Junior

<table>
<thead>
<tr>
<th>Course</th>
<th>F</th>
<th>W</th>
<th>S</th>
</tr>
</thead>
<tbody>
<tr>
<td>American Government (Pol Sc 301)</td>
<td>3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Growth of American Democracy (Hist 304)</td>
<td></td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>U. S. in World Affairs (Hist 305)</td>
<td></td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>General Psychology (Psy 202)</td>
<td></td>
<td></td>
<td>3</td>
</tr>
<tr>
<td>Health Education (PE 107)</td>
<td></td>
<td></td>
<td>2</td>
</tr>
<tr>
<td>Graphic Arts Processes (TA 127)</td>
<td></td>
<td></td>
<td>3</td>
</tr>
<tr>
<td>Reporting II (Jour 304)</td>
<td></td>
<td></td>
<td>3</td>
</tr>
<tr>
<td>Editing and Copy Desk (Jour 233)</td>
<td></td>
<td></td>
<td>3</td>
</tr>
<tr>
<td>Advanced Copy Editing (Jour 334)</td>
<td></td>
<td></td>
<td>3</td>
</tr>
<tr>
<td>Public Speaking (Sp 201)</td>
<td></td>
<td></td>
<td>2</td>
</tr>
<tr>
<td>Editorial and Feature Writing (Jour 302)</td>
<td></td>
<td></td>
<td>3</td>
</tr>
<tr>
<td>Radio News (Jour 333)</td>
<td></td>
<td></td>
<td>3</td>
</tr>
<tr>
<td>Global Geography (Geog 308)</td>
<td></td>
<td></td>
<td>3</td>
</tr>
<tr>
<td>Senior Project (Jour 461)</td>
<td></td>
<td>4</td>
<td>4</td>
</tr>
<tr>
<td>§ Electives</td>
<td>15</td>
<td>16</td>
<td>18</td>
</tr>
</tbody>
</table>

### Senior

<table>
<thead>
<tr>
<th>Course</th>
<th>F</th>
<th>W</th>
<th>S</th>
</tr>
</thead>
<tbody>
<tr>
<td>State and Local Government (Pol Sc 401)</td>
<td>3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Senior Project (Jour 462)</td>
<td></td>
<td></td>
<td>2</td>
</tr>
<tr>
<td>Undergraduate Seminar (Jour 463)</td>
<td></td>
<td></td>
<td>2</td>
</tr>
<tr>
<td>Newspaper and Magazine Advertising (Jour 421)</td>
<td>3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Advertising Layout and Copywriting (Jour 425)</td>
<td></td>
<td></td>
<td>2</td>
</tr>
<tr>
<td>Newspaper Management (Jour 403)</td>
<td></td>
<td></td>
<td>3</td>
</tr>
<tr>
<td>Applied Journalism Techniques (Jour 451, 452, 453)</td>
<td></td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>Magazine Production (Jour 427)</td>
<td></td>
<td></td>
<td>3</td>
</tr>
<tr>
<td>Public Relations (Jour 412)</td>
<td></td>
<td></td>
<td>3</td>
</tr>
<tr>
<td>§ Electives</td>
<td>6</td>
<td>8</td>
<td>6</td>
</tr>
<tr>
<td></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.

* The student may substitute Jour 303, 412, or 432 for Jour 427.

§ 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 TECHNICAL JOURNALISM

Jour 118 Journalism Orientation (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. 1 lecture, 1 two-hour laboratory.

Jour 201 Introductory Journalism (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 Elementary Photography (3)
For those who have had limited experience in photography. Picture-taking techniques and darkroom practices. 2 lectures, 1 laboratory.

Jour 222 Photojournalism (3)
Advanced photographic techniques and darkroom procedures for producing illustrations for newspapers and magazines. 2 lectures, 1 laboratory. Prerequisite: Jour 221 or equivalent experience.

Jour 233 Editing and Copy Desk (3)
Copy desk work, head writing, page makeup, special rewrite and editing problems, handling of correspondents, etc. 2 lectures, 1 two-hour laboratory. 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 Editorial 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: Jour 233

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 233

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
Applied Arts Division

Jour 323 Free-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 Radio News Writing (3)
Radio news programming, fundamentals of writing and editing for radio. Community interviews. Copy preparation. Commercial tie-ins. 1 lecture, 1 laboratory, and assigned field work. Prerequisite: Sp 201

Jour 334 Advanced Copy Editing (3)
Daily experience and responsibilities in editing and rewriting news and feature stories, and editorial writing for campus news media. Practical application of headline writing and page makeup principles. 1 lecture, 2 two-hour laboratories. Prerequisite: Jour 202, 233

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 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 Radio Advertising (3)
Survey of radio 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 a minimum of supervision. Projects typical of problems which graduates must solve in their fields of employment. Project results are presented in a formal report. Minimum 120 hours total time.

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.
THE APPLIED SCIENCES DIVISION
Student Using Scintillation Counter in Nuclear Physics Laboratory

Statistics Laboratory, Mathematics Department

Biological Sciences Laboratory Class
THE APPLIED SCIENCES DIVISION

The Applied Sciences Division has four primary functions:

1. To provide courses for students working toward the Bachelor 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 and Engineering those courses which support, directly complement, or are closely related to their areas of specialization.
4. To provide mathematics, natural and social sciences courses for students preparing to teach at the elementary and/or secondary school level.

In close cooperation with the Applied Arts Division the faculty of the Applied Sciences Division 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 Biological Sciences, Mathematics, Physical Sciences or Social Sciences as a part of the requirements for the Master of Arts in Education degree.

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

BIOLGICAL SCIENCES DEPARTMENT

Department Head, Glenn A. Noble

John H. Applegarth  C. Dennis Hynes  Aryan I. Roest
Tracey G. Call  David H. Montgomery  Shirley R. Sparling
Fred L. Clogston  Richard F. Nelson  William D. Stansfield
Harry C. Finch  Richard A. Pimentel  David H. Thomson
R. C. Hatfield  Robert J. Rodin  William Thurmond
Robert F. Hoover  Derrell B. White

The department offers a complete program of college work, leading to the bachelor 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.

CURRICULUM IN BIOLOGICAL SCIENCES

**Freshmen**

<table>
<thead>
<tr>
<th>Course</th>
<th>F</th>
<th>W</th>
<th>S</th>
</tr>
</thead>
<tbody>
<tr>
<td>General Botany (Bot 121, 122, 123) or General Zoology</td>
<td>4</td>
<td>4</td>
<td>4</td>
</tr>
<tr>
<td>General Inorganic Chemistry (Chem 324, 325)</td>
<td>4</td>
<td>4</td>
<td>4</td>
</tr>
<tr>
<td>Organic Chemistry (Chem 326)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Freshman Composition (Eng 104, 105, 106)</td>
<td>3</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>Mathematics for Engineers (Math 117)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Analytic Geometry &amp; Calculus (Math 118)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Health Education (PE 107)</td>
<td></td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>Physical Education (PE 141)</td>
<td>½</td>
<td>½</td>
<td>½</td>
</tr>
<tr>
<td>Electives</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>16½</td>
<td>16½</td>
<td>16½</td>
</tr>
</tbody>
</table>

**Sophomore**

<table>
<thead>
<tr>
<th>Course</th>
<th>F</th>
<th>W</th>
<th>S</th>
</tr>
</thead>
<tbody>
<tr>
<td>General Zoology (Zoo 131, 132, 133) or General Botany</td>
<td>4</td>
<td>4</td>
<td>4</td>
</tr>
<tr>
<td>General Bacteriology (Bact 221)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>General Psychology (Psy 202)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>General Entomology (Ent 126)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>College Physics (Phys 121, 122, 123)</td>
<td>4</td>
<td>4</td>
<td>4</td>
</tr>
<tr>
<td>Principles of Economics (Ec 201, 202)</td>
<td>3</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Sports Education (PE 241)</td>
<td>½</td>
<td>½</td>
<td>½</td>
</tr>
<tr>
<td>Electives</td>
<td>1</td>
<td>2</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td>16½</td>
<td>16½</td>
<td>16½</td>
</tr>
</tbody>
</table>

* 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.
1 Chem 321, 322, and 323 will substitute for Chem 324 and 325.
2 Math 102 and 103 or Math 100 and 200 will substitute.
3 Phys 131, 132, 133 will substitute.
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.

DESCRIPTIONS OF COURSES IN BACTERIOLOGY

Bact 221 General Bacteriology (4)
Morphology, metabolism, classification and identification; bacteriology of air, soil, water, and foods with applications to industry, agriculture, medicine, and public health. 2 lectures, 2 laboratories. Prerequisite: One quarter of college chemistry or Bot 121 or Zoo 131

Bact 322 Dairy Bacteriology (4)
Advanced course for practical work demonstrating the domestic and industrial importance of micro-organisms involved in milk and dairy products: milk, milk powders, fermented milks, evaporated and condensed milks, butter, cheese, cheese starters, and ice cream. 2 lectures, 2 laboratories. Prerequisite: Bact 221

Bact 333 Industrial Microbiology (4)
Sanitary and industrial applications of microbiology stressing food, dairy, water, air and sewage; practical aspects of environmental sanitation emphasized. 2 lectures, 2 laboratories. Prerequisite: Bact 221

Bact 342 Sanitary Inspection and Control (2)
Domestic and commercial contamination, epidemiology, stressing practical applications of hygienic practices and methods of correcting and eliminating health hazards. 2 laboratories. Prerequisite: Bact 221

Bact 421 Food Microbiology (4)
Physiological activities of microorganisms involved in the preparation, preservation, deterioration and toxicity of foods and related products. Sanitary and public health implications. 2 lectures, 2 laboratories. Prerequisite: Bact 221. Recommended: Chem 326

Bact 423 Public Health Microbiology (4)
Detailed study of pathogenic yeasts, molds, viruses, and bacteria in relation to public health. 2 lectures, 2 laboratories. Prerequisite: Bact 221
Bact 436 Marine Microbiology (4)
Harmful and beneficial marine bacteria and allied microorganisms. Role played by marine microorganisms as biochemical, geological and hydrobiological agents. 2 lectures, 2 laboratories. Prerequisite: Bact 221

Bact 590 Seminar in Bacteriology (1-3)
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.

DESCRIPTIONS OF COURSES IN BIOLOGY

Bio 100 Agricultural Biology (3)
Basic biological principles applied to agriculture. This course may not be substituted for General Zoology or General Botany. 2 lectures, 1 demonstration and discussion hour. Not open to degree students for degree credit.

Bio 101 General Biology (3)
Characteristics of living things; cellular composition and organization; functional approach to organ systems of man. 3 lectures. Not open to students who have taken Bot 121 or Zoo 131.

Bio 102 General Biology (3)
Endocrine system; reproduction; heredity and environment; social implications of biological principles. 3 lectures. Prerequisite: Bio 101.

Bio 103 General Biology (3)
Disease; plants, animals and man; balance of nature, conservation of resources; history of man. 3 lectures. Prerequisite: Bio 102.

Bio 110 Applied Biology (3)
Basic principles of cellular biology, heredity, environmental relationships and evolutionary development of living things with emphasis on man. Applications to engineering and industry. Not open to students with credit in general biology, general botany, or general zoology. 3 lectures.

Bio 127 Natural History (3)
Scope of natural history; formation and identification of features in the physical environment; natural history survey of the plant kingdom. 1 lecture, 2 laboratories.

Bio 128 Natural History (3)
Natural history survey of the animal kingdom; field study and identification of environmental features and organisms. 1 lecture, 2 laboratories. Prerequisite: Bio 127.

Bio 129 Natural History (3)
Principles of field biology and ecology; laboratory and field study of wildflowers, insects and field biology; 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 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 cytogenticology. 2 lectures. Prerequisite: Bio 303.
Bio 313 Radiation Biology (2)
Effect of radiation on plant and animal tissues. Includes use of nonionizing and ionizing radiations, isotopes and health hazards. 2 lectures. Prerequisite: Phys 123, or Phys 133 and one of the following or its equivalent: 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: 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: Zoo 133 and Bot 122 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, Bot 123 or 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 Advanced Genetics Laboratory (2)
Laboratory techniques in genetics. 2 laboratories. Prerequisite: Bio 304 (may be taken concurrently).

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 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 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 521 Curriculum and Methods in Teaching Biological Sciences (3)
Objectives, content, techniques, materials, and recent trends of successful instruction in secondary school biology. 3 lectures. Prerequisite: Graduate standing; evidence of satisfactory preparation in biology, botany and zoology.
Bio 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.

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 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 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.

DESCRIPTIONS 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 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

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. 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 and Microtechnique (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 (3)
   Microscopic and chemical examination of blood. Designed for preparing laboratory technologists. 2 lectures, 1 laboratory. 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 objectives of the Mathematics Department are to offer courses needed in the other departments for the purpose of developing vocational proficiency; to contribute to the general education of all students; to prepare secondary and elementary mathematics teachers who know the meaning and significance of the mathematics they will teach; and to prepare applied mathematicians for industrial and civil service employment.

It is recommended that the high school student planning a mathematics major include in his high school program at least three years of mathematics and two years of science.

Mathematics Placement Tests are given to all entering students to determine their relative facility and competence in mathematics. The results of these tests are used to help in placing the students in courses where they can most likely succeed. Students in mathematics, physics, chemistry, biological sciences, and engineering who have had adequate preparation will normally begin their college mathematics work in Math 117 or Math 118. Students majoring in Business Administration will usually begin with Math 108. Other students of the Applied Sciences and Applied Arts Divisions will start with Math 100. Students majoring in the Agriculture Division will normally begin with Math 102.

### CURRICULUM IN MATHEMATICS

#### Freshman

<table>
<thead>
<tr>
<th>Course</th>
<th>F</th>
<th>W</th>
<th>S</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mathematics for Engineers (Math 117)</td>
<td>5</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Analytic Geometry and Calculus (Math 118, 201)</td>
<td>5</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Freshman Composition (Eng 104, 105, 106)</td>
<td>3</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>General Physics (Phys 131, 132)</td>
<td>4</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>Health Education (PE 107)</td>
<td>2</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>Electives</td>
<td>6</td>
<td>4</td>
<td>6</td>
</tr>
</tbody>
</table>

**Total:** 16 ½

#### Sophomore

<table>
<thead>
<tr>
<th>Course</th>
<th>F</th>
<th>W</th>
<th>S</th>
</tr>
</thead>
<tbody>
<tr>
<td>Analytic Geometry and Calculus (Math 202, 203)</td>
<td>3</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Programming for Digital Computers (Math 221 or 304)</td>
<td>3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Differential Equations (Math 316)</td>
<td>3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mathematics of Statistics (Math 321)</td>
<td>3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Approved Mathematics Courses</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>General Psychology (Psy 202)</td>
<td>3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>General Physics (Phys 133)</td>
<td>4</td>
<td></td>
<td></td>
</tr>
<tr>
<td>General Chemistry (Chem 321)</td>
<td></td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>Principles of Economics (Ec 201)</td>
<td>3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sports Education (PE 241)</td>
<td>½</td>
<td>½</td>
<td>½</td>
</tr>
<tr>
<td>Electives</td>
<td>6</td>
<td>4</td>
<td>6</td>
</tr>
</tbody>
</table>

**Total:** 16 ½

*Teacher candidates should use several of their electives toward their teaching minor.

†To be selected with approval of adviser and to include at least 6 units of applied mathematics.
### Junior

<table>
<thead>
<tr>
<th>Course</th>
<th>F</th>
<th>W</th>
<th>S</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Differential Equations (Math 317)</strong></td>
<td>2</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Advanced Engineering Mathematics (Math 318, 319)</strong></td>
<td>3</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td><strong>Numerical Analysis (Math 332)</strong></td>
<td></td>
<td></td>
<td>3</td>
</tr>
<tr>
<td>† Approved Mathematics Courses</td>
<td>6</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>* Literature or Philosophy</td>
<td></td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>* Biological Sciences</td>
<td></td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>Electives</td>
<td>6</td>
<td>5</td>
<td>5</td>
</tr>
<tr>
<td></td>
<td>17</td>
<td>17</td>
<td>17</td>
</tr>
</tbody>
</table>

### Senior

<table>
<thead>
<tr>
<th>Course</th>
<th>F</th>
<th>W</th>
<th>S</th>
</tr>
</thead>
<tbody>
<tr>
<td>Senior Project (Math 461, 462)</td>
<td>2</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>Undergraduate Seminar (Math 463)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Vector Analysis (Math 404)</strong></td>
<td>3</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Advanced Calculus or Statistics (Math 412 or 322)</strong></td>
<td>3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>† Approved Mathematics Courses</td>
<td></td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>* Literature</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>American Government (Pol Sc 301)</td>
<td>3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Growth of American Democracy (Hist 304)</td>
<td></td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>U. S. in World Affairs (Hist 305)</td>
<td></td>
<td></td>
<td>3</td>
</tr>
<tr>
<td>* Social Sciences</td>
<td></td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Electives</td>
<td>5</td>
<td>5</td>
<td>8</td>
</tr>
<tr>
<td></td>
<td>16</td>
<td>16</td>
<td>16</td>
</tr>
</tbody>
</table>

### DESCRIPtIONS OF COURSES IN MATHEMATICS

**Math 1 Preparatory Mathematics (4)**

Decimal system and systems of other bases, four fundamental processes with integers, fractions, signed numbers, and algebraic symbols, use of exponents, simple linear equations with applications in rate, levers, mixture, ratio, proportion, percentage, Pythagorean theorem, and square root. 4 lectures.

**Math 7 Preparatory Algebra (5)**

Signed numbers, linear equations, literal equations, formula evaluation, functional relationships, graphing linear and quadratic equations, factoring algebraic functions, fractional equations. 5 lectures. Prerequisite: Satisfactory score on placement examination.

**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. Prerequisite: Satisfactory score on placement test or Math 1

**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. Prerequisite: Math 1 or satisfactory score on placement examination.

**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

* To be selected from the General Education list.

** Teacher candidates should substitute the following: Theory of Equations, Math 307; Modern Algebra, Math 381, 382; Secondary School Mathematics, Math 402, 403; College Geometry, Math 442.

† To be selected with approval of adviser and to include at least 6 units of applied mathematics.
Math 104 Slide Rule (1)
Operation of the slide rule and methods of computation used in engineering. 1 lecture. Prerequisite: Math 108, 115 or 117

Math 108 Mathematics of Business (3)
Algebra of business; simple interest principles, methods and applications; bank, cash and trade discounts; exponents, radicals, logarithms, equations and basic algebraic operations. 3 lectures. Prerequisite: Math 1 or satisfactory score on Math Placement Test.

Math 114 College Algebra for Agriculture (3)
Abridged course covering selected topics from algebra designed for those students who are majoring in mechanized agriculture. Not open to students with credit in Math 117. 3 lectures. Prerequisite: Math 103

Math 115 Trigonometry for Agriculture (3)
Abridged course covering selected topics from trigonometry designed for those students who are majoring in mechanized agriculture. 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. Prerequisite: Math 7 or satisfactory score on placement examination.

Math 118 Analytic Geometry and Calculus (5)
Rectangular coordinates, geometry of the straight line and conic sections, functions, limits, continuity, differentiation of algebraic functions, related rates, maxima and minima, differentials, integration, and simple applications of the integral. 5 lectures. Prerequisite: Math 117 or 115, or a satisfactory score on the placement examination.

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 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 108, or a satisfactory score on the placement examination.

Math 201 Analytic Geometry and Calculus (3)
Continuation of Math 118. Curve tracing, mean value theorem, definite integrals of algebraic functions with applications to area, volume, work, and centroids, differentiation of transcendental functions with such applications as Newton's Method for solving equations and L'Hospital's Rule. 3 lectures. Prerequisite: Math 118
Math 202 Analytic Geometry and Calculus (3)
Continuation of Math 201. Polar co-ordinates, integration by formula, trigonometric substitution, and parts. Applications in area, volume, work, and centroids. 3 lectures. Prerequisite: Math 201

Math 203 Analytic Geometry and Calculus (3)
Continuation of Math 202. Integration by partial fractions, approximate integration, length of arc, introductory topics in solid analytic geometry, partial differentiation, double integrals, centroids, moments, and infinite series. 3 lectures. Prerequisite: Math 202

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 211 Descriptive Statistics (3)
Graphical representation of statistical data, calculation and uses of various averages, measures of variability, elementary probability and the normal curve, sampling and estimation. 3 lectures. Prerequisite: Math 103 or instructor's permission.

Math 212 Statistical Methods (3)
Tests of hypotheses, sampling theory, linear regression, linear correlation, index numbers, time-series analysis, quality control, and analysis of variance. 2 lectures, 1 activity period. Prerequisite: Math 211 or instructor's permission.

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 Computers (3)
Algorithms and iterative computer methods; neurons and nerve nets; permutations, combinations and probability; number systems and traditional logic. 3 lectures. Prerequisite: Satisfactory grade in any degree mathematics course.

Math 218 Mathematics of Digital Computers (3)
Types of relations; Boolean algebra of classes and proportions; deductive systems; simplification of Boolean functions and reduction to normal forms. 3 lectures. Prerequisite: Math 217

Math 219 Mathematics of Digital Computers (3)
Boolean algebra of switching circuits, linear programming, nerve net theory, introduction to information theory. 3 lectures. Prerequisite: Math 218

Math 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.

Math 250 Programming and Operating the Small Digital Computer (1)

Math 251 Programming of Data Processing Equipment (2)
Machine, symbolic, and Gotran languages as used for programming the IBM 1620 digital computer. Programming of problems from the fields of business, agriculture, and applied sciences. 1 lecture, 1 activity.
Math 252 Fortran Programming (1)

Emphasis on programming techniques for mathematical analysis. Business and science applications with specific use of the IBM 1620 digital computer. 1 activity.

Math 302 Intuitive Geometry and Measurement (4)

Field and laboratory approach to measurement of angles, volumes, liquid and dry measures; weight and time; the metric system; scale drawings; the study of plane figures and geometrical solids; graphing of equations and inequalities in coordinate geometry; intuitive geometry; inductive and deductive reasoning; indirect proof. 3 lectures and 2 hours of activity periods. Prerequisite: Math 122 or instructor's permission.

Math 304 Digital Computer Programming (3)

Programming of a large modern digital computer. Assembly program usage, subroutine libraries, timing problems. Problems in data processing. 2 lectures, 1 two-hour activity period. Prerequisite: Math 221 or consent of instructor.

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 201

Math 312, 313 Linear Algebra (3) (3)

Vector spaces, linear independence, subspaces, determinants, linear transformations, eigenvalues and eigenvectors, applications. 3 lectures. Prerequisite: Math 203

Math 316 Differential Equations (3)

An introduction to first order differential equations and simple linear equations with constant coefficients. Applications to dynamics, electric circuits, and heat flow. 3 lectures. Prerequisite: Math 203

Math 317 Differential Equations (2)

Linear differential equations with constant coefficients. Operational methods including an introduction to the Laplace transform and their applications. 2 lectures. Prerequisite: Math 316

Math 318 Advanced Engineering Mathematics (3)

Theory and application of power series, Laplace transforms, Bessel functions, series solutions of ordinary differential equations, Gamma functions. 3 lectures. Prerequisite: Math 317

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 317

Math 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 201

Math 322 Mathematics of Statistics (3)

Continuation of Math 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: Math 321

Math 323 Mathematics of Statistics (3)

Continuation of Math 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: Math 322
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 316 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 problems. Total credit limited to 4 units, with a maximum of 2 units per quarter. Prerequisite: Permission of the department head.

Math 402 Secondary School Mathematics (3)
A study of the mathematical content of junior high school courses with particular emphasis on the new curricular materials that are being developed and introduced into the schools. Suitable for both upper grade and junior high school teachers. 3 lectures. Prerequisite: At least junior standing.

Math 403 Secondary School Mathematics (3)
A study of the mathematical content of the senior high school courses, with particular emphasis on the new curricular materials that are being developed and introduced into the senior high school courses. 3 lectures. Prerequisite: At least junior standing.

Math 404 Vector Analysis (3)
Algebra of free vectors with applications. Differential and integral calculus of vectors. Development of theory and application of vector operators. 3 lectures. Prerequisite: Math 316

Math 405 Vector Analysis (3)
General coordinates, differential geometry and harmonic functions. Applications to physical fields: electrostatics, magnetism and electrodynamics. Fundamentals of tensor method. 3 lectures. Prerequisite: Math 404

Math 408 Functions of a Complex Variable (2)
Fundamental properties of a complex variable. Conformal mapping and its applications to heat transfer, electric potential theory, and hydrostatics. 2 lectures. Prerequisite: Math 317

Math 409 Functions of a Complex Variable (2)
Analysis of two-dimensional fields by use of conformal mapping and contour integration. 2 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 203

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; emphasis toward the teaching of secondary mathematics. 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 118 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 a minimum of supervision. Projects typical of problems which graduates must solve in their fields of employment. Project results are presented in a formal report. Minimum 120 hours total time.

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 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 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 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 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.

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 classical deductive logic. Methods of clear thinking in English prose sentences. 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.
MILITARY SCIENCE DEPARTMENT

Department Head, Colonel Elmer H. Bauer
Lt. Col. George R. Davies
Maj. Hugh G. Waite Capt. Frederick A. Rall

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, and 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 $40 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.
PHYSICAL SCIENCES DEPARTMENT
Department Head, Woodford E. Bowls

Athol J. D. Brunk  A. L. Houk  Arthur Z. Rosen
Laurence H. Carr  Jerome F. Houlis  Gordon A. Silver
Alan W. Cobb  Aernat S. James  Alfred W. Simon
Charles E. Dills  Herbert R. Kabat  Russell L. Tice
Walter E. Elliott  Bruce Kennelly  Howard Walker
Robert H. Frost  Vance D. Lewis  Harold J. Watson
Evangelos Hadjimichael  Leon W. Magur  Omer K. Whipple
Lewis E. Hammitt  Kenneth S. Ozawa  Hewitt G. Wight
Robert E. Holmquist  James M. Peters  Lloyd J. Work
Ray J. Holt  T. M. Rickansrud  Marshall Wright

The Physical Sciences Department serves all divisions of the College by offering courses which help provide scientific explanations for work taken by students in the Agriculture, Engineering, Applied Arts, and Applied Sciences Divisions. 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 three major curricula of the department lead to the bachelor of science degree in physics, chemistry, or biochemistry.

The occupational objectives of the curricula in physics and chemistry are to qualify students for entry at the bachelor's level into positions in governmental service and industry and to help prepare secondary teachers of the physical sciences.

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

It is suggested that the high school student planning to major in physics or chemistry include in his high school program as much as possible of the following: three semesters of algebra, one of trigonometry, two of geometry, two of physics, and two of chemistry.

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, feed analyst, feed technologist, fertilizer chemist, insecticide residue analyst, and public health chemist. It is recommended that the high school student planning to follow the curriculum in biochemistry include 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 PHYSICS

<table>
<thead>
<tr>
<th>Freshman</th>
<th>F</th>
<th>W</th>
<th>S</th>
</tr>
</thead>
<tbody>
<tr>
<td>Biological Sciences (Bio 101, 110, Bot 121, or Zoo 131)</td>
<td>3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Freshman Composition (Eng 104, 105, 106)</td>
<td>3</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>Manufacturing Processes (MFGP 141, 142)</td>
<td>1</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Health Education (PE 107)</td>
<td></td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>Physical Education (PE 141)</td>
<td>½</td>
<td>½</td>
<td>½</td>
</tr>
<tr>
<td>Mathematics for Engineers (Math 117)</td>
<td>5</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Analytic Geometry and Calculus (Math 118, 201)</td>
<td></td>
<td>5</td>
<td>3</td>
</tr>
<tr>
<td>General Chemistry (Chem 321, 322, 323)</td>
<td>4</td>
<td>4</td>
<td>4</td>
</tr>
<tr>
<td>General Physics (Phys 131, 132)</td>
<td></td>
<td></td>
<td>4</td>
</tr>
</tbody>
</table>

|                           | 16½| 17½ | 16½ |

<table>
<thead>
<tr>
<th>Sophomore</th>
<th>F</th>
<th>W</th>
<th>S</th>
</tr>
</thead>
<tbody>
<tr>
<td>Principles of Economics (Ec 201)</td>
<td>3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sports Education (PE 241)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>General Psychology (Psy 202)</td>
<td>½</td>
<td>½</td>
<td>½</td>
</tr>
<tr>
<td>Analytic Geometry and Calculus (Math 202, 203)</td>
<td>3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Differential Equations (Math 316)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Laboratory Glassblowing (Chem 342)</td>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Organic Chemistry (Chem 326)</td>
<td>4</td>
<td></td>
<td></td>
</tr>
<tr>
<td>General Physics (Phys 133)</td>
<td>4</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Engineering Statics (Phys 201)</td>
<td>3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Engineering Dynamics (Phys 202)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Introduction to Optics and Atomic Physics (Phys 211)</td>
<td>4</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sound (Phys 212)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Electrical Circuits (Phys 206)</td>
<td>3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Electrical Measurements Laboratory (Phys 256, 257)</td>
<td>1</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Light (Phys 223)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Electives</td>
<td></td>
<td></td>
<td>3</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Junior</th>
<th>F</th>
<th>W</th>
<th>S</th>
</tr>
</thead>
<tbody>
<tr>
<td>Literature</td>
<td>3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Vector Analysis (Math 404, 405)</td>
<td>3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Physical Chemistry (Chem 432)</td>
<td>4</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Heat (Phys 301)</td>
<td>3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Analytic Mechanics (Phys 303)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Electricity and Magnetism (Phys 306)</td>
<td>4</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Atomic Physics (Phys 401)</td>
<td>3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Atomic Physics Laboratory (Phys 441)</td>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Nuclear Physics (Phys 402, 403)</td>
<td>3</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Nuclear Physics Laboratory (Phys 442, 443)</td>
<td>1</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Electives</td>
<td>3</td>
<td>5</td>
<td>5</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Senior</th>
<th>F</th>
<th>W</th>
<th>S</th>
</tr>
</thead>
<tbody>
<tr>
<td>American Government (Pol Sc 301)</td>
<td>3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Growth of American Democracy (Hist 304)</td>
<td></td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>U. S. In World Affairs (Hist 305)</td>
<td></td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Social Sciences</td>
<td>3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Literature, Philosophy, or Arts</td>
<td>4</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Electricity and Magnetism (Phys 307)</td>
<td>3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Quantum Mechanics (Phys 405)</td>
<td>3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Solid State Physics (Phys 406)</td>
<td></td>
<td></td>
<td>3</td>
</tr>
<tr>
<td>Solid State Physics Laboratory (Phys 456)</td>
<td></td>
<td></td>
<td>1</td>
</tr>
<tr>
<td>Senior Project (Phys 461, 462)</td>
<td>2</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>Undergraduate Seminar (Phys 463)</td>
<td></td>
<td></td>
<td>2</td>
</tr>
<tr>
<td>Electives</td>
<td>5</td>
<td>4</td>
<td>7</td>
</tr>
</tbody>
</table>

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.
### CURRICULUM IN CHEMISTRY

#### Freshman

<table>
<thead>
<tr>
<th>Course</th>
<th>F</th>
<th>W</th>
<th>S</th>
</tr>
</thead>
<tbody>
<tr>
<td>General Chemistry (Chem 321, 322, 323, or Chem 324, 325, 323)</td>
<td>4</td>
<td>4</td>
<td>4</td>
</tr>
<tr>
<td>General Chemistry Laboratory (Chem 143)</td>
<td></td>
<td></td>
<td>1</td>
</tr>
<tr>
<td>Freshman Composition (Eng 104, 105, 106)</td>
<td>3</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>Mathematics for Engineers (Math 117)</td>
<td>5</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Analytic Geometry and Calculus (Math 118, 201)</td>
<td>½</td>
<td>½</td>
<td>½</td>
</tr>
<tr>
<td>Physical Education (PE 141)</td>
<td></td>
<td></td>
<td>2</td>
</tr>
<tr>
<td>Health Education (PE 107)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Biological Sciences (Bio 101, 110, Bot 121 or Zoo 131)</td>
<td>3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Electives</td>
<td>4</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td></td>
<td>15½</td>
<td>16½</td>
<td>17½</td>
</tr>
</tbody>
</table>

#### Sophomore

<table>
<thead>
<tr>
<th>Course</th>
<th>F</th>
<th>W</th>
<th>S</th>
</tr>
</thead>
<tbody>
<tr>
<td>Quantitative Analysis (Chem 331, 332)</td>
<td>4</td>
<td>4</td>
<td>4</td>
</tr>
<tr>
<td>Organic Chemistry (Chem 326)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Laboratory Glassblowing (Chem 342)</td>
<td></td>
<td></td>
<td>1</td>
</tr>
<tr>
<td>General Physics (Phys 131, 132, 133)</td>
<td>4</td>
<td>4</td>
<td>4</td>
</tr>
<tr>
<td>Analytic Geometry and Calculus (Math 202, 203)</td>
<td>3</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Literature</td>
<td>3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sports Education (PE 241)</td>
<td>½</td>
<td>½</td>
<td>½</td>
</tr>
<tr>
<td>Principles of Economics (Ec 201)</td>
<td>3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Report Writing (Eng 301)</td>
<td></td>
<td></td>
<td>3</td>
</tr>
<tr>
<td>Literature, Philosophy or Arts</td>
<td></td>
<td></td>
<td>6</td>
</tr>
<tr>
<td>Electives</td>
<td>1</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td></td>
<td>17½</td>
<td>16½</td>
<td>17½</td>
</tr>
</tbody>
</table>

#### Junior

<table>
<thead>
<tr>
<th>Course</th>
<th>F</th>
<th>W</th>
<th>S</th>
</tr>
</thead>
<tbody>
<tr>
<td>Organic Chemistry (Chem 327, 338)</td>
<td>5</td>
<td>5</td>
<td></td>
</tr>
<tr>
<td>Agricultural Biochemistry (Chem 328)</td>
<td></td>
<td></td>
<td>4</td>
</tr>
<tr>
<td>Physical Chemistry (Chem 432, 433)</td>
<td>4</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>Qualitative Organic Analysis (Chem 343)</td>
<td></td>
<td></td>
<td>4</td>
</tr>
<tr>
<td>Introduction to Optics and Atomic Physics (Phys 211)</td>
<td>4</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Light (Phys 223)</td>
<td></td>
<td></td>
<td>4</td>
</tr>
<tr>
<td>General Psychology (Psy 202)</td>
<td>3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>American Government (Pol Sc 301)</td>
<td>3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Literature</td>
<td>3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Electives</td>
<td>2</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td></td>
<td>16</td>
<td>17</td>
<td>16</td>
</tr>
</tbody>
</table>

#### Senior

<table>
<thead>
<tr>
<th>Course</th>
<th>F</th>
<th>W</th>
<th>S</th>
</tr>
</thead>
<tbody>
<tr>
<td>Advanced Organic Chemistry (Chem 403)</td>
<td></td>
<td></td>
<td>3</td>
</tr>
<tr>
<td>Senior Project (Chem 461, 462)</td>
<td>2</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>Undergraduate Seminar (Chem 463)</td>
<td></td>
<td></td>
<td>2</td>
</tr>
<tr>
<td>Advanced Physical Chemistry (Chem 437)</td>
<td>4</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Special Problems for Advanced Undergraduates (Chem 400)</td>
<td>2</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>Atomic Physics (Phys 401)</td>
<td>3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Atomic Physics Laboratory (Phys 441)</td>
<td></td>
<td></td>
<td>1</td>
</tr>
<tr>
<td>Growth of American Democracy (Hist 304)</td>
<td></td>
<td></td>
<td>3</td>
</tr>
<tr>
<td>U.S. in World Affairs (Hist 305)</td>
<td></td>
<td></td>
<td>3</td>
</tr>
<tr>
<td>Electives</td>
<td>6</td>
<td>9</td>
<td>6</td>
</tr>
<tr>
<td></td>
<td>16</td>
<td>16</td>
<td>16</td>
</tr>
</tbody>
</table>

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.
# CURRICULUM IN BIOCHEMISTRY

## Freshman

<table>
<thead>
<tr>
<th>Course</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>General Chemistry (Chem 324, 325, 323, or 321, 322, 323)</td>
<td>4</td>
</tr>
<tr>
<td>Freshman Composition (Eng 104, 105, 106)</td>
<td>3</td>
</tr>
<tr>
<td>Mathematics (Math 117, 118)</td>
<td>5</td>
</tr>
<tr>
<td>Physical Education (PE 141)</td>
<td>½</td>
</tr>
<tr>
<td>Health Education (PE 107)</td>
<td>½</td>
</tr>
<tr>
<td>General Zoology (Zoo 131) or General Botany (Bot 121)</td>
<td>4</td>
</tr>
<tr>
<td>Electives</td>
<td>4</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Total</td>
<td>F</td>
<td>W</td>
<td>S</td>
</tr>
<tr>
<td>---------------------</td>
<td>---------</td>
<td>-------</td>
<td>-------</td>
</tr>
<tr>
<td></td>
<td>15½</td>
<td>15½</td>
<td>16½</td>
</tr>
</tbody>
</table>

## Sophomore

<table>
<thead>
<tr>
<th>Course</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>Quantitative Analysis (Chem 331, 332)</td>
<td>4</td>
</tr>
<tr>
<td>Organic Chemistry (Chem 326)</td>
<td>4</td>
</tr>
<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 201 or 211)</td>
<td>3</td>
</tr>
<tr>
<td>Literature, Philosophy or Arts</td>
<td>3</td>
</tr>
<tr>
<td>Sports Education (PE 241)</td>
<td>½</td>
</tr>
<tr>
<td>Approved Courses</td>
<td>4</td>
</tr>
<tr>
<td>Electives</td>
<td>2</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Total</td>
<td>F</td>
<td>W</td>
<td>S</td>
</tr>
<tr>
<td>---------------------</td>
<td>---------</td>
<td>-------</td>
<td>-------</td>
</tr>
<tr>
<td></td>
<td>17½</td>
<td>16½</td>
<td>16½</td>
</tr>
</tbody>
</table>

## Junior

<table>
<thead>
<tr>
<th>Course</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>Organic Chemistry (Chem 327)</td>
<td>5</td>
</tr>
<tr>
<td>Agricultural Biochemistry (Chem 328)</td>
<td>4</td>
</tr>
<tr>
<td>Biochemistry (Chem 329)</td>
<td>4</td>
</tr>
<tr>
<td>Physical Chemistry (Chem 432, 433)</td>
<td>4</td>
</tr>
<tr>
<td>Qualitative Organic Analysis (Chem 343)</td>
<td>4</td>
</tr>
<tr>
<td>Report Writing (Eng 301)</td>
<td>3</td>
</tr>
<tr>
<td>Principles of Economics (Ec 201)</td>
<td>3</td>
</tr>
<tr>
<td>American Government (Pol Sc 301)</td>
<td>3</td>
</tr>
<tr>
<td>Social Sciences</td>
<td>3</td>
</tr>
<tr>
<td>Literature</td>
<td>3</td>
</tr>
<tr>
<td>General Psychology (Psy 202)</td>
<td>3</td>
</tr>
<tr>
<td>Electives</td>
<td>6</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Total</td>
<td>F</td>
<td>W</td>
<td>S</td>
</tr>
<tr>
<td>---------------------</td>
<td>---------</td>
<td>-------</td>
<td>-------</td>
</tr>
<tr>
<td></td>
<td>17</td>
<td>17</td>
<td>17</td>
</tr>
</tbody>
</table>

## Senior

<table>
<thead>
<tr>
<th>Course</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>Advanced Biochemistry (Chem 434)</td>
<td>4</td>
</tr>
<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>2</td>
</tr>
<tr>
<td>Literature, Philosophy or Arts</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>
<td>5</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Total</td>
<td>F</td>
<td>W</td>
<td>S</td>
</tr>
<tr>
<td>---------------------</td>
<td>---------</td>
<td>-------</td>
<td>-------</td>
</tr>
<tr>
<td></td>
<td>17</td>
<td>16</td>
<td>16</td>
</tr>
</tbody>
</table>

1. To be selected from the General Education list with not more than four units from fine and practical arts.
2. Ten units to be selected with approval of adviser.
3. To be selected from the General Education list.
California State Polytechnic College

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, acids and bases, ions, solutions, types of chemical reactions, properties of gases, liquids, and solids, and elementary equilibria. For engineering, physics, chemistry, and mathematics majors. 3 lectures, 1 laboratory. Prerequisite: Chem 4 or the passing of a placement test.

Chem 322  General Chemistry  (4)
The common nonmetals and their compounds, properties of metals, metallurgy, electrochemistry and corrosion, nuclear chemistry. 3 lectures, 1 laboratory. Prerequisite: Chem 321

Chem 323  General Chemistry  (4)
The compounds of the metals, ionic equilibria, an introduction to the carbon compounds emphasizing petroleum products and synthetic polymers. Semi-micro qualitative analysis in the laboratory. 3 lectures, 1 laboratory. Prerequisite: Chem 322 or 325

Chem 324  General Inorganic Chemistry  (4)
Fundamental principles including atomic structure, bonding, nomenclature, chemical equations, states of matter, water, solution concentration, chemistry of several non-metals. For agriculture, biological science and biochemistry majors. 3 lectures, 1 laboratory. Prerequisite: Chem 106 or the passing of a placement test.

Chem 325  General Inorganic Chemistry  (4)
Electrochemistry, simple equilibria, some non-metals with application to fertilizers, colloids, an introduction to metals and nuclear chemistry. 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  Agricultural 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)
Chemistry and physiology of the vitamins as applied to their function in plant and animal metabolism. Manufacture, stabilization, effect of food processing operations, laboratory animal technique, feed and food enrichment. 3 lectures, 1 laboratory. Prerequisite: Chem 328
**Chem 331** Quantitative Analysis (4)

Volumetric industrial analytical procedures based upon precipitometry, redoximetry, alkaliometry, and acidimetry. Laboratory work is the focal point, with class discussion supplying supporting theory. Emphasis on applications of chemical equilibrium and methods of problem solving. 2 lectures, 2 laboratories. Prerequisite: Chem 323 or 325

**Chem 332** Quantitative Analysis (4)

Principles of gravimetric analysis applied to industrial methods with emphasis on metals. Basic theory of laboratory work in class discussion. Properties of precipitates and colloids as applied to analytical procedures. Topics in instrumental analysis. 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 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 118

**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 in plants and animals. Special reference to enzymes, hormones, pigments, biological oxidation and their relationship to agricultural production. 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 461, 462 Senior Project (2) (2)
Selection and completion of a project under a minimum of supervision. Projects typical of problems which graduates must solve in their fields of employment. Project results are presented in a formal report. Minimum 120 hours total time.

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.

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 118 or 200

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 108 114, 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: Concurrent Math 118, or higher.

Phys 132 General Physics (4)
Fundamental principles of hydraulics, heat, sound, and light. Fluids at rest and in motion, temperature, expansion, quantity of heat, heat transfer, thermodynamics, thermal properties of matter, wave motion, vibrating bodies, acoustical phenomena, nature and propagation of light, geometric optics. 3 lectures, 1 laboratory. Prerequisite: Phys 131
Phys 133 General Physics (4)
Fundamental principles of magnetostatics, electrostatics, and current electricity. Coulomb's law, electric field, potential properties of dielectrics, capacitance, Ohm's law, electrochemistry, magnetism and magnetic fields, measuring instruments, magnetic field of a moving charge, induced e.m.f., a.c. circuits, electronics. 3 lectures, 1 laboratory. Prerequisite: Phys 132, Math 201

Phys 201 Engineering 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 201

Phys 202 Engineering 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 202

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 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 203

Phys 256, 257 Electrical Measurements Laboratory (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 203

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 316

Phys 306, 307 Electricity and Magnetism (4)
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 203

Phys 402 Introductory Nuclear Physics (3)
Natural and induced radioactivity. Interactions of charged particles and gamma rays in matter. Detection methods and instruments. Neutron production and interactions. 3 lectures. Prerequisite: Phys 401

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 316, 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 211, Math 316

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 or concurrent: Phys 211

Phys 442 Introductory Nuclear Physics Laboratory (1)
Techniques of measurement including Geiger, proportional and scintillation counting. Determination of the properties of alpha, beta and gamma radiation. 1 laboratory. Prerequisite or concurrent: Phys 402

Phys 443 Nuclear Physics Laboratory (1)
Energy spectra of nuclear particles. Coincidence measurements. Absolute activity determinations and selected specialized techniques. 1 laboratory. Prerequisite or concurrent: Phys 403. Prerequisite: Phys 442

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

Phys 463 Undergraduate Seminar (2)
Study of current developments in physics and discussion of periodicals of an appropriate level. 2 meetings.

Phys 501 Selected Topics in Advanced Physics (3)
Topics in mathematical physics or advanced experimental work. 3 lectures. Prerequisite: Graduate standing.

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

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 quantitative study of matter and energy and the principles and laws that describe their behavior and applications. 3 lectures, 1 recitation in PSc 101, 102; 3 lectures and 1 recitation or 1 laboratory in PSc 103 (alternative to be selected by student's major department). Prerequisite: Math 100, 103, 108, or 122. Not open for credit to students who have completed a college course with laboratory in physics or chemistry.

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 203; Phys 211 or 223 strongly recommended.

PSc 512 Philosophy of Science (3)
The relationship of philosophy and science. A presentation of problems in the logic of science and in the analysis of the concepts of science. 3 lectures. Prerequisite: Graduate standing.

PSc 521 Curriculum and Methods in the Physical Sciences (3)
Techniques, aims and objectives in the teaching of physics, chemistry, physical science, and general science at the secondary school level. Selection and organization of teaching material. Evaluation of results. 3 lectures. Prerequisite: Graduate standing.
The Social Sciences Department serves the four divisions 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.

CURRICULUM IN SOCIAL SCIENCES

Freshman

<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>Physical Education (PE 141)</td>
<td>½</td>
<td>½</td>
<td>½</td>
</tr>
<tr>
<td>Basic Mathematics for General Education (Math 100)</td>
<td>3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>* Natural Science</td>
<td>3</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>History of Civilization (Hist 101, 102, 103)</td>
<td>3</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>Principles of Political Science (Pol Sc 101, 102, 103)</td>
<td>3</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>** Electives</td>
<td>2</td>
<td>4</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td>17½</td>
<td>16½</td>
<td>16½</td>
</tr>
</tbody>
</table>

Sophomore

<table>
<thead>
<tr>
<th>Course</th>
<th>F</th>
<th>W</th>
<th>S</th>
</tr>
</thead>
<tbody>
<tr>
<td>Introduction to Philosophy (Phil 201)</td>
<td></td>
<td></td>
<td>3</td>
</tr>
<tr>
<td>Principles of Economics (Ec 201, 202, 203)</td>
<td>3</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>Public Speaking (Sp 201)</td>
<td>2</td>
<td></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>General Psychology (Psy 202)</td>
<td></td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>* Natural Science</td>
<td>3</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>History of the United States (Hist 201, 202, 203)</td>
<td>3</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>** Electives</td>
<td>5</td>
<td>5</td>
<td>5</td>
</tr>
<tr>
<td></td>
<td>16½</td>
<td>16½</td>
<td>17½</td>
</tr>
</tbody>
</table>

* 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.
Junior

<table>
<thead>
<tr>
<th>Course</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>Literature (Eng 211, 212, 213; or 311, 312, 313)</td>
<td>3</td>
</tr>
<tr>
<td>Advanced Public Speaking (Sp 202)</td>
<td>2</td>
</tr>
<tr>
<td>Social Problems (Soc 303)</td>
<td>3</td>
</tr>
<tr>
<td>Senior Project (Soc Sc 461)</td>
<td>2</td>
</tr>
<tr>
<td>U.S. in World Affairs (Hist 305)</td>
<td>3</td>
</tr>
<tr>
<td>Comparative Economic Systems (Ec 304)</td>
<td>3</td>
</tr>
<tr>
<td>Principles of Sociology (Soc 201, 202, 203)</td>
<td>3</td>
</tr>
<tr>
<td>Political Science (Any 6 units from 300 or 400 level)</td>
<td>3</td>
</tr>
<tr>
<td>Approved Courses in Social Sciences</td>
<td>3</td>
</tr>
<tr>
<td>** Electives</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>17</td>
</tr>
</tbody>
</table>

Senior

<table>
<thead>
<tr>
<th>Course</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cultural Anthropology (Ant 201)</td>
<td>3</td>
</tr>
<tr>
<td>Senior Project (Soc Sc 462)</td>
<td>2</td>
</tr>
<tr>
<td>Undergraduate Seminar (Soc Sc 463)</td>
<td>2</td>
</tr>
<tr>
<td>History (Any 6 units from 300 or 400 level)</td>
<td>3</td>
</tr>
<tr>
<td>Geography (Geog 308 or 315)</td>
<td>3</td>
</tr>
<tr>
<td>Philosophy (Phil 202 or 204)</td>
<td>3</td>
</tr>
<tr>
<td>Social Psychology (Psy 401)</td>
<td>3</td>
</tr>
<tr>
<td>Approved Courses in Social Sciences</td>
<td>3</td>
</tr>
<tr>
<td>** Electives</td>
<td>5</td>
</tr>
<tr>
<td></td>
<td>16</td>
</tr>
</tbody>
</table>

** Electives

<table>
<thead>
<tr>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>5</td>
</tr>
<tr>
<td>5</td>
</tr>
<tr>
<td>6</td>
</tr>
<tr>
<td>15</td>
</tr>
</tbody>
</table>

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 221 Elements of Geography (3)
International importance, geographical characteristics, and socio-economic problems of Europe, the Soviet Union, and the Middle East. Primarily for the elementary school teacher. 3 lectures.

Geog 222 Elements of Geography (3)
International importance, geographical characteristics and socio-economic problems of the Orient, Pacific world, Africa, and the Americas. Primarily for the elementary 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.

** 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.
**Hist 101, 102, 103 History of Civilization (3) (3) (3)**

Development of civilization from earliest times of 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 117 History and Development of American Labor (3)**

Origin and development of trade unionism in the United States; legal status of unionism; role of government; influence of labor leaders; current scene and outlook. 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. 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 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.

---

**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 satisfies state requirement in American government and California government. 3 lectures.

Pol Sc 301 American Government (3)

Pol Sc 302 Dynamics of the American Political Process (3)
Political parties, pressure groups, public opinion and the role of each in contributing to the dynamics of the American political process. 3 lectures. Prerequisite: Junior standing and Pol Sc 101 or 301

Pol Sc 306 Modern Political Thought (3)
Theories of political control and the relationship between man and the state. 3 lectures. Prerequisite: Junior standing.

Pol Sc 311 Inter-American Relations (3)
Inter-American affairs. Political, economic, and social problems; forces motivating cultural behavior, industrial development, trade techniques, agriculture methods. Opportunities for employment in agriculture, engineering, and business. Finding and evaluating authoritative source materials on Latin American affairs. 3 lectures. Prerequisite: Pol Sc 301, Hist 304

Pol Sc 312 International Politics (3)
International political processes and problems; foreign policies and politics in relations between states; conflicts and adjustments. Analyses of selected problems. Prerequisite: History 305

Pol Sc 313 Comparative Government (3)
Contemporary political situation in Britain, France, Soviet Union, Germany, Italy, and Japan. Policies and problems; forces making for conflict and adjustment. Constitutional, economic, communal, and sovereignty bases. 3 lectures. Prerequisite: Pol Sc 312 or permission of instructor.

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 105 Sources and Methods in the Social Sciences (2)
Location and evaluation of information in the social sciences; introduction to analytical methods in the social sciences. 2 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 a minimum of supervision. Projects typical of problems which graduates must solve in their fields of employment. Project results are presented in a formal report. Minimum 120 hours total time.

Soc Sc 463 Undergraduate Seminar (2)
Intensive study of selected social problems with application of techniques for analysis. 2 meetings. Prerequisite: Completion of Senior Project.

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 (1-3)
Special problems in selected areas of the Social Sciences. Each seminar will have a subtitle describing its nature and content. 1 to 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. 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 Science 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 prob-
lems. 3 lectures.

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.
KELLOGG CAMPUS

POMONA
INTRODUCTION

Instructional work of the southern branch of the College was moved to the Kellogg Campus in the fall of 1956 when the first unit of the new campus building program was completed. Before that, instruction had been at the Voorhis Campus which had been given to Cal Poly in 1938.

Following the educational philosophy and method long established at the San Luis Obispo Campus, the Kellogg Campus offers students the opportunity to obtain occupational instruction in agriculture, engineering, arts and sciences and business in Southern California.

The Agriculture Division offers four-year programs leading to the bachelor of science degree in eight majors. They are Agricultural Business Management, Animal Science, Fruit Industries, Foods and Nutrition, Agronomy, Agricultural Services and Inspection, Ornamental Horticulture, and Landscape Architecture. Many courses are also offered in related agriculture.

The Engineering Division offers four-year programs leading to the bachelor of science degree in Aerospace, Chemical, Civil, Electronic, Industrial, and Mechanical Engineering.

The Arts and Sciences Division offers four-year major programs leading to the bachelor of science degree in Biological Sciences, Economics, Language Arts, Mathematics, Physical Education, Physical Sciences, and Social Sciences. Necessary fifth-year courses are offered so that students in the Arts and Sciences Division may complete requirements for the elementary or secondary teaching credentials.

In the field of business, major offerings are provided in Accountancy, Business Management, and Marketing.

GENERAL INFORMATION

FACILITIES

Agriculture Classroom Building

Occupied for the first time at the beginning of the Fall Quarter, 1962, the Agriculture Classroom Building has five lecture rooms, 11 laboratories, and staff offices. It provides instructional facilities for majors in Agricultural Business Management, Fruit Industries, Agronomy, Ornamental Horticulture, Animal Science, Agricultural Services and Inspection, and Landscape Architecture.

Administration-Classroom Building

The Administration Building houses the college administrative offices, the Student Personnel Division, the Business Management Division, and other administrative support services. Included also are classroom facilities for instruction in mathematics, English, social sciences, art, advertising, and journalism.

Library

Library and audiovisual services are centered in the Library Building. The library collection includes basic and general books plus specialized documents and periodicals in support of the majors offered.

Educational Computer Center

A computer center is operated on the Kellogg Campus as an all-campus facility. The center utilizes an IBM 1620 digital computer and peripheral data processing equipment. Instruction on the use of the computer is offered by several departments and students are encouraged to use the computer as an integral part of their program.
Science Building

The 75,000 square-foot Science Building, completed in 1956, contains modern classrooms, large lecture rooms, and laboratories. The departments of Biological Science and Physical Science are housed in this building.

Engineering Center

The engineering buildings on the Kellogg Campus include four laboratory and shop buildings, one classroom and laboratory building, and a wind tunnel building. These contain equipment and facilities for instruction in Aerospace, Civil, Electronic, Industrial, and Mechanical Engineering. Included are fully equipped shops for instruction in machine tool practice, drafting rooms, offices, lecture rooms, and specialized laboratories for the major course work.

Business Classroom Building

Completed in 1959, the 28,000 square-foot Business Classroom Building is designed especially for instruction in the business majors. In addition to classrooms and offices, it contains laboratories for the operation of business machines, installation of merchandising displays, and the use of other devices employed in modern business practice.

Agricultural Facilities

In addition to the original farm buildings and shops on the Kellogg and Voorhis properties, completely new units to house livestock, poultry, ornamental plants, and fruits and vegetables were completed in 1958 on the Kellogg Campus. Included are modern sheds and pens for beef cattle, sheep and swine, a meat processing plant and feed mill, facilities for poultry and poultry products, an apiculture unit, a packing and storage house for fruits and vegetables, and substantial greenhouse, headhouse and lath-house units for ornamental horticulture and nursery practice. The new agricultural engineering building houses laboratories for instruction in farm power, farm machinery, agricultural mechanics, carpentry, irrigation, and surveying. Also included are offices for faculty and a lecture facility. The world-famous Arabian horse unit and show arena are important parts of the agricultural establishment.

Physical Education and Athletics

Physical education and athletic facilities, covering 38 acres, are located on the Kellogg Campus. These include a gymnasium with related classrooms and offices, also fields for football, track, baseball, tennis, and other sports.

Dining Hall

A modern dining hall is in operation on the Kellogg Campus and seats 800 students. It also includes a snack bar, outside patio, and dining rooms for staff, residence students and special groups.

Residence Halls

The Kellogg Campus has residence halls for men and for women. Each hall has accommodations for 212 students. Students live two to each room and are furnished with beds, wardrobe, study desks, bookcases, etc. Each of these air conditioned buildings has a lounge, catering kitchen and recreation room. Coin operated vending machines and laundry facilities are also available. The halls are located within short walking distance of the classroom buildings, cafeteria, library and gymnasium.

Chapel

Occasional nonsectarian services, and college concerts are held in the Voorhis Chapel during the school year. The architectural style of the chapel was patterned after the old Spanish missions.

Health Center

The student Health Center is a new well-equipped medical clinic. It includes X-ray, physiotherapy, laboratory, emergency cast and treatment facilities as well as doctor's offices and examination rooms. Although there are no infirmary facilities, there are day-rest rooms.
STUDENT ORGANIZATIONS AND ACTIVITIES

STUDENT ACTIVITIES

Student Activities are recognized as part of the college educational program. The Student Activities Office, under the direction of the Associate Dean (Activities), is responsible for studying, encouraging and developing student participation in leadership and followership, sound programming and well-balanced living.

STUDENT GOVERNMENT

Student government functions under the jurisdiction of the elected student body officers and the Student Affairs Council, made up of elected representatives of the various campus organizations. All students are members of the Associated Students of California State Polytechnic College, Kellogg Campus, at Pomona, Inc., and are required to pay a membership fee which entitles the student to full participation in the activities of the association. Membership also includes a subscription to the weekly newspaper, Poly Post. The self-governing student organization attempts to coordinate all of the student sponsored activities with those of the college in order to make possible the maximum return to the entire educational community.

The government of student affairs and control of property are vested in the Student Affairs Council, the members of which are elected annually. In addition, there are boards and committees to oversee publications, athletics, drama, speech, music, college union and Poly Vue.

Clubs and organizations on the Kellogg Campus cover all departments and activities, and the opportunity exists for every student to take an active part in club life. The college does not recognize either national or local social fraternities or sororities and students are advised against participation in unofficial student organizations that are not in keeping with the college's traditions.

PUBLICATIONS

Poly Post is the official publication of the Associated Students and is published weekly during the school year.

POLY VUE AND EDUCATIONAL FIELD DAY

Poly Vue is the name given to the annual open house of the Kellogg Campus that is held in the spring each year. It is designed to show parents and friends the yearly activities and progress of the institution, as well as to provide a time for friendly social activities. The entire affair is organized and carried out by the students.

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

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, golf, tennis, cross country, swimming and water polo.

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

HEALTH AND MEDICAL

Medical services, paid for by the State and the student, are designed to provide on an outpatient basis the services usually rendered by the family physician. Any specialist care or hospitalization is at the student's expense unless student insurance is purchased at the time of enrollment. Full time enrollees may utilize the health services Monday through Friday daily between 8:00 a.m. and 5:00 p.m. with emergencies always taking precedence. Registration in the College is not complete until a student has had his entrance physical examination or received approval for other arrangements from the Medical Director.

COUNSELING

Services of the Counseling Center are available to students with problems in personal, social, vocational, or academic areas. The Test Office is operated within the Center. Reading improvement and study skills problems are handled in group guidance work carried on in the Center. Included, also, is a well-equipped occupational literature library. Each student is assigned a faculty adviser in his major field of study for academic and occupational guidance. The adviser also helps the student in his program planning. Problems in personal and social counseling are identified by the faculty adviser and referred to the professional staff in the Counseling Center.

STUDENT HOUSING

The Kellogg Campus of the California State Polytechnic College has residence hall facilities for both men and women students. The College's interest in the resident student, however, goes beyond providing desirable living and dining facilities. It is believed that the on-campus living experiences should be an integral part of the "learn by doing" education which directly prepares the graduate to step into industry or the professional fields and to be a positive leader in his community. Through participation in the out-of-class intellectual programs, hall and wing government, social functions and the total living experience, the student's social awareness and competency are greatly strengthened.

New students interested in on-campus housing should request a housing application at the time of application for admission to the College. Commuting distance from the campus, date of housing application and college admission date are the criteria used for determining housing priority. Subsequent to the receipt of the housing application the College will notify the applicant of his current housing priority status. Housing licenses, which cover both room and board fees, are mailed to those applicants eligible for housing in advance of the start of the appropriate quarter. The payment date will appear on the license and will be prior to the start of the quarter.

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 an advance written parental responsibility statement is filed with the Associate Dean, Women, prior to registration. Inquiries about off-campus housing should be made in person at the College Housing Office.

PLACEMENT

A centralized placement service is available to students who have completed their college program. The Placement Office and departments work together in assisting students to obtain the most suitable employment consistent with their preparation and experience.

No guarantee of placement is made to any student, but a sincere effort is made to find employment for anyone who shows himself worthy of this service.
SUMMER EMPLOYMENT

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

The Placement Office receives many summer job listings. Ranchers and businessmen visit the campus in person and large business concerns send recruiters to interview undergraduates for summer employment. A summer job often leads to permanent 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 from $1.25 per hour to $2.50 per hour depending on the job requirements and the skills of the worker.

SCHOLARSHIPS

Scholarship application blanks are available October 1 of each year. They must be completed and returned before April 15 of the following year for consideration in the next coming college year. Applications received after April 15 are considered only in cases of cancellations. Applications may be obtained by writing the Financial Aids Office.

Sears-Roebuck Foundation Agriculture Scholarship Awards

Annual scholarships of $300 each are awarded to entering men students who enroll as freshmen in one of the agriculture majors offered at the college. 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. Applications should be in the hands of the scholarship committee by April 1.

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 awards as first-year students.

American Society for Quality Control—San Bernardino Section—Scholarship

The American Society for Quality Control, San Bernardino Section, has established a $100 scholarship (minimum) to assist students interested in quality control studies and careers.

Animal Science Scholarship

One $150 scholarship is provided annually to assist a continuing animal science major who demonstrates greatest all-around abilities and qualities for success in his chosen career field.
Bandini Fertilizer Company Scholarship

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

Jim Bastady Memorial Scholarship

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

Business Scholarship

Business management, accountancy, and marketing majors are eligible to apply for the Cal Poly Business Award sponsored annually by the students and faculty of these departments, in an amount of at least $75.

California Association of Nurserymen Award

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

California Congress of Parent Teachers Association Scholarship

The California Congress of Parent Teachers Association provides a $400 scholarship to a senior or graduate student preparing for a career in elementary education.

California Fertilizer Association Awards

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

California State Polytechnic College Alumni Association Award

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

Cal Poly Activity Award

Each year one award (or more) of $100 goes to qualified students who have made, or demonstrate the potential of making, leadership contributions in the area of campus activities and citizenship.

Cal Poly Women's Club Scholarship

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

Central California and Tulare County Sunkist Managers Club Scholarship

One $300 scholarship is awarded to an entering student in fruit industries.

Emblem Club of Pomona Scholarship

The Emblem Club of Pomona provides a $500 award each year to a qualified senior who plans a career in the mental health field.

Jack Evans Memorial Award

A $100 award is awarded annually to an outstanding junior student majoring in landscape architecture.

Foothill Sunkist Managers Club Scholarship

One $150 scholarship is awarded to an entering student in fruit industries.

Foundry Educational Foundation Scholarships

Four scholarships of $500 each are given annually by the Foundry Educational Foundation to students in industrial engineering and related fields who are preparing themselves for careers in the foundry industries.

Kellogg Supply Co., Inc., Scholarships

One annual scholarship of $125 is available to a qualified and deserving student enrolled in the soil science field and similarly one scholarship of $125 to a student enrolled in ornamental horticulture.
Kellogg Campus

Lemon Men’s Club Annual Award of Merit
A $150 award goes to an outstanding upper classman majoring in fruit industries.

Los Angeles Chapter, California Association of Nurseriesmen Award
The Los Angeles Chapter of the California Association of Nurseriesmen provides an award of $125 each year to an outstanding student preparing for a career in an ornamental horticulture field.

Los Angeles County Fire Department Grant
An educational grant of $200 is available to a Cal Poly student who is a dependent of a full-time paid employee of the Los Angeles County Fire Department, a retired employee, a disabled employee, or a widow or orphan of a deceased employee.

Los Angeles County Pomona Grange Award
The Los Angeles County Pomona Grange #37 makes possible a $200 award to a qualified student who will be entering a career in agriculture.

Chet Pencille Memorial Fund
One $200 scholarship and one $100 scholarship may be awarded to entering freshmen and/or students transferring from other colleges who enroll with the Services and Inspection Department and have completed the junior year.

Harry E. Rosedale Memorial Scholarship
An award of $100 is made available for a student enrolled in ornamental horticulture at the Kellogg Campus. The student must have completed one year of work in the Ornamental Horticulture Department.

San Bernardino County Pomona Grange Award
An award of $150 is made available by the San Bernardino County Pomona Grange #32. This award is designed to assist students who show promise in agricultural endeavors.

Millard D. Shriver Scholarship
The purpose of the Millard D. Shriver Scholarship, a $250 award given annually, is to encourage academic excellence among students majoring in aerospace engineering at Cal Poly for one year or more.

Solar Aircraft Company Scholarships
Two annual $100 scholarships are made available for qualified engineering students who are entering their junior year. 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 five $100 junior student awards made at the two Cal Poly campuses.

Sunkist Growers, Inc., Scholarship
One $150 scholarship is awarded as a second-year award to the most outstanding recipient of the Sunkist Managers Club Scholarships.

Sunkist Managers Club Scholarship (San Diego and Orange Counties)
One $150 scholarship is awarded to an entering student in fruit industries.

Tri-County Sunkist Managers Club
One $150 scholarship is awarded to an entering student in fruit industries.

Vitren Corporation Scholarship
One $100 scholarship is made available for an outstanding student in poultry or animal husbandry.

Wagner Landscape Contractors Award
Each year a $100 award is given to an outstanding upperclass student preparing for a career in landscape contracting.
Western Electric Scholarship
A scholarship covering the cost of required fees, books and other materials in an amount of not less than $400 is provided to an undergraduate student majoring in engineering.

STUDENT LOANS
A number of student loan funds on the Kellogg Campus provide temporary assistance to qualified 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 should be made in the Financial Aids Office.

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.

Alex M. Wilson Memorial Loan Fund
The family and friends of Alex M. Wilson established a memorial loan fund in his memory with an original grant of $500. The purpose of this fund is to make short- and long-term loans available to students of California State Polytechnic College.

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.

Associated Students Loan Fund
The Associated Students established a loan fund with an original grant of $500 for the purpose of making short-term loans available to students enrolled at the Kellogg Campus.

Cal Poly Student Wives Club Loan Fund
The Cal Poly Student Wives Club has established a loan fund designed to provide aid primarily to married students.

Cal Poly Women's Club Student Accommodation Loan Fund
The Cal Poly Women's Club established a student accommodation loan fund for the purpose of making short-term loans to deserving students.

Chet Pencille Memorial Fund
The Pest Control Operators of California established the Chet Pencille Memorial Fund with an original grant of $2,500. The purpose of this fund is to make short- and long-term loans available to deserving young men enrolled in services and inspection.

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

Laura E. Settle Loan Fund
A loan fund has been established by the California Retired Teachers Association. Long- or short-term loans are available from this fund to senior or graduate students preparing for teaching careers.

Lemon Men's Club Loan Fund
The Lemon Men's Club of California established this loan fund with an original grant of $500 to make short-term loans available to deserving young men. Although preference is given fruit production students, other students are not excluded from receiving loans from this fund.
Animal Science Club Loan Fund
The college animal science club established the Animal Science Club Loan Fund with an original grant of $200. Subsequent to the original grant the Arabian Horse Association of Southern California has contributed an additional $200 to the fund. Although preference is given to students majoring in animal husbandry, other students are not excluded from receiving loans from this fund.

Katherine and Edwin Jobe Loan Fund
Mr. and Mrs. Verne Jobe established this loan fund with an original grant of $4,000 for the purpose of making both short- and long-term loans available to deserving students.

Phillip H. Henry Memorial Loan Fund
Friends of Phillip H. Henry established a memorial loan fund in his memory with an original grant of $1,200. The purpose of this fund is to make short- and long-term loans available to students of California State Polytechnic College.

Terminix Educational Foundation Fund
The Terminix Company Inc. of Los Angeles established this fund with an original grant of $500 to make short- and long-term loans available to deserving students. Although preference is given to students enrolled in services and inspection, other students are not excluded from receiving loans from this fund.

Dr. C. D. N. Gilfillan Memorial Loan Fund
A loan fund to perpetuate the memory of Dr. C. D. N. Gilfillan, former medical director of the Student Health Service at this college, has been established to assist students regardless of major.

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

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

Southern California Meter Association
A $750 loan fund has been established by the members of the Southern California Meter Association for the purpose of making short- and long-term loans available to students enrolled in Engineering Division majors.

West End Soil Conservation District
The members of the West End Soil Conservation District have made available a $500 short-term loan fund for students enrolled in Agriculture Division majors.

California Fertilizer Association Loan Fund
A $500 loan fund has been established by the Soil Improvement Committee of the California Fertilizer Association for the purpose of making small, short-term loans available to deserving students, in order that these students may continue their education.

Ornamental Horticulture Alumni Association Loan Fund
The Ornamental Horticulture Alumni Association established this loan fund to make short- and long-term loans available to students majoring in ornamental horticulture.

Jack Woodruff Memorial Loan Fund
The family and friends of Jack Woodruff established a memorial loan fund for the purpose of making short- and long-term loans available to qualified students enrolled at this institution.
Senior Loan Fund
The fund has been established to provide financial assistance to students in their senior year in college. Qualified seniors may apply to repay borrowed funds after graduation.

Southern California Turfgrass Council Loan Fund
This fund was established by the Southern California Turfgrass Council to provide short- and long-term loan assistance to students planning to enter the career field of park administration or related fields in ornamental horticulture.

Don Davis Memorial Loan Fund
This memorial loan fund was established by the former students, family and friends of Mr. Don Davis to perpetuate his helpfulness to students as an instructor in agricultural business management and as a member of the Scholarship and Loan Committee.

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

United Student Aid Fund
United Student Aid Fund is a private non-profit corporation which endorses lowcost loans by participating banks to college students. The college participates in this program by providing a specified amount of matching funds which allows the college to recommend students for such bank loans. Students who have completed their freshman year may borrow from a bank up to $1,000 a year at 6% simple interest with repayment beginning after graduation or separation from college.

FEES AND EXPENSES

State Fees
Materials and service fee (quarter):
Each student enrolled for six units or less.............................................. $13.00
Each student enrolled for over six units............................................. 25.50
Nonresident tuition—U.S. ($800 annual maximum):
Each student enrolled for 15 units or more (per quarter)....................... 200.00
Each student enrolled for less than 15 units (per quarter per unit or fraction of unit for the first 14 units)........................................ 13.50
For the 15th unit or fraction thereof.................................................... 11.00
Nonresident tuition—Foreign ($340 annual maximum):
Each student enrolled for 15 units or more (per quarter)....................... 85.00
Each student enrolled for less than 15 units (per quarter per unit or fraction of unit for the first 14 units)........................................ 5.75
For the 15th unit or fraction thereof.................................................... 4.50
Late registration fee ............................................. 5.00
Transcript of record fee (no charge for first copy) .................. 1.00
Course credit by special examination fee (per unit) .................. 1.00
Extension course fee (per quarter unit)
  Lecture and discussion courses .................................. 8.75
  Activity courses .................................................. 11.50
  Laboratory courses ............................................... 17.20
Conference, Short Course or Institute, per person .................... Estimated Cost
Application fee ................................................................ 5.00
Change of program fee ................................................. 1.00
Failure to meet administratively required appointment or time limit 2.00
Library fees ................................................................... See schedule in library
Check returned for any cause .......................................... 2.00

Parking fee:
  Nonreserved spaces (per quarter):
    Each student enrolled for more than six units .................... 9.00
    Each student enrolled for six units or less ..................... 4.00
    Each alternate car in addition to fee for first vehicle .......... 1.00
  Special groups, 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
    Fall quarter ................................................................ $10.00
    Winter, spring, and summer quarters, each ...................... 5.00
  Each student enrolled for six units or less
    Fall quarter ................................................................ 5.00
    Winter, spring, and summer quarters, each ...................... 3.00

Graduation fee ................................................................ 10.00

Note: Payment of the above listed associated student card fees during the fall, winter and spring quarters shall entitle any student who is also enrolled in the summer quarter next succeeding to membership in the student body organization for that quarter without payment of additional fees.

Living Expenses

STUDENTS LIVING IN CAMPUS RESIDENCE HALLS

Room and board per quarter (subject to change) .................... $260.00
Housing security deposit (payable prior to occupancy) .............. 20.00

Note 1: Room and board payable in advance. Arrangements to pay in two equal installments may be made upon special application. A service fee of $4 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. The college furnishes weekly linen service of bed sheets and pillow cases.

Note 3: The board plan includes breakfast, lunch, and dinner Monday through Friday excluding college holidays. Weekend meals are available at the Kellogg dining hall on a cash basis.

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 $346 to $400, depending upon his major, at the time of fall quarter registration.

* Not State fees, subject to change.
and approximately the same amount at the time of winter and spring quarter registration.†

Associated student card (fall quarter, $10.00, winter and spring quarters, $5.00 each) 

Materials and service fee (per quarter) 

Room and board (15 meals per week) 

Books and supplies (estimated) 

Weekend meals (estimated $15 per month) 

Laundry (estimated $10 per month) 

Estimated total expenses per quarter $420.50

---

**SPECIAL INSTRUCTIONAL SERVICES**

**SUMMER QUARTER**

The summer quarter at the Kellogg Campus is operated as a full academic quarter identical in duration and organization with the other quarters. The summer quarter provides opportunities for acceleration of program and also helps students make program adjustments that meet prerequisite requirements for normal progression and scheduling throughout the year.

The admission requirements, fees, deposits, and academic regulations for the summer quarter do not differ from those of the other quarters.

---

**ELEMENTARY AND SECONDARY TEACHER PREPARATION PROGRAMS**

Rodman F. Garrity
Coordinator, Teacher Credential Programs

**TEACHING CREDENTIALS OFFERED**

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

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

The Kellogg Campus offers courses which lead to the five-year Standard Teaching Credential with specialization in elementary or secondary teaching. Prospective secondary school teachers are advised to enroll in one of the following: Agriculture, Biological Sciences, Business Management, Language Arts, Mathematics, Physical Education, Physical Sciences, or Social Sciences. Prospective elementary teachers are advised to enroll in one of the following: Biological Sciences, Language Arts, Mathematics, Physical Sciences, or Social Sciences. Early in the program, the prospective elementary or secondary teacher must also choose a single subject teaching minor. Prospective secondary school teachers must minor in one of the following: Agriculture, Biology, Chemistry, Drama, Economics, English, History, Mathematics, Music, Physical Education or Physics. Prospective elementary teachers must minor in Agriculture, Biology, Chemistry, Economics, English, History, Mathematics, Music, Physical Education or Physics. Information brochures on admission and course requirements for the Standard Teaching Credentials are available from the Coordinator of Teacher Credential Programs and from major advisers in the several departments.

† 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.
ADMISSION TO CANDIDACY FOR TEACHING CREDENTIALS

The selection of candidates to prepare for teaching is accomplished through a three-step process involving campus-wide teacher education committees. These committees determine policies for the teacher preparation program, review the qualifications of all candidates, and decide whether or not the candidate should be admitted to the program. The three steps leading to the final completion of credential requirements are:

Step 1. Approval to enter the teacher preparation program;
Step 2. Approval to participate in student teaching;
Step 3. Final approval for an elementary or secondary credential.

A student who enters the college with the intention of earning a teaching credential must be approved as a candidate for the credential which he is seeking. This procedure involves the filing of an application and completing certain steps as explained later in this section.

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 from the Coordinator of Teacher Credential Programs. 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 qualifications is based on the following factors:

1. Achievement. Satisfactory performance in the area of English usage, reading, spelling, arithmetic, science, handwriting, and the social studies as indicated by scores on achievement tests.

2. Personal Adjustment. Evidence of satisfactory personal adjustment, habits, interests and attitudes as shown by evaluation instruments, observation, interview, and faculty ratings.

3. Speech. Demonstration of satisfactory speech quality and habits as indicated by speech test.

4. Physical Fitness. Evidence of good physical health must be shown before the time of student teaching.

5. Scholarship. Satisfactory scholarship on all work accepted by the college toward curriculum requirements must be in evidence before approval of candidacy for the teaching credential.
   a. Elementary and Secondary credentials, grade point average of 2.50 (on five point scale)
   b. Graduate work, grade point average of 2.75

6. General Education Requirements. All applicants must show satisfactory progress toward meeting specific and degree requirements in general education.

7. Professional Attitude. Applicants should show evidence of ability and willingness to work with pupils, parents, and school officials, through experience in working with youth activities.
THE AGRICULTURE DIVISION
THE AGRICULTURE DIVISION

Instruction in agriculture on the Kellogg Campus of the California State Polytechnic College is offered in eight majors leading to the Bachelor of Science degree. Students interested in agricultural education may choose a program leading to a standard teaching credential with a major in agriculture. Admission to the Agriculture Division is open to any high school graduate or college transfer who meets the requirements listed in the section on admissions.

Each curriculum is uniquely patterned so that the student may select his major occupational field as a freshman. Basic job-getting technical and exploratory courses are stressed during the first two years while increasing proportions of general education and supporting courses are found in the last two years. The beginning student, therefore, is normally highly motivated as a result of the opportunity to begin study directly in his major. In addition, it is possible for him to determine in a short time whether or not he is fitted for work in the field he has selected.

The courses offered in each agricultural curriculum may be conveniently 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 occupational field of the student's choice.

2. Related agriculture—Supporting courses in agriculture selected from closely allied fields. They supplement the major agricultural 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.

Courses are distributed throughout the four years so as to achieve important emphasis and balance in all areas.

The college has facilities necessary for the best preparation possible in its major fields. The college farm consists of fertile soils typical of the Southern California area with enough variation in soil type and climate to give students a broad background of experience. A new agriculture building houses offices, classrooms, laboratories, and auxiliary rooms for the entire division providing modern scientific equipment and supplies conveniently arranged for student use.

A new agricultural engineering building complete with shops and classrooms is equipped to provide training in mechanics for students throughout the Agriculture Division. Auxiliary buildings house farm machinery and tractors.

The Agricultural Business Management major has laboratory space in the agriculture building equipped with business machines and other equipment suited to the study and project needs of business management students.

Students majoring in Agricultural Services and Inspection use the facilities of the entire farm in their work in specific production courses. This department has at its disposal complete facilities in bee production including a modern apiary and processing plant.

The Agronomy Department manages approximately 400 acres devoted to the production of field, vegetable and forage crops. Fully equipped soils laboratories and experimental plots are available for student use. Modern equipment and facilities serve instruction in cultural operations, processing, and marketing.

The Animal Science Department is equipped with modern facilities for beef cattle, horses, sheep, and swine to accommodate both college herds and student-owned projects. Barns, feed yards, and 500 acres of both irrigated and natural pasture are available for departmental use. Most recent additions to the depart-
ment include a feed mill and a completely equipped meats processing building. A poultry plant emphasizing egg and meat production complete with a modern dressing plant is available for student use. An adjunct of this department is the world-famous Kellogg Arabian Horse program.

The Foods and Nutrition Department has at its disposal a modern, fully equipped food preparation laboratory. In addition, students in this major use other food-related college facilities, such as the meats laboratory, the fruit packing plant and the production equipment of the dining hall.

The Fruit Industries Department has for instructional use 60 acres of citrus fruit, 15 acres of avocados, and smaller acreages of deciduous fruits and nuts. This department has at its disposal a variety of specialized equipment for all cultural operations. A modern, student-operated packinghouse is used to process fruit from the college orchards.

The Landscape Architecture Department has design laboratories, special service rooms, project court and other auxiliary facilities located in the new agriculture building. In addition the entire campus is used as a laboratory for design problems, many of which have been installed by students to enhance the beauty and utility of the campus.

The Ornamental Horticulture Department has more than 70 acres devoted to ornamental plantings for use in laboratory work, with additional land available for commercial flower growing. In addition, this department offers its students the use of nine glasshouses, two lathouses, two screenhouses, two propagation houses, and numerous hotbeds and coldframes.

In keeping with the college philosophy of "learning by doing," each student is provided an opportunity to learn the fundamental skills involved in the care, maintenance, and operation of all equipment and facilities to assure him of occupational competence. A supervised work program is an important part of instruction and all departments offer jobs outside of classtime so that students may earn while attending college.
SCIENCE OPTIONS IN AGRICULTURE

Cognizant of the technological advancement in all areas of employment in agriculture, the college offers three interdisciplinary programs for agricultural students who desire preparation in depth in specific scientific areas. These programs, referred to as options, are designed to complement agricultural major curricula and provide an opportunity for the graduate to broaden his field of employment into scientific areas related to agriculture. The student may elect one of the science options appropriate for his chosen major. With the approval of the departmental adviser some courses listed for the options may be substituted for requirements in the major curriculum. The three options are described as follows:

AGROPHYSICS

This option combines studies in soils, geology, chemistry, physics, and radio isotope tracer techniques. Study in these areas will expand the graduate’s employment desirability in many employment markets, both agricultural and industrial.

<table>
<thead>
<tr>
<th>Course</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>Phys 121-2-3</td>
<td>College Physics: 12</td>
</tr>
<tr>
<td>Math 117</td>
<td>College Algebra and Trigonometry: 5</td>
</tr>
<tr>
<td>Math 118</td>
<td>Analytic Geometry and Calculus: 5</td>
</tr>
<tr>
<td>PSc 329</td>
<td>Physical Geology: 4</td>
</tr>
<tr>
<td>Phys 339</td>
<td>Soil Physics: 2</td>
</tr>
<tr>
<td>Chem 334</td>
<td>Radiochemistry or Bio 431</td>
</tr>
<tr>
<td>Chem 337</td>
<td>Soil Analysis: 2</td>
</tr>
</tbody>
</table>

Total Units: 34

BIOCHEMISTRY

The biochemistry option prepares the graduate for the dual role of agricultural scientist and scientific analyst. It opens new employment opportunity in industry and government where there is a demand for agriculturists with concentrations of study in biology and chemistry.

<table>
<thead>
<tr>
<th>Course</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chem 329</td>
<td>Biochemistry II: 4</td>
</tr>
<tr>
<td>Chem 335</td>
<td>Biochemistry III: 4</td>
</tr>
<tr>
<td>Bio 335</td>
<td>Cellular Physiology or VS 205, Physiology of Domestic Animals: 4 or 3</td>
</tr>
<tr>
<td>PSc 102</td>
<td>General Physical Science: 4</td>
</tr>
<tr>
<td>Math 110</td>
<td>Introduction to Mathematical Analysis: 3</td>
</tr>
<tr>
<td>Math 111</td>
<td>Introduction to Mathematical Analysis: 3</td>
</tr>
<tr>
<td>Chem 334</td>
<td>Radiochemistry: 4</td>
</tr>
<tr>
<td>Chem 337</td>
<td>Soil Analysis: 2</td>
</tr>
<tr>
<td>Chem 338</td>
<td>Plant Tissue Analysis: 2</td>
</tr>
<tr>
<td>Bio 432</td>
<td>Isotope Tracers: 3</td>
</tr>
</tbody>
</table>

Total Units: 33 or 32
Biometrics is the application of mathematical-statistical theory to agriculture. The graduate will be prepared to design experiments, collate and analyze results of industrial or government research, design and analyze surveys, process data using modern computers, and arrive at management decisions related to agriculture in government and industry.

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>Math 110</td>
<td>Introduction to Mathematical Analysis</td>
<td>3</td>
</tr>
<tr>
<td>Math 111</td>
<td>Introduction to Mathematical Analysis</td>
<td>3</td>
</tr>
<tr>
<td>Math 204</td>
<td>Introduction to Mathematical Analysis</td>
<td>3</td>
</tr>
<tr>
<td>Math 211</td>
<td>Descriptive Statistics</td>
<td>3</td>
</tr>
<tr>
<td>Math 221</td>
<td>Automatic Programming for Digital Computers</td>
<td>1</td>
</tr>
<tr>
<td>Math 311</td>
<td>Mathematical Statistics I</td>
<td>3</td>
</tr>
<tr>
<td>Math 322</td>
<td>Mathematical Statistics II</td>
<td>3</td>
</tr>
<tr>
<td>Math 421</td>
<td>Design of Experiments</td>
<td>3</td>
</tr>
<tr>
<td>Math 422</td>
<td>Design of Surveys</td>
<td>3</td>
</tr>
</tbody>
</table>

*Selection

Total Units 30

* To be selected with the approval of the adviser.
The Agricultural Business Management major is a business program applied to the agricultural industry. It is designed to train students for such positions as agricultural business manager, agricultural credit manager, farm loan officer, produce buyer, purchasing agent, land appraiser, government administrator, and personnel manager. In addition to business management, sales and sales-promotional training, students may elect studies in specified production fields to gain valuable production techniques and experience necessary for job competency.

To satisfy a growing need in the agricultural marketing and distribution fields, students are prepared for careers in produce marketing, advertising, merchandising, manufacturer representation, food brokerage, sales and public relations in agriculture's related fields.

The student will be well prepared for marketing activities, since major courses are complemented with production courses and food processing facilities on the campus. This “learn by doing” technique affords the student a wealth of knowledge and equips him to handle and merchandise commodities through a more comprehensive knowledge of the product.

Much of agriculture's product is merchandised as processed food or fresh produce. The food distribution industry cooperates with this department in training and job experience programs to prepare students for employment in this field. Buying practices, merchandising techniques and marketing functions are studied in detail.

To supplement classroom and laboratory sessions, field trips are taken to distribution centers, warehouses and retail stores, to agricultural industries and production centers. Frequent campus visits by industry representatives further enrich student experiences. Undergraduate students are encouraged to find part-time employment in related agricultural industry and commerce.

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

### 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 (ABM 101)</td>
<td>3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Agricultural Credit (ABM 103)</td>
<td>3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Construction Fundamentals (AE 121)</td>
<td>2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Utility Systems (AE 122)</td>
<td>2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Freshman Composition (Eng 104, 105, 106)</td>
<td>3</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>Health Education (PE 107)</td>
<td>2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Basic Mathematics (Math 101)</td>
<td>3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Business Mathematics (Math 106)</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>Basic Biology (Bio 115)</td>
<td>3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>General Physical Science (PSc 101, 102) or General Inorganic Chemistry (Chem 324, 325)</td>
<td>4</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>General Psychology I (Psy 202)</td>
<td>3</td>
<td></td>
<td></td>
</tr>
<tr>
<td><em>Electives</em></td>
<td>3</td>
<td>2</td>
<td>3</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Sophomore</th>
<th>F</th>
<th>W</th>
<th>S</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wholesaling of Agricultural Products (ABM 206)</td>
<td>3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Advertising and Promotion of Agricultural Products (ABM 225)</td>
<td>3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>General Soils (SS 230)</td>
<td>4</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Job Instruction Training (ABM 203)</td>
<td>2</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*All students will select twenty additional units in agricultural production courses, with at least nine units selected from the following: AS 111; Agr 111; FI 230; OH 151; AS 227 or SI 101. Deviation only with adviser's approval.*
<table>
<thead>
<tr>
<th>Course</th>
<th>F</th>
<th>W</th>
<th>S</th>
</tr>
</thead>
<tbody>
<tr>
<td>Salesmanship (Mktg 208)</td>
<td>3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Principles of Economics (Ec 201, 202)</td>
<td></td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Public Speaking (Sp 200)</td>
<td></td>
<td></td>
<td>3</td>
</tr>
<tr>
<td>Report Writing (Eng 216)</td>
<td></td>
<td></td>
<td>3</td>
</tr>
<tr>
<td>† Literature</td>
<td></td>
<td></td>
<td>3</td>
</tr>
<tr>
<td>General Physical Science (PSc 103) or Organic Chemistry (Chem 326)</td>
<td></td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>Physical Education (PE 141)</td>
<td>½</td>
<td>½</td>
<td>½</td>
</tr>
<tr>
<td>Principles of Accounting (Acc 121, 122, 123)</td>
<td>3</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>† Philosophy or Literature</td>
<td>3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>* Electives</td>
<td></td>
<td>3</td>
<td></td>
</tr>
<tr>
<td></td>
<td>16 ½</td>
<td>16 ½</td>
<td>17 ½</td>
</tr>
</tbody>
</table>

**Junior**

<table>
<thead>
<tr>
<th>Course</th>
<th>F</th>
<th>W</th>
<th>S</th>
</tr>
</thead>
<tbody>
<tr>
<td>Agricultural Sales and Service Management (ABM 302)</td>
<td>3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Retailing of Agricultural Products (ABM 325)</td>
<td></td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Agricultural Marketing (FM 304)</td>
<td></td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Agricultural Economics (FM 311)</td>
<td></td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Descriptive Statistics (Math 211) or Business Forecasting (Bus 311)</td>
<td></td>
<td></td>
<td>3</td>
</tr>
<tr>
<td>Business Law (Bus 301, 302)</td>
<td></td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>Economic Problems (Ec 213)</td>
<td></td>
<td></td>
<td>3</td>
</tr>
<tr>
<td>American Civilization (Am Civ 301, 302, 303)</td>
<td>3</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>Introduction to Data Processing (DP 211)</td>
<td></td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>* Electives</td>
<td>4</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td></td>
<td>16</td>
<td>16</td>
<td>17</td>
</tr>
</tbody>
</table>

**Senior**

<table>
<thead>
<tr>
<th>Course</th>
<th>F</th>
<th>W</th>
<th>S</th>
</tr>
</thead>
<tbody>
<tr>
<td>Personnel Management (ABM 402)</td>
<td>3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Land Appraisal (ABM 406)</td>
<td></td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Food Merchandising (ABM 413)</td>
<td></td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Transportation of Agricultural Commodities (ABM 416)</td>
<td></td>
<td></td>
<td>3</td>
</tr>
<tr>
<td>Agricultural Labor-Management Relations (ABM 418)</td>
<td></td>
<td></td>
<td>3</td>
</tr>
<tr>
<td>Senior Project (ABM 461, 462)</td>
<td>2</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>Undergraduate Seminar (ABM 463)</td>
<td></td>
<td></td>
<td>2</td>
</tr>
<tr>
<td>Agricultural Prices and Government Control (FM 403)</td>
<td></td>
<td></td>
<td>3</td>
</tr>
<tr>
<td>Human Relations (Psy 314)</td>
<td></td>
<td></td>
<td>3</td>
</tr>
<tr>
<td>Insurance Principles (Fin 303)</td>
<td></td>
<td></td>
<td>3</td>
</tr>
<tr>
<td>State and Local Government (Pol Sc 401)</td>
<td></td>
<td></td>
<td>3</td>
</tr>
<tr>
<td>Advanced Public Speaking (Sp 300)</td>
<td></td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>* Electives</td>
<td>5</td>
<td>5</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>16</td>
<td>16</td>
<td>16</td>
</tr>
</tbody>
</table>

**DESCRIPTIONS OF COURSES IN AGRICULTURAL BUSINESS MANAGEMENT**

**ABM 101 Introduction to Agricultural Business (3)**

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

**ABM 103 Agricultural Credit (3)**

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

* All students will select twenty additional units in agricultural production courses, with at least nine units selected from the following: AS 111; Agr 111; Ft 230; OH 131; AS 227 or SI 101. Deviation only with adviser's approval.

† To be selected from the General Education list.
ABM 203  Job Instruction Training (2)
The principles and techniques of instructing mechanical or technical jobs; job breakdown and job description as applied to agricultural enterprises. 2 lectures.

ABM 206  Wholesaling of Agricultural Products (3)
Principles, methods, and techniques of buying, receiving, storing and handling agricultural products between the producer and the retail outlets. Functions of brokers, wholesaler—voluntary and cooperative types. 3 lectures.

ABM 225  Advertising and Promotion of Agricultural Products (3)
Industry-sponsored agricultural advertising programs, including the tools of publicity, merchandising and public relations. Detailed examination of local types of advertising media and rates as they are used for short, seasonal promotions. Advertising provisions of California agricultural marketing orders are reviewed. 2 lectures, 1 laboratory.

ABM 302  Agricultural Sales and Service Management (3)
Supervision of people who sell to and serve farmers. Selecting, training, directing, and evaluating personnel. Methods of payment, use of advertising, promotion, incentives and service. 3 lectures. Prerequisite: Marketing 208

ABM 325  Retailing of Agricultural Products (3)
Principles of buying, receiving, storing, and handling agricultural products for profitable retail store operations. Costs, facilities, techniques, and methods. Store operations—supermarket, shopping centers, etc. Field trips and case studies. 2 lectures, 1 laboratory.

ABM 402  Personnel Management (3)
Immediate supervisor-worker relationships for greater productivity and increased job satisfaction; impact of technology; union-management relationships; and skills of face-to-face supervision. 3 lectures.

ABM 406  Land Appraisal (3)
Principles, methods and techniques of appraising real property for loans, purchase and sale, tax assessments, condemnations and other purposes. 3 lectures.

ABM 413  Food Merchandising (3)
Retail agricultural marketing practices with emphasis on the selling and promotion functions. Display methods; related products and tie-in merchandising; customer motivation and traffic studies. 3 lectures.

ABM 416  Transportation of Agricultural Commodities (3)
Principles of transportation of perishable agricultural products, emphasizing current trends of rail, truck and air carriers. Types of equipment available, containerization potentials, and regulations including agricultural exemptions and incentives. 3 lectures.

ABM 418  Agricultural Labor-Management Relations (3)
Study of existing union contracts pertinent to the agricultural industry. Responsibilities of management and labor. Trends and practices. 3 lectures.

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

ABM 463  Undergraduate Seminar (2)
New methods and developments, practices, and procedures in the field. 2 meetings. Prerequisite: Senior standing.

AG 400  Special Problems for Advanced Undergraduates (1-2)
Individual or group investigation, research, studies, or surveys of selected problems. Total credit limited to 4 units, with a maximum of 2 units per quarter.
DESCRIPTIONS OF COURSES IN FARM MANAGEMENT

FM 304 Agricultural Marketing (3)
Economic and historical aspects of marketing agricultural products. Various marketing institutions, their problems and possible solutions. Current trends and developments, with emphasis on California products and marketing structure. 3 lectures. Prerequisite: Ec 201

FM 311 Agricultural Economics (3)
Use of economic principles to analyze problems in agriculture. Agriculture's role in the economy and policies affecting our agricultural resources. 3 lectures. Prerequisite: Ec 202

FM 324 Management Accounting (4)
Fundamental processes of double-entry accounting considered as a tool of agricultural management with emphasis on practical application. 3 lectures, 1 laboratory.

FM 326 Enterprise Accounting (3)
Methods of accounting for income, costs, and profit for separate enterprises in diversified agricultural business to achieve most profitable enterprise combinations. 3 lectures. Prerequisite: FM 324

FM 328 Agricultural Enterprise Management (4)
Methods of measuring profits in agricultural production and business, sources of economic information, land appraisal and description, sources of farm credit and capital, land leases and rental budgeting techniques. 3 lectures, 1 laboratory.

FM 403 Agricultural Prices and Government Control (3)
Principles and methods of price analysis, forces affecting agricultural prices, price variations, cycles and trends, price reports and forecasting, governmental agricultural price control programs and price characteristics of specific agricultural commodities. 3 lectures. Prerequisite: Ec 202
Agriculture Division

AGRICULTURAL SERVICES AND INSPECTION DEPARTMENT
Department Head, Edward C. Appel, Jr.
Kenneth R. Hobbs

The Agricultural Services and Inspection program offers a broad background in the sciences that serve agriculture. Graduates are prepared for a variety of professional careers and for further studies leading to teaching credentials or advanced degrees.

(1) Careers are available in civil service and other positions with county, state, and federal agencies which promote and protect the general public and the various agricultural enterprises. Governmental officials are cooperative agents whose duties are to assist producers and processors and enforce laws and regulations. They advise and supervise in the science of protecting agricultural crops from the numerous insects, mites, nematodes, plant diseases, weeds, rodents, birds and other vertebrate pests; they assure buyers and consumers of fruit and vegetables, seeds, and agricultural chemicals of good quality; and they act as plant quarantine officers. These functions require the services of many new agricultural scientists each year.

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

(3) Positions in sales, service, and as consulting representatives of the agricultural chemical companies are challenging. These organizations offer employment to graduates with scientific pest control knowledge and a sound understanding of agricultural production practices.

(4) Structural and agricultural pest control specialists are needed as owners, supervisors, and field representatives. Many inspection services are required because of the increase in housing and industrial development and intensification and expansion to new crop lands.

Summer appointments with county, state, and federal agencies or private companies after a year of training in this major provide valuable experience and an income.

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

CURRICULUM IN AGRICULTURAL SERVICES AND INSPECTION

<table>
<thead>
<tr>
<th>Freshman</th>
<th>F</th>
<th>W</th>
<th>S</th>
</tr>
</thead>
<tbody>
<tr>
<td>Agricultural Law (SI 101)</td>
<td>3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Freshman Composition (Eng 104, 105, 106)</td>
<td>3</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>Basic Mathematics (Math 101, 112)</td>
<td>3</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Agricultural Engineering (AE 121 or 122)</td>
<td>2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Health Education (PE 107)</td>
<td></td>
<td></td>
<td>2</td>
</tr>
<tr>
<td>Physical Education (PE 141)</td>
<td></td>
<td>½</td>
<td>½</td>
</tr>
<tr>
<td>General Entomology (Ent 126)</td>
<td>4</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Basic Biology (Bio 115)</td>
<td></td>
<td></td>
<td>3</td>
</tr>
<tr>
<td>Basic Biology Lab (Bio 145)</td>
<td></td>
<td></td>
<td>2</td>
</tr>
<tr>
<td>Agricultural Botany (Bot 120)</td>
<td></td>
<td></td>
<td>4</td>
</tr>
<tr>
<td>Plant Production Electives</td>
<td>3</td>
<td>4</td>
<td>4</td>
</tr>
<tr>
<td>Electives</td>
<td>2</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

| Total | 15½ | 17½ | 16½ |
### Sophomore

<table>
<thead>
<tr>
<th>Course</th>
<th>F</th>
<th>W</th>
<th>S</th>
</tr>
</thead>
<tbody>
<tr>
<td>Economic Insect Pests (SI 228, 229)</td>
<td>3</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>Plant Identification (SI 224)</td>
<td>4</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pest Control Materials (SI 231)</td>
<td>4</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Vertebrate Pest Control (SI 223)</td>
<td>4</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Weeds and Weed Control (Agr 233)</td>
<td>4</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Principles of Economics (Ec 201, 202)</td>
<td>3</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>Pest Control Equipment (AE 233)</td>
<td>3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Soils (SS 121)</td>
<td>4</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Report Writing (Eng 216)</td>
<td>3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Public Speaking (Sp 200)</td>
<td>3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>General Plant Pathology (Path 223)</td>
<td>4</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>Principles of Accounting (Acc 121, 122)</td>
<td>3</td>
<td>3</td>
<td></td>
</tr>
</tbody>
</table>

**Total:** 17½ 17½ 17½

### Junior

<table>
<thead>
<tr>
<th>Course</th>
<th>F</th>
<th>W</th>
<th>S</th>
</tr>
</thead>
<tbody>
<tr>
<td>Produce Market Quality (SI 325)</td>
<td>3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fruit Quarantine (SI 322)</td>
<td>4</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Services and Inspection Careers (SI 372)</td>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Human Relations (Psy 314)</td>
<td>3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>General Psychology I (Psy 202)</td>
<td>3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>General Inorganic Chemistry (Chem 324, 325)</td>
<td>4</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>Organic Chemistry (Chem 326)</td>
<td>4</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Literature</td>
<td>3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Office Management (Bus 127)</td>
<td>4</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Electives</td>
<td>2</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Total:** 16 16 16

### Senior

<table>
<thead>
<tr>
<th>Course</th>
<th>F</th>
<th>W</th>
<th>S</th>
</tr>
</thead>
<tbody>
<tr>
<td>Biological Control (SI 403)</td>
<td>3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pest Control Practices (SI 424)</td>
<td>3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Senior Project (SI 461, 462)</td>
<td>2</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>Undergraduate Seminar (SI 463)</td>
<td>2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fertilizers (SS 221)</td>
<td>4</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Biochemistry I (Chem 328)</td>
<td>4</td>
<td></td>
<td></td>
</tr>
<tr>
<td>American Civilization (Am Civ 301, 302, 303)</td>
<td>3</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>Morphology of Immature Insects (Ent 334)</td>
<td>3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>* Philosophy, Arts, Music, or Literature</td>
<td>4</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Electives</td>
<td>4</td>
<td>4</td>
<td>4</td>
</tr>
</tbody>
</table>

**Total:** 16 16 16

### Descriptions of Courses in Agricultural Services and Inspection

**SI 101 Agricultural Law** (3)

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

* To be selected from the General Education list with not more than 2 units from arts and music.

† To be selected from the General Education list.
SL 223  **Vertebrate Pest Control**  (4)
Small animals and birds injurious to agricultural crops and structures; emphasizing introduced and native rats and mice, ground squirrels, pocket gophers, rabbits, and moles. Identification, seasonal history, and economic importance. Control methods and materials, their uses and precautions. Related laws and regulations. 3 lectures, 1 laboratory.

SL 224  **Plant Identification**  (4)
Identification of ornamental, orchard, and crop plants by contrast of odors, leaf shapes, and arrangements; fruit and flower types, growth habits; coloration of plant parts; and environmental variations. Consideration of scientific, common, and family name; general propagation and most serious pests. 3 lectures, 1 laboratory. Pre-requisite: Bot 120

SL 228  **Economic Insect Pests**  (3)
Recognition and distribution of the important mites and insects attacking the major field, cereal, and truck crops. Hosts and identification of damage to various plant parts. Seasonal history, habits, and problems relating to recommended control measures. 2 lectures, 1 laboratory. Prerequisite: Ent 126

SL 229  **Economic Insect Pests**  (3)
Recognition and distribution of the important mites and insects attacking citrus, deciduous fruit, small fruit, berries, and nut trees. Hosts and identification of damage to various plant parts. Seasonal history, habits, and problems relating to recommended control measures. 2 lectures, 1 laboratory. Prerequisite: Ent 126

SL 231  **Pest Control Materials**  (4)
Economic entomology as it pertains to the development of pest control materials; properties and formulations of pesticides; insect, plant, and animal tolerances; application of and precautions for modern insecticides, including the most recent developments; related laws and regulations. 3 lectures, 1 laboratory. Prerequisite: Ent 126, PSc 103 or the passing of a placement test.

SL 303  **Horticultural Products**  (3)
Market quality factors as they affect selection and use of important fruits, vegetables, eggs, and honey. Includes parasitic and non-parasitic defects, maturity, ripening and handling considerations. Governmental agencies concerned with quality and wholesomeness of foods. For non-majors. 3 lectures.

SL 321  **Fruit and Vegetable Standards**  (4)
Standardization provisions of the Agricultural Code relating to fruits, nuts, vegetables, eggs, and honey. Minimum standards for marketing, including maturity, container, marking, and size requirements. Parasitic and physiological market defects, their identification, cause, and legal tolerances. 3 lectures, 1 laboratory. Prerequisite: SL 325

SL 322  **Plant Quarantine**  (4)
Purpose and application of United States and California plant quarantine laws and regulations; identification, habits and seasonal history of pest and diseases concerned; areas under quarantine, commodities covered, restrictions, and established treatments. 3 lectures, 1 laboratory. Prerequisite: Ent 126, Path 223

SL 325  **Produce Market Quality**  (3)
Identification, cause, and detection methods of quality and condition entities resulting from insects, mites, nematodes, birds, mammals, plant diseases, and non-parasitic factors important when marketing major fruits and vegetables. Maturity indexes, size designations, and methods of packing produce. 2 lectures, 1 laboratory. Prerequisite: Path 223
SI 332  Household Pests (3)
  Pests attacking plant and animal products in dwellings, food serving, and process-
ing establishments, warehouses, and other enclosures; recognition of pests, damage,
habits; means of control and exclusion; pesticides registered for use in controlling
these pests; related laws and regulations. 2 lectures, 1 laboratory. Prerequisite: Ent 126. Offered odd-numbered years.

SI 333  Household Pests (3)
  A continuation of SI 332 to include pests existing as nuisances in homes or other
enclosures of occupancy; dooryard pests, and pests attacking man and domestic
animals, including pets, poultry, and wild animals whose ectoparasites also attack
man. 2 lectures, 1 laboratory. Prerequisite: Ent 126. Offered odd-numbered years.

SI 334  Insects Affecting Timber Products (3)
  The major and minor insect pests and other arthropods of economic significance
in the destruction of wood products; recognition of stages and damage; habits,
seasonal history, and control of such pests. Laws and regulations affecting the
structural pest control operator. 2 lectures, 1 laboratory. Prerequisite: Ent 126
Offered even-numbered years.

SI 336  Bee Science (3)
  Care, management, and manipulation of bees by beginners. Practical application
of principles for effective establishment and maintenance of home and commercial
apiaries. Recognition and control of bee diseases. Laws and regulations pertaining
to beekeeping. 2 lectures, 1 laboratory. Prerequisite: Ent 126.

SI 372  Services and Inspection Careers (1)
  Career opportunities and employment techniques. Application forms, letters of
application, data sheet, portfolio, the interview, and application follow-up. 1 lecture.
Prerequisite: Junior standing.

SI 403  Biological Control (3)
  Natural and induced control of insect, mite, and weed pests using agents other
than toxicants; collection, production and liberation of control agents; habits and
identification of major groups of parasites and predators; recent developments in
pest inhibition. 3 lectures. Prerequisite: Consent of instructor.

SI 419  Seed Technology (2)
  Identification of agricultural, vegetable, and weed seeds; inspection methods and
procedures. Technique of purity and germination tests in accordance with official
procedures. California seed law and other pertinent laws and regulations. 2 lectures.
Offered even-numbered years.

SI 424  Pest Control Practices (3)
  Methods of determining extent of pest populations in agricultural plantings.
Relationships between controls, population dynamics and economic levels. Experi-
mental plot design, design evaluation through statistical analysis and control results.
Determination of presence of pests, economic thresholds. Evaluation of control
programs. 2 lectures, 1 laboratory. Prerequisite: Senior standing.

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

SI 463  Undergraduate Seminar (2)
  New methods and developments, practices, and procedures in the field. 2 meetings.

AG 400  Special Problems for Advanced Undergraduates (1-2)
  Individual or group investigation, research, studies, or surveys of selected prob-
lems. Total credit limited to 4 units, with a maximum of 2 units per quarter.
The Agronomy Department offers instruction in the science and related studies concerned with crops and soils. The technical knowledge and operational skills acquired qualify the graduate to pursue careers in farm management; with seed, fertilizer and pest-control industries; in the processing and marketing of agricultural products; with agencies of the federal and state governments, and in education. Placement opportunities for graduates are both excellent and rewarding.

Four hundred acres are operated by the Agronomy Department in the production of cereals, field crops, truck crops and pastures. Students participate in the operational phases of this program through class laboratories and many of them through employment in the farming operations of the department. Actual experience is related to classroom instruction through the physical facilities of the college. Students also gain production skills through participation in Foundation crops projects wherein they grow crops for experience and profit. The new Agriculture Building provides modern instructional equipment and laboratories. A processing building, greenhouse and experimental plant growing area are integral working facilities of the department.

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

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

**CURRICULAR OPTIONS**

**Crops**

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

**Soils**

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

**CURRICULUM IN AGRONOMY**

<table>
<thead>
<tr>
<th>Course Description</th>
<th>F</th>
<th>W</th>
<th>S</th>
</tr>
</thead>
<tbody>
<tr>
<td>Introduction to Plant Science (Agr 111)</td>
<td>3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cereal Crops (Agr 122)</td>
<td></td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>Vegetable Crops (Agr 226)</td>
<td></td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>Construction Fundamentals (AE 121)</td>
<td>2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Utility Systems (AE 122)</td>
<td></td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>Farm Tractors (AE 241)</td>
<td>2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Basic Biology (Bio 115)</td>
<td>3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Basic Biology Lab (Bio 145)</td>
<td>2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Agricultural Botany (Bot 120)</td>
<td></td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>General Entomology (Ent 126)</td>
<td></td>
<td></td>
<td>4</td>
</tr>
<tr>
<td>Freshman Composition (Eng 104, 105)</td>
<td>3</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Report Writing (Eng 216)</td>
<td></td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Basic Mathematics (Math 101, 112)</td>
<td>3</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Physical Education (PE 141)</td>
<td>½</td>
<td>½</td>
<td>½</td>
</tr>
<tr>
<td>Courses to complete major and electives</td>
<td></td>
<td>15½</td>
<td>16½</td>
</tr>
</tbody>
</table>

Total Credits: 16½
<table>
<thead>
<tr>
<th>Year</th>
<th>Courses</th>
</tr>
</thead>
<tbody>
<tr>
<td>Freshman</td>
<td>AE 123 Welding (2)</td>
</tr>
<tr>
<td></td>
<td>Agr 224 Harvesting and Marketing (4)</td>
</tr>
<tr>
<td></td>
<td>AE 227 Farm Power (2)</td>
</tr>
<tr>
<td></td>
<td>AE 221 Farm Machinery (2)</td>
</tr>
<tr>
<td>Sophomore</td>
<td>Math 211 Descriptive Statistics (3)</td>
</tr>
<tr>
<td></td>
<td>AE 132 Applied Farm Surveying (2)</td>
</tr>
<tr>
<td></td>
<td>SS 222 Soil Conservation (3)</td>
</tr>
<tr>
<td></td>
<td>SS 223 Range Management (4)</td>
</tr>
<tr>
<td></td>
<td>SS 333 California Soils (3)</td>
</tr>
<tr>
<td></td>
<td>PSc 329 Physical Geology (4)</td>
</tr>
<tr>
<td></td>
<td>CROPS OPTION (ADD COURSES BELOW TO BASIC CURRICULUM)</td>
</tr>
<tr>
<td></td>
<td>Agr 322 Crop Technology (4)</td>
</tr>
<tr>
<td></td>
<td>SF 231 Pest Control Materials (4)</td>
</tr>
<tr>
<td></td>
<td>SF 228 Economic Insect Pests (3)</td>
</tr>
<tr>
<td></td>
<td>Agr 331 Seed Production (4)</td>
</tr>
<tr>
<td></td>
<td>Agr 421 Crop Diseases (4)</td>
</tr>
<tr>
<td></td>
<td>Agr 404 Plant Breeding (3)</td>
</tr>
<tr>
<td></td>
<td>SOILS OPTION (ADD COURSES BELOW TO BASIC CURRICULUM)</td>
</tr>
<tr>
<td></td>
<td>SS 431 Advanced Soil Management (3)</td>
</tr>
<tr>
<td></td>
<td>Bot 322 Plant Physiology (4)</td>
</tr>
<tr>
<td></td>
<td>Chem 337 Soil Analysis (2)</td>
</tr>
<tr>
<td></td>
<td>Chem 338 Plant Tissue Analysis (2)</td>
</tr>
</tbody>
</table>

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

DESCRIPTIONS OF COURSES IN AGRONOMY

Agr 111 Introduction to Plant Science (3)
Diversification and importance of economic crop plants. Environmental factors as they affect plant growth. Physical characteristics of soil, soil-water relationships, terminology. 3 lectures.

Agr 121 Field Crops (4)
Growing of California field crops other than cereals, such as row-planted cotton, flax, field beans, sugar beets, and miscellaneous fiber and oil crops. Characteristics of the major varieties in relation to the best cultural, harvesting, marketing, disease and pest control practices. 3 lectures, 1 laboratory.

Agr 122 Cereal Crops (4)
Production and management of the major California cereal crop varieties. Characteristics of these varieties in relation to applicable cultural practices, harvesting, cost of production, grain grading and processing, marketing, disease and pest control. 3 lectures, 1 laboratory.

Agr 123 Forage Crops (4)
Production, harvesting, and utilization of principal California forage crops. Identification and utilization of range plants studied in the field. 3 lectures, 1 laboratory.

Agr 130 General Field Crops (4)
Production, harvesting, and use of important California cereal and field crops. Production areas, varieties, disease, and pest control. 3 lectures, 1 laboratory.

Agr 224 Harvesting and Marketing (4)
Harvesting methods and procedures; current handling and packaging techniques; grades and grading, minimum standards, containers, storage; requirements of crops for processing. 3 lectures, 1 laboratory.

Agr 226 Vegetable Crop Production (4)
Cultural practices; varieties, economics of production of major warm and cool season vegetables. Application of production techniques on college operated acreage. 3 lectures, 1 laboratory.

Agr 230 General Truck Crops (4)
Principles of production, harvesting, and marketing of major truck crops grown in California. Specific production problems relating to areas. 3 lectures, 1 laboratory.

Agr 233 Weeds and Weed Control (4)
Recognition and control of weeds injurious to California crop and range lands. Classification of weeds and their seed. Dissemination; cultural, chemical, and biological control practices; laws regarding weeds. 3 lectures, 1 laboratory.

Agr 322 Crop Technology (4)
Grades and qualities of California crops as they affect market values. Determination of factors affecting optimum harvesting and storage. Technological processes as they affect processing. 3 lectures, 1 laboratory. Prerequisite: Agr 121, 122, 224

Agr 331 Seed Production (4)
California field, vegetable and flower seed production. Location, methods of growing, harvesting, storing. Economic outlook for principal kinds. Certified seed production: Seed laws, 3 lectures, 1 laboratory. Prerequisite: Agr 121, 122, 226, 233

Agr 333 Irrigated Pastures (4)
Culture, management, fertilization, composition, and costs of California irrigated pastures. Identification, adaptation, and utilization of major irrigated pasture varieties. 3 lectures, 1 laboratory.

Agr 404 Plant Breeding (3)
Principles and techniques of improving ornamental and agronomic plants. 2 lectures, 1 laboratory. Prerequisite: Bio 303
Agr 421  Crop Diseases (4)
Methods of recognizing and controlling diseases of commercial vegetable and field crops. Chemical and cultural control methods that are presently being utilized in California. 3 lectures, 1 laboratory. Prerequisite: Bot 120, Path 223

Agr 437  Crop Farm Operation (3)
Operation of commercial vegetable and field crop acreages. Land preparation, cultivation, planting, fertilization, and pest control. Familiarity with more specialized farm equipment. 2 lectures, 1 laboratory. Prerequisite: Agr 121, 122; Agr 224 or 226

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

Agr 463  Undergraduate Seminar (2)
New methods and developments. Practices and procedures in the field. 2 lectures.

AG 400  Special Problems for Advanced Undergraduates (1-2)
Individual or group investigation, research, studies, or surveys of selected problems. Total credit limited to 4 units, with a maximum of 2 units per quarter.

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, drainage, and irrigation practices on soil productivity. 3 lectures, 1 laboratory. Prerequisite: SS 121

SS 221  Fertilizers (4)
Composition, value, and use of fertilizer materials and soil correctives. Methods employed in the manufacture, distribution, and application of fertilizers. 3 lectures, 1 laboratory. Prerequisite: SS 121 or SS 230

SS 222  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. 2 lectures, 1 laboratory. Prerequisite: SS 121 or SS 230

SS 223  Range Management (4)
Soil and plant characteristics of rangelands. Management practices used to maintain range resources and increase production of forage and livestock. Identification of important range plants. 3 lectures, 1 laboratory. Prerequisite: SS 121 or SS 230

SS 230  General Soils (4)
General properties of soils including common soil management, fertility, and conservation practices. 3 lectures, 1 laboratory.

SS 333  California Soils (3)
Origin, formation, and classification of California soils. Interpretation and utilization of soil survey and other data in crop production. 2 lectures, 1 laboratory. Prerequisite: SS 121

SS 431  Advanced Soil Management (3)
Soil and water problems affecting the production of crops. Methods of studying these problems and recent advances in soil and water management. 2 lectures, 1 laboratory. Prerequisite: SS 122, 221
Agriculture Division

ANIMAL SCIENCE DEPARTMENT

Department Head, Harry B. McLachlin
Allen C. Christensen Homer D. Fausch Mack H. Kennington
Norman K. Dunn Jack T. Gesler Edward A. Nelson
Eugene K. Keating

The location of the Kellogg Campus near the center of California’s expansive commercial livestock feeding, and Los Angeles, the largest slaughter and meats processing center of the west, combines naturally with college facilities to provide opportunities for students to obtain specialized and practical training in the animal industry in production, management, feeding, marketing and processing.

The courses in animal science are designed to prepare men and women for careers in the commercial and scientific phases of the animal industry. Emphasis may be achieved in business, education, preparation for graduate study, or pre-veterinary medicine.

Equipment for instruction consists of a well-equipped laboratory facility, 330 acres of range land and over 100 acres of irrigated pasture with well-equipped barns, a meat and poultry processing laboratory, a feed mill, and well-bred herds and flocks representative of various classes of livestock.

The livestock includes a purebred herd of Aberdeen-Angus, and Hereford, Aberdeen-Angus and Shorthorn commercial feeder cattle; the Kellogg herd of registered Arabian horses; purebred Shetland ponies; flocks of purebred Ramboüillet, Southdown and Suffolk sheep; a herd of Minnesota No. 1, 2, 3 and cross-bred swine; fryer projects and a poultry laying flock. Through the courtesy of prominent local breeders, commercial feeders, and livestock auctions and commission firms, excellent opportunities are offered for additional field study of methods of management and breeding.

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

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

CURRICULUM IN ANIMAL SCIENCE

Freshman

<table>
<thead>
<tr>
<th>Course</th>
<th>F</th>
<th>W</th>
<th>S</th>
</tr>
</thead>
<tbody>
<tr>
<td>Elements of Market Beef Production (AS 131)</td>
<td>4</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Elements of Swine Production (AS 122)</td>
<td></td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>Elements of Sheep Production (AS 123)</td>
<td></td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>Feeds and Feeding (AS 101, 102)</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>* Agricultural Engineering</td>
<td></td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>Farm Tractors (AE 241)</td>
<td></td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>Basic Mathematics (Math 101, 112)</td>
<td>3</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Freshman Composition (Eng 104, 105, 106)</td>
<td>3</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>Basic Biology (Bio 115)</td>
<td></td>
<td></td>
<td>3</td>
</tr>
<tr>
<td>Basic Biology Lab (Bio 145)</td>
<td></td>
<td></td>
<td>2</td>
</tr>
<tr>
<td>Physical Education (PE 141)</td>
<td></td>
<td></td>
<td>½</td>
</tr>
<tr>
<td>Health Education (PE 107)</td>
<td></td>
<td></td>
<td>½</td>
</tr>
<tr>
<td>Electives</td>
<td>2</td>
<td></td>
<td>2</td>
</tr>
</tbody>
</table>

Sophomore

<table>
<thead>
<tr>
<th>Course</th>
<th>F</th>
<th>W</th>
<th>S</th>
</tr>
</thead>
<tbody>
<tr>
<td>† Meat Animal Slaughter and Cutting (AS 227)</td>
<td></td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Approved Animal Science Courses</td>
<td></td>
<td>4</td>
<td>4</td>
</tr>
<tr>
<td>Plant Science (Select one) (Agr 122, 123, 333)</td>
<td></td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>Principles of Economics (Ec 201, 202)</td>
<td>3</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Genetics (Bio 303)</td>
<td></td>
<td></td>
<td>3</td>
</tr>
<tr>
<td>General Zoology (Zoo 134, 135)</td>
<td>4</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>General Inorganic Chemistry (Chem 324)</td>
<td></td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>General Bacteriology (Bact 221)</td>
<td></td>
<td></td>
<td>4</td>
</tr>
</tbody>
</table>

* Ag. Engineering—Select four units from AE 121, 122, 123, 131.
† Women Animal Science majors would substitute Meats Utilization (AS 325).

16½ 17½ 16½
California State Polytechnic College

<table>
<thead>
<tr>
<th>Junior</th>
<th>F</th>
<th>W</th>
<th>S</th>
</tr>
</thead>
<tbody>
<tr>
<td>Soil Science (SS 230 or 121)</td>
<td>4</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Physiology of Domestic Animals (VS 205)</td>
<td>3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Physical Education (PE 141)</td>
<td>1/2</td>
<td>1/2</td>
<td>1/2</td>
</tr>
<tr>
<td>Electives</td>
<td>2</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>17 1/2</td>
<td>15 1/2</td>
<td>17 1/2</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Senior</th>
<th>F</th>
<th>W</th>
<th>S</th>
</tr>
</thead>
<tbody>
<tr>
<td>Approved Animal Science Courses</td>
<td>4</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>Advanced Livestock Feeding (AS 303)</td>
<td>2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Animal Breeding (AS 304)</td>
<td>3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Animal Parasitology and Disease Control (VS 302)</td>
<td>3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>General Inorganic Chemistry (Chem 325, 326)</td>
<td>4</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>Biochemistry I (Chem 328)</td>
<td>4</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Public Speaking (Sp 200)</td>
<td>3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Management Accounting (FM 324)</td>
<td>4</td>
<td></td>
<td></td>
</tr>
<tr>
<td>American Civilization (Am Civ 301)</td>
<td>3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>General Psychology I (Psy 202)</td>
<td>3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Electives</td>
<td>5</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td></td>
<td>17</td>
<td>15</td>
<td>17</td>
</tr>
</tbody>
</table>

**DESCRIPTIONS OF COURSES IN ANIMAL SCIENCE**

**AS 101** Feeds and Feeding (2)
Identification and classification of feeds; simple use of food nutrients, protein, fat and carbohydrates; methods of preparing feeds; relative values of common feeds, for each class of livestock; the use of by-product feeds. 2 lectures.

**AS 102** Feeds and Feeding (3)
Digestion and utilization of feeds; feeding standards and computation of standard rations for livestock; economy in feeding, and purchasing feeds by nutritive values; important vitamins and minerals and feed sources thereof. 2 lectures, 1 laboratory. Prerequisite: AS 101

**AS 111** Animal Agricultural Science (3)
Designed for non-agricultural majors as an orientation course pertaining to breed identification, production, marketing and economics of agricultural animals. 3 lectures.

**AS 122** Elements of Swine Production (4)
History and development of swine industry. Types and breeds of swine. Hog production under California and Midwestern conditions. Common feeds used to supply nutrition requirements. Practice in handling, feeding, and selection. 3 lectures, 1 laboratory.

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

AS 123 Elements of Sheep Production (4)

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

AS 124 Basic Equitation (2)

Designed for those interested in training to ride and handle horses. Includes grooming, saddling, bridling, parts of and care of the equipment of horses, riding techniques. 2 laboratories.

AS 131 Elements of Market Beef Production (4)

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

AS 223 Market Swine Production (4)

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

AS 225 Elements of Horse Production (3)

An introductory course to acquaint the student with the field of horse production, breeds and types of horses, feeding, judging, unsoundnesses, diseases. 2 lectures, 1 laboratory.

AS 226 Livestock Judging (2)

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

AS 227 Meat Animal Slaughter and Cutting (3)

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

AS 232 Sheep and Wool Production (4)

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

AS 233 Commercial Beef Production (4)

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

AS 234 Horseshoeing (3)

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

AS 303 Advanced Livestock Feeding (2)

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

AS 304 Animal Breeding (3)

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

AS 305 Artificial Insemination of Domestic Animals (3)
Fundamentals and techniques used in the artificial breeding of cattle, sheep, swine and horses; physiological aspects of reproduction; evaluation of artificial insemination to the livestock industry. 2 lectures, 1 laboratory. Prerequisite: VS 206

AS 325 Meats Utilization (3)
Introduction to technology of meat, including cutting, wrapping, curing, smoking, freezing, and storage problems. Economic aspects of procurement, portion control and preparation, inspection and grading. For women Animal Science majors and interested non-majors. 2 lectures, 1 laboratory.

AS 328 Textile Fibers and Products (3)
Study of textile fibers of animal origin, their properties, capabilities, and means of identification as well as by-products of the animal industry, their importance and methods of merchandising and marketing. 2 lectures, 1 laboratory

AS 329 Advanced Horse Production (3)
An advanced and detailed course in breeding, mare and stallion selection, conformation and bloodlines, fertility and sterility diagnosis, pregnancy, gestation and foaling management, feeding techniques for stallions and mares, breeding hygiene, breeding problems, records and office procedures. 2 lectures, 1 laboratory. Prerequisite: AS 225

AS 332 Beef Cattle Husbandry and Improvement (3)
Feeding and managing the breeding herd. Investment requirements and cost of production. Equipment, disease problems, and selection. Record keeping and performance testing. Fitting and marketing sale cattle. Breeding systems and bloodlines. 2 lectures, 1 laboratory. Prerequisite: AS 233

AS 335 Meat Processing (3)
Manufacturing of processed meats, with emphasis on sanitation, sausage formulation, quality control, and smokehouse operations. 1 lecture, 2 laboratories. Prerequisite: AS 227

AS 336 Meat Classification and Grading (2)
Factors related to carcass quality, conformation, and finish, including meat classification, grading, and judging of carcass and wholesale cuts of beef, pork, and lamb. Field trips to nearby packing plants required. 1 lecture, 1 laboratory. Prerequisite: AS 227

AS 337 Wool Technology and Marketing (3)
Factors which determine commercial value of fleeces. Clean fleece weight for grade and relative importance of quality, length, soundness, purity, crimp, color, and condition. Markets and wool marketing. Management practices affecting wool value. 2 lectures, 1 laboratory. Prerequisite: AS 232. Offered odd-numbered years.

AS 338 Wool Judging (1)
Judging and scoring fleeces on the basis of grade, class, yield, quality, etc. Preparation for intercollegiate judging contests. 1 laboratory. Prerequisite: AS 232

AS 339 Basic Horse Training Techniques (2)
For students interested in training, principles, and procedures. Includes descriptions and practical experience in basic training procedures, driving on long lines, breaking foals to lead, working on long line, grooming, fitting and teaching horses to show in breeding classes. 2 laboratories. Prerequisite: AS 329

AS 402 Animal Nutrition (3)
Metabolism of proteins, carbohydrates, fats, minerals, and vitamins. Relationship of proper nutrition to livestock production. 3 lectures. Prerequisite: AS 102, Chem 328
AS 421  Meat Technology (3)
Characteristics of meat and meat products as related to processing operation, manufacture, and marketing. 2 lectures, 1 laboratory. Prerequisite: AS 227, Chem 326. Offered even-numbered years.

AS 422  Commercial Feedlot Operations (3)
Management of the commercial feedlot. Selection of feeder cattle; procurement of feedstuffs; economical rations; disease control; livestock and equipment financing; recordkeeping and feeder-owner agreements; and cattle marketing. 2 lectures, 1 laboratory.

AS 423  Livestock Marketing (3)
Livestock marketing practices and procedures. Observations of the public market. Study of factors affecting livestock and meat prices. Functions of livestock marketing agencies. 2 lectures, 1 laboratory. Prerequisite: AS 122, 123, 131. Offered even-numbered years.

AS 441  Advanced Livestock Judging (2)
Intensive practice in livestock judging in preparation for livestock judging team to compete in intercollegiate contests. 2 laboratories. Prerequisite: AS 226

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

AS 463  Undergraduate Seminar (2)
New methods and developments, practices, and procedures in the field. 2 lectures. Prerequisite: Senior standing.

AG 400  Special Problems for Advanced Undergraduates (1-2)
Individual or group investigation, research, studies, or surveys of selected problems. Total credit limited to 4 units, with a maximum of 2 units per quarter.

DESCRIPTION OF COURSE IN DAIRY HUSBANDRY

DH 230  General Dairy Husbandry (4)
Selection, breeding, feeding, and management of dairy cattle, composition and food value of dairy products. Dairy industry statistics and opportunities. 3 lectures, 1 laboratory.

DESCRIPTIONS OF COURSES IN POULTRY INDUSTRIES

PI 131  Poultry Principles (4)
Fundamentals of poultry production. Natural history, anatomy, physiology and life cycles of birds. Kinds, varieties, and breeds of poultry and their commercial uses. 3 lectures, 1 laboratory.

PI 231  Poultry Industries (4)
Channels through which poultry travels from producer to consumer. Buying, processing, and selling of poultry. Economic, sanitation, management, and merchandising problems involved. 3 lectures, 1 laboratory. Prerequisite: PI 131

PI 232  Poultry Marketing (4)
Channels through which eggs travel from producer to consumer. Buying, processing, and selling of eggs. Economic, management, and merchandising problems involved. 3 lectures, 1 laboratory. Prerequisite: PI 131
VS 205  Physiology of Domestic Animals  (3)
Physiological processes of the more important organs of the animal body. 3 lectures. Prerequisite: Zoo 134

VS 206  Anatomy of Domestic Animals  (2)
Laboratory demonstrations and discussions involving the comparative anatomy of the skeleton, musculature and digestive systems of the horse, cow, sheep and pig. 1 lecture, 1 laboratory. Prerequisite: Bio 115

VS 302  Animal Parasitology and Disease Control  (3)
Study of factors contributing to problems and control of animal sanitation, disease and parasites. 3 lectures. Prerequisite: Zoo 134
The primary objective of the Foods and Nutrition Department is to prepare professional dietitians, nutritionists, and food administrators for supervisory work in hospitals, teaching and social institutions, government agencies, food laboratories, and experimental kitchens. In addition, the curriculum includes a strong complement of courses in accounting and business management, and thus prepares the graduate for positions of leadership and responsibility in the fields of food management, sales, demonstration, and advertisement.

The curriculum meets the academic standards of the American Dietetic Association and qualifies the graduate for admission to hospital internship, which is required of graduates wishing to become professional hospital dietitians.

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

### CURRICULUM IN FOODS AND NUTRITION

#### Freshman

<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>General Inorganic Chemistry (Chem 324, 325)</td>
<td>4</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>Physical Education (PE 141)</td>
<td>½</td>
<td>½</td>
<td>½</td>
</tr>
<tr>
<td>Introduction to Foods (FN 121)</td>
<td>3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Basic Mathematics (Math 101, 112)</td>
<td>3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Basic Biology (Bio 115)</td>
<td></td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Basic Biology Lab (Bio 145)</td>
<td></td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>Health Education (PE 107)</td>
<td></td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>College Physics (Phys 121, 122)</td>
<td>4</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>Principles of Accounting (Acc 121, 122, 123)</td>
<td>3</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>16½</td>
<td>17½</td>
<td>17½</td>
</tr>
</tbody>
</table>

#### Sophomore

<table>
<thead>
<tr>
<th>Course</th>
<th>F</th>
<th>W</th>
<th>S</th>
</tr>
</thead>
<tbody>
<tr>
<td>Physical Education (PE 141)</td>
<td>½</td>
<td>½</td>
<td>½</td>
</tr>
<tr>
<td>Principles of Economics (Ec 201, 202)</td>
<td>3</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>General Psychology I (Psy 202)</td>
<td></td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Literature</td>
<td></td>
<td></td>
<td>3</td>
</tr>
<tr>
<td>Public Speaking (Sp 200)</td>
<td></td>
<td></td>
<td>3</td>
</tr>
<tr>
<td>Human Anatomy and Physiology (Zoo 234, 235)</td>
<td>4</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>Organic Chemistry (Chem 326)</td>
<td>4</td>
<td></td>
<td>3</td>
</tr>
<tr>
<td>Nutrition (FN 235)</td>
<td></td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>General Bacteriology (Bact 221)</td>
<td></td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Dietetics (FN 236)</td>
<td></td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>Meals (FN 221)</td>
<td></td>
<td>4</td>
<td>2</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>15½</td>
<td>17½</td>
<td>15½</td>
</tr>
</tbody>
</table>

† To be selected from the General Education list.
Junior

† Literature, Philosophy
American Civilization (Am Civ 301, 302, 303) 3 3 3
Report Writing (Eng 216) 3
Food Microbiology (Bact 424) 4
Art 3
Biochemistry I (Chem 328) 4
Quantity Food Preparation (FN 331) 3
General Psychology II (Psy 203) 3
Meats Utilization (AS 325) 3
Food Technology (FN 302) 4
Horticulture Products (SI 303) 3
Electives 3 3

Senior (Major courses not offered 1966–67)
Senior Project (FN 461, 462) 2 2
Undergraduate Seminar (FN 463) 2
Advanced Nutrition (FN 421) 3
Food Analysis (FN 432) 4
Personnel Management (ABM 402) 3
Diet Therapy (FN 423) 3
Food Production and Management (FN 436) 3
Food Equipment and Layout (FN 427) 4
Selected courses in business management 3 3
Electives 5 5 8

16 16 16

DESCRIPTIONS OF COURSES IN FOODS AND NUTRITION

FN 121 Introduction to Foods (3)
Elementary principles and practices in the selection and preparation of foods. Historical aspects of food science and its relationship to human health and progress. World’s food supply and food habits. 2 lectures, 1 laboratory.

FN 221 Meals (4)
Design and preparation of economical, palatable and nutritionally-balanced meals for family groups and community groups. Etiquette of proper table setting and service. 2 lectures, 2 laboratories.

FN 235 Nutrition (3)
Chemical composition of foods and their utilization by living organisms. Fundamental principles and problems of human nutrition. 2 lectures, 1 laboratory.

FN 236 Dietetics (3)
Qualitative and quantitative studies of the normal diets for persons of various ages and occupations. Planning and computation of diets. 2 lectures, 1 laboratory.

FN 302 Food Technology (4)
Technical principles of food processing including pasteurization, sterilization, homogenization, dehydration, conventional freezing and freeze-drying as they relate to the preservation of various types of foods and beverages. Field trips. 3 lectures, 1 laboratory. Prerequisite: FN 121, Chem 328

FN 331 Quantity Food Preparation (3)
Economic and technical principles and problems involved in planning, preparing and serving foods to large groups. Field trips. 1 lecture, 2 laboratories. Prerequisite: FN 121

† To be selected from the General Education list.
FN 421 Advanced Nutrition (3)
Qualitative, quantitative and intermediary metabolic studies of diets. 1 lecture, 2 laboratories. Prerequisite: Chem 328, FN 235

FN 423 Diet Therapy (3)
Relationship between diet and health with particular emphasis on specific dietary requirements associated with certain diseases and conditions. 2 lectures, 1 laboratory. Prerequisite: FN 421

FN 427 Food Equipment and Layout (4)
Selection, maintenance and arrangement of equipment and furnishings for food service departments with emphasis on materials, construction and specifications. 2 lectures, 2 laboratories. Prerequisite: FN 331

FN 432 Food Analysis (4)
Commercial techniques in chemical analysis of seed and cereal crops, fruit and vegetable crops, meat and meat products, milk and dairy products, egg and poultry products. Chemical and biological deterioration. Detection of adulterants. Legal specifications, packaging, grading and labeling. 2 lectures, 2 laboratories. Prerequisite: Chem 326

FN 436 Food Production and Management (3)
Principles of good organization and management and their application to the effective operation of food service. Production of quality food for group service within a pre-determined budget. Responsibilities of the food service manager. 2 lectures, 1 laboratory. Prerequisite: FN 331

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

FN 463 Undergraduate Seminar (2)
New methods and developments, practices, and procedures in the field. 2 meetings. Prerequisite: Senior standing.
The instruction program of the Fruit Industries Department represents the only four-year college curriculum specializing in citrus production and marketing in the United States. Parallel, but less extensive offerings are given for avocados, other subtropical fruits, and deciduous fruits.

The instruction program, in addition to production, stresses processing, marketing and management. In addition, general education and science courses provide the student with a broad program of liberal and applied education in the arts and sciences to fulfill the requirements of the degree program.

Facilities provide for the field and laboratory application phases of the program. Seventy acres of commercially operated orchards provide students with opportunities to perform and become familiar with cultural practices and procedures. A citrus packinghouse is operated in conjunction with the instruction program enabling students to become familiar with the processing, handling and marketing of citrus fruit.

The citrus and avocado industries represent an aggregate of over 250,000 acres of orchards in California. The annual production value exceeds $200,000,000. Citrus ranks second in the state in tree crop production value. California produces approximately 30 percent of the citrus consumed in the United States.

Employment opportunities for graduates of the Fruit Industries Department are found in orchard operation and management, commercial orchard pest control, fruit tree nurseries, laboratories for public and private agencies, fruit marketing and processing companies, teaching; and with commercial business serving the fruit industries of California. The demand for graduates of this department far exceeds the supply.

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

### CURRICULUM IN FRUIT INDUSTRIES

#### Freshman

<table>
<thead>
<tr>
<th>Course</th>
<th>F</th>
<th>W</th>
<th>S</th>
</tr>
</thead>
<tbody>
<tr>
<td>Introduction to Plant Science (Agr 111)</td>
<td>3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Citrus Production (FI 121, 122, 123)</td>
<td>4</td>
<td>4</td>
<td>4</td>
</tr>
<tr>
<td>Freshman Composition (Eng 104, 105, 106)</td>
<td>3</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>Basic Mathematics (Math 101, 112)</td>
<td>3</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>Agricultural Engineering (AE 121, 122 and AE 123 or 241)</td>
<td>2</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>Physical Education (PE 141)</td>
<td>½</td>
<td>½</td>
<td>½</td>
</tr>
<tr>
<td>Basic Biology (Bio 115)</td>
<td>3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Basic Biology Lab (Bio 145)</td>
<td>2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Agricultural Botany (Bot 120)</td>
<td>4</td>
<td></td>
<td></td>
</tr>
<tr>
<td>General Entomology (Ent 126)</td>
<td>4</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Electives</td>
<td>3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>17½</td>
<td>16½</td>
<td>16½</td>
</tr>
</tbody>
</table>

#### Sophomore

<table>
<thead>
<tr>
<th>Course</th>
<th>F</th>
<th>W</th>
<th>S</th>
</tr>
</thead>
<tbody>
<tr>
<td>Citrus Pest Control (FI 221)</td>
<td>4</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Avocado Production (FI 222)</td>
<td>4</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Citrus Diseases (FI 226)</td>
<td>4</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fruit Propagation (FI 245, 246)</td>
<td>1</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Principles of Economics (Ec 201, 202)</td>
<td>3</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Public Speaking (Sp 200)</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>Health Education (PE 107)</td>
<td>2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>General Plant Pathology (Path 233)</td>
<td>4</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Farm Surveying (AE 131)</td>
<td>2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Farm Power (AE 227)</td>
<td>2</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
## Agriculture Division

<table>
<thead>
<tr>
<th>Course</th>
<th>F</th>
<th>W</th>
<th>S</th>
</tr>
</thead>
<tbody>
<tr>
<td>Farm Machinery (AE 221)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Soils (SS 121)</td>
<td>4</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Soil Management (SS 122)</td>
<td>4</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fertilizers (SS 221)</td>
<td>4</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Electives</td>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>17½</td>
<td>16½</td>
<td>15½</td>
</tr>
</tbody>
</table>

### Junior

<table>
<thead>
<tr>
<th>Course</th>
<th>F</th>
<th>W</th>
<th>S</th>
</tr>
</thead>
<tbody>
<tr>
<td>Citrus and Avocado Marketing (FI 321)</td>
<td>3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fruit Processing and Handling (FI 322)</td>
<td>3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Packinghouse Management (FI 323)</td>
<td></td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Irrigation (AE 240)</td>
<td>4</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Management Accounting (FM 324)</td>
<td>4</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Enterprise Accounting (FM 326)</td>
<td></td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>General Inorganic Chemistry (Chem 324, 325)</td>
<td>4</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>Organic Chemistry (Chem 326)</td>
<td></td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>Plant Tissue Analysis (Chem 338)</td>
<td></td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>Pest Control Materials (SI 231)</td>
<td></td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>American Civilization (Am Civ 301)</td>
<td></td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Report Writing (Eng 216)</td>
<td></td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Electives</td>
<td>2</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>17</td>
<td>17</td>
<td>15</td>
</tr>
</tbody>
</table>

### Senior

<table>
<thead>
<tr>
<th>Course</th>
<th>F</th>
<th>W</th>
<th>S</th>
</tr>
</thead>
<tbody>
<tr>
<td>Orchard Management (FI 422)</td>
<td></td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>Senior Project (FI 461, 462)</td>
<td>2</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>Undergraduate Seminar (FI 463)</td>
<td></td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>American Civilization (Am Civ 302, 303)</td>
<td>3</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>General Psychology I (Psy 202)</td>
<td>3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Biochemistry I (Chem 328)</td>
<td></td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>Plant Physiology (Bot 322)</td>
<td></td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Genetics (Bio 303)</td>
<td></td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>❧ Literature</td>
<td></td>
<td></td>
<td>3</td>
</tr>
<tr>
<td>❧ Literature or Philosophy</td>
<td></td>
<td></td>
<td>3</td>
</tr>
<tr>
<td>Electives</td>
<td></td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>16</td>
<td>17</td>
<td>16</td>
</tr>
</tbody>
</table>

### Descriptions of Courses in Fruit Industries

**FL 121 Citrus Production Laboratory (1)**

Field practice in basic orchard skills including tree evaluation, orchard mapping and fall orchard practices. 1 laboratory.

**FL 122 Citrus Fruit Production I (4)**

Economic importance of the industry, frost protection methods, citrus botany, rootstocks, commercial varieties, pruning, disease control and fruit handling. 3 lectures, 1 laboratory.

**FL 123 Citrus Fruit Production II (4)**

Propagation and nursery methods, planning and care of orchards, soil management including irrigation, nutrition, cultivation and weed control. 3 lectures, 1 laboratory.

*To be selected from the General Education list.*
Fl 131 Subtropical Fruits (4)
Subtropical fruits including the date, olive, fig, macadamia nut and other selected fruits for commercial planting in California. Climatic and cultural requirements, fruiting and growth habits, varietal characteristics, and propagation. 3 lectures, 1 laboratory. Offered odd-numbered years.

Fl 132 Pomology (4)
Commercial deciduous fruits and nuts. Varieties, production areas, seasonal cultural practices and requirements. 3 lectures, 1 laboratory.

Fl 136 Small Fruit Production (4)
Specialized berry culture, varieties, production areas, propagation, pest and disease control, cultural practices and harvesting. 3 lectures, 1 laboratory. Offered odd-numbered years.

Fl 221 Citrus Pest Control (4)
Recognition of citrus pests, damage and seasonal history. Methods and materials used in control practices. Spray equipment operation and soil fumigation. 3 lectures, 1 laboratory. Prerequisite: Ent 126

Fl 222 Avocado Production (4)
Industry development, environmental requirements, variety adaptation, propagation, tree training, cultural requirements, soil management practices and production economics. 3 lectures, 1 laboratory.

Fl 226 Citrus Diseases (4)
Diseases of citrus under California conditions, their symptoms and methods of control. 3 lectures, 1 laboratory. Prerequisite: Path 223, FI 122

Fl 230 General Fruit Production (4)
Characteristics of the fruit industry of California. Varieties and cultural practices used in selected commercial fruit crops including fruiting and growth habits and propagation. For students other than Fruit Industries majors. 3 lectures, 1 laboratory.

Fl 231 Grape Production (4)
Production, processing, and marketing of raisins, table and wine grapes. 3 lectures, 1 laboratory. Offered even-numbered years.

Fl 245 Fruit Propagation I (1)
Nursery propagation of fruit plants. Budding, tipgrafting, cuttings, seedbed preparation, care and management of the nursery. 1 laboratory. Prerequisite: Bio 115

Fl 246 Fruit Propagation II (1)
Topworking and grafting fruit plants. Types of grafts used, selection of propagating material. 1 laboratory. Prerequisite: Bio 115

Fl 321 Citrus and Avocado Marketing (3)
Procedures in marketing citrus and avocados. Organization, importance, and function of cooperative and private marketing corporations in the assembling, processing and distribution of these fruit crops. 3 lectures. Prerequisites: Fl 123, 222

Fl 322 Fruit Processing and Handling (3)
Physical operations of citrus and avocado packinghouses in relation to harvesting, processing, and packing; fruit storage and diseases; pre-cooling, refrigeration and transportation. 2 lectures, 1 laboratory. Prerequisites: Fl 123, 226

Fl 323 Packinghouse Management (3)
Management relations in citrus and avocado packinghouse procedures. Regulatory aspects of fruit quality, grades and standards. Use and manufacture of products from citrus and avocados. 2 lectures, 1 laboratory. Prerequisite: Fl 322
Fl 422 Orchard Management (4)
Factors of management relating to the efficient operation of citrus and avocado orchards. Effect of cultural practices on production and quality of fruit. 3 lectures, 1 laboratory. Prerequisite: Senior standing.

Fl 425 Fruit Storage (2)
Behavior of citrus and avocados under storage conditions. Respiration and internal change determinations of fruit in storage. 1 lecture, 1 laboratory. Prerequisite: Senior standing. Offered odd-numbered years.

Fl 461, 462 Senior Project (2) (2)
Selection and completion of a project under a minimum of supervision. Projects typical of problems which graduates must solve in their fields of employment. Project results are presented in a formal report. Prerequisite: Senior standing.

Fl 463 Undergraduate Seminar (2)
Intensive study of the technical and management problems and new developments in the operation and management of fruit orchards. 2 lectures. Prerequisite: Senior standing.

AG 400 Special Problems for Advanced Undergraduates (1-2)
Individual or group investigation, research, studies, or surveys of selected problems. Total credit limited to 4 units, with a maximum of 2 units per quarter.
The Landscape Architecture curriculum provides a broad range of occupational choice from positions with the many offices engaged in private practice, to civil service opportunities with city, county, state, and federal governments.

The 800-acre campus provides a valuable outdoor laboratory for the study of plant material, and design and construction problems as these real site situations fit into the instructional program. Works and offices of landscape architects and planners in the Southern California area provide a wealth of instructional experiences available through field trips to these sites and places.

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

CURRICULAR OPTIONS

Landscape Architecture

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

Urban Planning

The student specializing in urban planning is provided a program of study and experiences in the many fields of knowledge of concern to the planner; but with an emphasis on planning as a three dimensional design field in which space and people are the prime elements of concern. As an urban or city planner the graduate will understand how to translate the needs of people, and the economic, political, and social forces into a satisfactory, effective urban form.

CURRICULUM IN LANDSCAPE ARCHITECTURE

<table>
<thead>
<tr>
<th>Freshman</th>
<th>F</th>
<th>W</th>
<th>S</th>
</tr>
</thead>
<tbody>
<tr>
<td>Landscape Drafting (LA 144)</td>
<td>2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Theory of Design (LA 121, 142, 143)</td>
<td>2</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>Freshman Composition (Eng 104, 105)</td>
<td>3</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>† Literature</td>
<td></td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Physical Education (PE 141)</td>
<td></td>
<td>½</td>
<td>½</td>
</tr>
<tr>
<td>Health Education (PE 107)</td>
<td></td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>Basic Biology (Bio 115)</td>
<td></td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Basic Concepts of Taxonomy (Bot 116)</td>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Basic Mathematics (Math 101, 112)</td>
<td>3</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Plant Materials II (OH 232)</td>
<td></td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>Fundamentals of Drawing (Art 244)</td>
<td>2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Electives and courses to complete major</td>
<td>3</td>
<td>6</td>
<td>7</td>
</tr>
<tr>
<td></td>
<td>17½</td>
<td>17½</td>
<td>17½</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Sophomore</th>
<th>F</th>
<th>W</th>
<th>S</th>
</tr>
</thead>
<tbody>
<tr>
<td>Basic Landscape Design (LA 227, 228, 229)</td>
<td>3</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>Perspective (LA 241, 242)</td>
<td>2</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Delineation (LA 243)</td>
<td></td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>Surveying (AE 131, 132)</td>
<td></td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>Plant Materials I (OH 231)</td>
<td></td>
<td>4</td>
<td></td>
</tr>
</tbody>
</table>

† To be selected from the General Education list.
**Agriculture Division**

<table>
<thead>
<tr>
<th></th>
<th>F</th>
<th>W</th>
<th>S</th>
</tr>
</thead>
<tbody>
<tr>
<td>† Literature or Philosophy</td>
<td></td>
<td></td>
<td>3</td>
</tr>
<tr>
<td>Principles of Economics (Ec 201, 202)</td>
<td>3</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>General Physical Science (PSc 102, 103)</td>
<td>4</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>Physical Geology (PSc 329)</td>
<td>4</td>
<td></td>
<td></td>
</tr>
<tr>
<td>General Psychology I (Psy 202)</td>
<td></td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Physical Education (PE 141)</td>
<td>½</td>
<td>½</td>
<td>½</td>
</tr>
<tr>
<td>Electives and courses to complete major</td>
<td>1</td>
<td>1</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td>17 ½</td>
<td>17 ½</td>
<td>18 ½</td>
</tr>
</tbody>
</table>

**Junior**

<p>| | | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Intermediate Landscape Design (LA 324, 325)</td>
<td>4</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>Landscape Construction Drawing (LA 337)</td>
<td>3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Planting Design (LA 327)</td>
<td>3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>American Civilization (Am Civ 301)</td>
<td>3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Business Law (Bus 301)</td>
<td></td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Public Speaking (Sp 200)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>General Soils (SS 230)</td>
<td>4</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Management Accounting (FM 324)</td>
<td>4</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Electives and courses to complete major</td>
<td>6</td>
<td>12</td>
<td></td>
</tr>
<tr>
<td></td>
<td>17</td>
<td>17</td>
<td>15</td>
</tr>
</tbody>
</table>

**Senior**

<p>| | | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Advanced Landscape Design (LA 434, 436)</td>
<td>4</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>History and Literature of Landscape Architecture (LA 424, 425)</td>
<td>3</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Senior Project (LA 461, 462)</td>
<td>2</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>Undergraduate Seminar (LA 463)</td>
<td></td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>Contracts, Specifications and Estimating (PA 431, 415)</td>
<td>4</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>American Civilization (Am Civ 302, 303)</td>
<td>3</td>
<td>3</td>
<td>7</td>
</tr>
<tr>
<td>Electives and courses to complete major</td>
<td>3</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>16</td>
<td>14</td>
<td>13</td>
</tr>
</tbody>
</table>

**LANDSCAPE ARCHITECTURE OPTION (ADD COURSES BELOW TO BASIC CURRICULUM)**

**Freshman**

<p>| | | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>LA 145 Landscape Drafting</td>
<td></td>
<td>(2)</td>
<td></td>
</tr>
<tr>
<td>OH 131 Basic Horticulture Skills</td>
<td></td>
<td>(4)</td>
<td></td>
</tr>
<tr>
<td>AE 122 Utility Systems</td>
<td></td>
<td>(2)</td>
<td></td>
</tr>
<tr>
<td>AE 124-5 Landscape Construction</td>
<td></td>
<td>(4)</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Sophomore**

<p>| | | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>OH 233 Plant Materials III</td>
<td></td>
<td>(4)</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Junior**

<p>| | | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>LA 326 Intermediate Landscape Design</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>LA 338-9 Landscape Construction</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>LA 359 Planting Design</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>LA 348-9 Mechanics and Strength of Materials</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Sophomore**

<p>| | | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>OH 336 Native Plant Material</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>PA 333 Turf Management</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

† To be selected from the General Education list.
**URBAN PLANNING OPTION (ADD COURSES BELOW TO BASIC CURRICULUM)**

<table>
<thead>
<tr>
<th>Freshman</th>
<th>Senior</th>
</tr>
</thead>
<tbody>
<tr>
<td>UP 155 Urban Planning Graphics (2)</td>
<td>Psy 314 Human Relations (3)</td>
</tr>
<tr>
<td>Math 211 Descriptive Statistics (3)</td>
<td>Soc 401 Urban Sociology (3)</td>
</tr>
<tr>
<td></td>
<td>Pol Sc 310 Public Administration (3)</td>
</tr>
<tr>
<td></td>
<td>Geog 312 Economic Geography and World Resources (3)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Sophomore</th>
</tr>
</thead>
<tbody>
<tr>
<td>UP 126 Introduction to Urban Planning (3)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Junior</th>
</tr>
</thead>
<tbody>
<tr>
<td>UP 321, 322, 323 Planning I, II, III (9)</td>
</tr>
<tr>
<td>Pol Sc 401 State &amp; Local Government (3)</td>
</tr>
<tr>
<td>Ec 301 Public Finance (4)</td>
</tr>
<tr>
<td>Ec 319 Land Economics (3)</td>
</tr>
</tbody>
</table>

**DESCRIPTIONS OF COURSES IN LANDSCAPE ARCHITECTURE**

- **LA 121, 142, 143 Theory of Design (2) (2) (2)**
  Studies in form, space, color, and materials, and their relation to three-dimensional problems. LA 121: 1 lecture, 1 laboratory. LA 142, 143: 2 laboratories.

- **LA 144, 145 Landscape Drafting (2) (2)**
  Drafting techniques and standards, progressing from tracings to light-construction working drawings. 2 laboratories.

- **LA 224 Principles of Landscape Design (4)**
  Basic principles of design and the application of these principles in the solving of landscape design problems. For non-majors. 2 lectures, 2 laboratories.

- **LA 225 Landscape Design of Small Homes (4)**
  Adaptation of landscape design principles to the garden layout of residential properties. For non-majors. 2 lectures, 2 laboratories.

- **LA 227, 228, 229 Basic Landscape Design (3) (3) (3)**
  Fundamental concepts in the analysis and solution of site problems. 1 lecture, 2 laboratories. Prerequisite: LA 229, 243

- **LA 241, 242 Perspective (2) (1)**
  Mechanical and sketching perspective. 2 laboratories, 1 laboratory. Prerequisite: LA 145 or ME 121

- **LA 243 Delineation (2)**
  Two-dimensional representation of three-dimensional subject using different media which enable a student to express his ideas visually. 2 laboratories. Prerequisite: LA 241, Art 244

- **LA 324, 325, 326 Intermediate Landscape Design (4) (4) (4)**
  The application of design concepts and principles to increasingly more difficult problems involving the total range of physical environment. 1 lecture, 3 laboratories. Prerequisite: LA 229, 243

- **LA 327, 359 Planting Design (3) (2)**
  The association of plant materials according to form, color, texture and culture; their grouping, arranging, and relationship to structural materials. 2 lectures, 1 laboratory; 2 laboratories. Prerequisite: OH 231, 232; LA 229 or 225

- **LA 337, 338, 339 Landscape Construction Drawing (3) (3) (3)**
  Landscape construction problems involving the formulation and preparation of plans for grading, drainage, staking, reference and lighting, planting, irrigation, construction details, structures, and other working drawings; relationship to specifications and contract documents. Preparation of a complete set of landscape construction drawings and documents. 1 lecture, 2 laboratories. Prerequisite: Math 112, LA 145, AE 122, 132
Agriculture Division

LA 348, 349  Mechanics and Strength of Materials  (1) (1)
Basic forces and their components. Physical properties of construction materials. Shear and bending moment diagrams. Sizing of wood structural members. 1 lecture. Prerequisite: Math 112, PSc 102

LA 424, 425  History and Literature of Landscape Architecture  (3) (3)
The relationship of religious, economic, and social conditions, topography and climate to the landscape architecture of the major nations at various times and places. The contributions of the literature and landscape designers of note to the field of landscape architecture. 2 lectures, 1 laboratory.

LA 434, 436  Advanced Landscape Design  (4) (4)
A study of the relationship of buildings and building groups to irregular topography and the further long-range growth and development of the land and elements thereon. 1 lecture, 3 laboratories. Prerequisite: LA 326

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

LA 463  Undergraduate Seminar  (2)
Methods and developments, ethics, office practices and procedures in the profession. 2 lectures.

AG 400  Special Problems for Advanced Undergraduates  (1-2)
Individual or group investigation, research, studies, or surveys of selected problems. Total credit limited to 4 units, with a maximum of 2 units per quarter.

DESCRIPTIONS OF COURSES IN URBAN PLANNING

UP 155  Urban Planning Graphics  (2)
Techniques of graphic presentation in the practice of urban and regional planning. Preparation of models, charts and graphs, land use and zoning maps. Dupli-
cating techniques, use of audio-visual aids. Development of skill in choice and use of particular media. 2 laboratories.

UP 126  Introduction to Urban Planning  (3)
A review of the historical determinants of urban growth. Evolution of the modern city. Significant contributions by leading planners, architects, landscape architects. 2 lectures, 1 laboratory.

UP 321  Planning I  (3)
Town planning theory; major elements in the subdivision, shopping centers, parks, zoning. 1 lecture, 2 laboratories. Prerequisite: LA 229

UP 322  Planning II  (3)
Problems characteristic of the large city including traffic, transportation, redevelop-
dment, recreation, zoning. 1 lecture, 2 laboratories.

UP 323  Planning III  (3)
Problems arising in suburban areas adjacent to cities and arterial highways. 1 lecture, 2 laboratories.

UP 431, 432, 433  Advanced Planning  (4) (4) (4)
Methods and procedures of master planning large scale environmental development. Attention to complex regional and metropolitan planning problems. 1 lecture, 3 laboratories. Prerequisite: UP 323
ORNAMENTAL HORTICULTURE DEPARTMENT

Department Head, Oliver A. Batcheller

Dorval D. Banks  James L. Degen  Tom Y. Yoshikawa
James M. Griffin

Ornamental horticulture with its many related phases continues to be among the most rapidly growing industries in California. It has doubled in size in the last ten years, and indications are that this growth will continue. This department provides emphasis in Ornamental Horticulture and Park Administration.

Through field trips to surrounding areas students have ready access to the greatest variety and number of horticultural enterprises in the United States. The well-landscaped Kellogg and Voorhis campuses offer excellent opportunities for practical application of principles and methods used in the industry. In addition to the facilities in the new Agricultural Science Building, the department has 12,000 square feet of greenhouse space, 5,000 feet of lath and saran shade and five acres of growing grounds. The close alliance with the Landscape Architecture Department gives opportunity for additional training in landscape design.

Through the department’s unique project program, students may grow and market their own nursery stock, cut flowers, or potted plants, thus adding significantly to their educational experience.

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

CURRICULAR OPTIONS

Nursery Operation

The Nursery Operation Option emphasizes preparation for production and management of both retail and wholesale nurseries and prepares men and women for positions in nursery operations and marketing and in the floriculture industry. It provides an excellent background for the preparation of teachers in horticultural science as well as for positions with state and county arboretums.

Park Administration

The Park Administration Option emphasizes preparation for development, operation, and management of both public and private parks. It prepares men and women for positions in the park and recreation areas including the installation, operation and management of both public and private enterprises. A further area of emphasis is that of landscape contracting which includes preparation in estimating, installation, and supervision.

CURRICULUM IN ORNAMENTAL HORTICULTURE

<table>
<thead>
<tr>
<th>Course</th>
<th>F</th>
<th>W</th>
<th>S</th>
</tr>
</thead>
<tbody>
<tr>
<td>Basic Horticultural Skills (OH 131)</td>
<td>4</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Plant Materials II (OH 232)</td>
<td></td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>Freshman Composition (Eng 104, 105, 106)</td>
<td>3</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>Basic Mathematics (Math 101, 112)</td>
<td></td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>Landscape Construction (AE 124, 125)</td>
<td>2</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>Utility Systems (AE 122)</td>
<td></td>
<td></td>
<td>2</td>
</tr>
<tr>
<td>Physical Education (PE 141)</td>
<td>½</td>
<td>½</td>
<td>½</td>
</tr>
<tr>
<td>Health Education (PE 107)</td>
<td>2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Basic Biology (Bio 115)</td>
<td></td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Basic Biology Lab (Bio 145)</td>
<td>2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>General Entomology (Ent 126)</td>
<td></td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>Agricultural Botany (Bot 120)</td>
<td>4</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Electives and courses to complete major</td>
<td>1</td>
<td></td>
<td>4</td>
</tr>
</tbody>
</table>

Total Credits: 17⅓ 16⅓ 16⅓
### Agriculture Division

**Sophomore**

<table>
<thead>
<tr>
<th>Course</th>
<th>F</th>
<th>W</th>
<th>S</th>
</tr>
</thead>
<tbody>
<tr>
<td>Plant Materials I (OH 231)</td>
<td>4</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Plant Materials III (OH 233)</td>
<td></td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>Principles of Landscape Design (LA 224)</td>
<td></td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>Landscape Design of Small Homes (LA 225)</td>
<td></td>
<td></td>
<td>4</td>
</tr>
<tr>
<td>Principles of Economics (Ec 201, 202)</td>
<td>3</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>Pest Control Equipment (AE 233)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Soils (SS 121)</td>
<td></td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>Farm Surveying (AE 131)</td>
<td></td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>General Plant Pathology (Path 223)</td>
<td></td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>Public Speaking (Sp 200)</td>
<td></td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Physical Education (PE 141)</td>
<td>½</td>
<td>½</td>
<td>½</td>
</tr>
<tr>
<td>Literature</td>
<td></td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Electives and courses to complete major</td>
<td></td>
<td>4</td>
<td>3</td>
</tr>
</tbody>
</table>

**Junior**

<table>
<thead>
<tr>
<th>Course</th>
<th>F</th>
<th>W</th>
<th>S</th>
</tr>
</thead>
<tbody>
<tr>
<td>Diseases of Ornamental Plants (OH 327)</td>
<td></td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>Management Accounting (FM 324)</td>
<td></td>
<td></td>
<td>4</td>
</tr>
<tr>
<td>Business Law (Bus 301)</td>
<td></td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Fertilizers (SS 221)</td>
<td></td>
<td></td>
<td>4</td>
</tr>
<tr>
<td>General Psychology (Psy 202)</td>
<td></td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Native Plant Materials (OH 336)</td>
<td></td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>General Inorganic Chemistry (Chem 324, 325)</td>
<td>4</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>Personnel Management (ABM 402)</td>
<td></td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Electives and courses to complete major</td>
<td>6</td>
<td>3</td>
<td>8</td>
</tr>
</tbody>
</table>

**Senior**

<table>
<thead>
<tr>
<th>Course</th>
<th>F</th>
<th>W</th>
<th>S</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ethics (Phil 204)</td>
<td></td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Turf Management (PA 333)</td>
<td></td>
<td></td>
<td>4</td>
</tr>
<tr>
<td>Senior Project (OH 461, 462)</td>
<td>2</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>Undergraduate Seminar (OH 463)</td>
<td></td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>American Civilization (Am Civ 301, 302, 303)</td>
<td>3</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>Planting Design (LA 327)</td>
<td></td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Electives and courses to complete major</td>
<td>6</td>
<td>11</td>
<td>7</td>
</tr>
</tbody>
</table>

**NURSERY OPERATIONS OPTION (ADD COURSES BELOW TO BASIC CURRICULUM)**

**Freshman**

<table>
<thead>
<tr>
<th>Course</th>
<th>F</th>
<th>W</th>
<th>S</th>
</tr>
</thead>
<tbody>
<tr>
<td>OH 121 Nursery Operations</td>
<td>(4)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Sophomore**

<table>
<thead>
<tr>
<th>Course</th>
<th>F</th>
<th>W</th>
<th>S</th>
</tr>
</thead>
<tbody>
<tr>
<td>OH 222 Specialized Plant Propagation</td>
<td>(4)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mktg 208 Salesmanship</td>
<td>(3)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>SI 231 Pest Control Materials</td>
<td>(4)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Junior**

<table>
<thead>
<tr>
<th>Course</th>
<th>F</th>
<th>W</th>
<th>S</th>
</tr>
</thead>
<tbody>
<tr>
<td>OH 323 Greenhouse Operations</td>
<td>(4)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>FM 326 Enterprise Accounting</td>
<td></td>
<td>(3)</td>
<td></td>
</tr>
<tr>
<td>Chem 326 Organic Chemistry</td>
<td></td>
<td>(4)</td>
<td></td>
</tr>
</tbody>
</table>

**Senior**

<table>
<thead>
<tr>
<th>Course</th>
<th>F</th>
<th>W</th>
<th>S</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bio 303 Genetics</td>
<td>(3)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Chem 328 Biochemistry I</td>
<td></td>
<td>(4)</td>
<td></td>
</tr>
<tr>
<td>ABM 225 Advertising and Promotion</td>
<td></td>
<td>(3)</td>
<td></td>
</tr>
</tbody>
</table>

† To be selected from the General Education list.
**PARK ADMINISTRATION OPTION (ADD COURSES BELOW TO BASIC CURRICULUM)**

<table>
<thead>
<tr>
<th>Freshman</th>
<th>Senior</th>
</tr>
</thead>
<tbody>
<tr>
<td>LA 144-5 Landscape Drafting (4)</td>
<td>PA 415, 431 Contracts, Specifications, Estimating (7)</td>
</tr>
<tr>
<td>LA 121, 142 Theory of Design (4)</td>
<td>PA 414, 425, 426 Park Administration I, II, III (11)</td>
</tr>
</tbody>
</table>

**Sophomore**

<table>
<thead>
<tr>
<th>Course</th>
<th>(2)</th>
</tr>
</thead>
<tbody>
<tr>
<td>AE 132 Applied Farm Surveying</td>
<td></td>
</tr>
</tbody>
</table>

**Junior**

<table>
<thead>
<tr>
<th>Course</th>
<th>(3)</th>
</tr>
</thead>
<tbody>
<tr>
<td>PA 328 Arboriculture</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Course</th>
<th>(4)</th>
</tr>
</thead>
<tbody>
<tr>
<td>SS 122 Soil Management</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Course</th>
<th>(3)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pol Sc 314 Public Administration</td>
<td></td>
</tr>
</tbody>
</table>

**DESCRIPTIONS OF COURSES IN ORNAMENTAL HORTICULTURE**

**OH 121 Nursery Operations (4)**

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

**OH 131 Basic Horticultural Skills (4)**

The basic skills of horticulture. Techniques and plans for their use in the gardening and nursery trade. 3 lectures, 1 laboratory.

**OH 222 Specialized Plant Propagation (4)**

Commercial specialized propagation including all types of grafting, budding, layerage, inarching, separations, divisions, and cuttings. Flask seeding. Use of the college facilities and frequent field trips to wholesale growers. 3 lectures, 1 laboratory. Prerequisite: OH 131, 231, Bot 120

**OH 223 Basic Floral Design (3)**

Introduction to basic floral design, covering preparation of flowers, color harmony, and design principles. 1 lecture, 2 laboratories. Offered odd-numbered years.

**OH 231, 232, 233 Plant Materials I, II, III (4) (4) (4)**

The study of trees, shrubs, vines and herbaceous plants used in California; shown during their best growing season. This includes: identification, habit of growth, cultural requirements and landscape use. 3 lectures, 1 laboratory. Prerequisite: Bio 115

**OH 323 Greenhouse Operation (4)**

The operation and management of forcing structures. Growing of commercial cut-flowers under glass, lath, cloth, and in the open. Experience in growing and management. 3 lectures, 1 laboratory. Prerequisite: OH 222, 231

**OH 327 Diseases of Ornamental Plants (4)**

Effect of diseases on ornamental plants found in nurseries, greenhouses, flowers, and identification, control, and prevention. Field trips to production areas to study field conditions. 3 lectures, 1 laboratory. Prerequisite: Bio 145, Path 223

**OH 335 Sub-tropical Plant Materials (3)**

Sub-tropical plant materials, including ferns, bamboos, palms, house plants. Identification, growth habits, cultural requirements and landscape use. 2 lectures, 1 laboratory.

**OH 336 Native Plant Materials (3)**

Native California plants suitable for landscape purposes. Their identification, habits of growth, cultural requirements, and landscape use. 2 lectures, 1 laboratory.
Agriculture Division

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

OH 463 Undergraduate Seminar (2)
An open forum of senior students in which the latest developments, practices, and procedures are discussed. Each student is responsible for the development and presentation of a topic in his chosen field. 2 lectures.

AG 400 Special Problems for Advanced Undergraduates (1-2)
Individual or group investigation, research, studies, or surveys of selected problems. Total credit limited to 4 units, with a maximum of 2 units per quarter.

DESCRIPTIONS OF COURSES IN PARK ADMINISTRATION

PA 328 Arboriculture (3)
Care and management of specimen ornamental trees. Cavity work, bracing, cabling and pruning, disease and pest control. Practice in the use of lines and in climbing safety practices in tree work. 1 lecture, 2 laboratories. Prerequisite: OH 131

PA 333 Turf Management (4)
Practice in the maintenance and management of turf areas, including such specialized areas as golf greens, athletic fields, and park lawns. 3 lectures, 1 laboratory. Prerequisite: OH 131, SS 221

PA 414 Park Administration I (3)
Development of national, state and municipal park systems. A consideration of the changing philosophies affecting the development. 3 lectures. Prerequisite: Senior standing.

PA 415 Contracts, Specifications, Estimating (3)
Cost finding and estimating, contract and specification writing and legal aspects of the landscape industry. 3 lectures.

PA 425 Park Administration II (4)
Planning, scheduling and operational techniques applicable to the management of park facilities, including city street trees, park structures, plunges and fountains. 3 lectures, 1 laboratory. Prerequisite: PA 414

PA 426 Park Administration III (4)
Administration of park programs with emphasis on the municipal level. Consideration of policies and practices governing park departments. Relationship of park departments to other governmental agencies. 3 lectures, 1 laboratory. Prerequisite: PA 425

PA 431 Contracts, Specifications, Estimating (4)
Practice in supervising men and applying approved techniques in landscape construction. Cost finding and estimating, contract and specification writing, and legal aspects of the landscape industry. 3 lectures, 1 laboratory.

PA 445 Construction Foremanship Laboratory (1)
Practice in supervising men and in applying approved techniques in landscape construction. (to be taken concurrently with PA 415) 1 laboratory. Prerequisite: Junior standing.
RELATED AGRICULTURAL COURSES

DESCRIPTIONS OF COURSES IN AGRICULTURAL ENGINEERING

Chairman, Haven Q. Conard
Leo P. Gorman  Donald E. Kibbe  Theodore L. Lieb  Dudley R. Smith

AE 121 Construction Fundamentals (2)
Construction techniques, materials strength tests, structural engineering and planning. Carpentry and masonry tools, hardware and materials as applied to construction of various structures. Hand and power equipment. 1 lecture, 1 laboratory.

AE 122 Utility Systems (2)
Electrical power and lighting systems. Electrical principles, codes, construction techniques and wiring practices. Design of water pressure systems. Methods of installation. 1 lecture, 1 laboratory.

AE 123 Welding (2)
Fundamentals of arc and acetylene welding. Flat, horizontal, vertical, and overhead positions. Cutting, brazing, hard-facing. Practical arts and skills of metal fabrication. 1 lecture, 1 laboratory.

AE 124 Landscape Construction (2)
Materials, tools, equipment, safety. Design of landscape structures. 1 lecture, 1 laboratory.

AE 125 Landscape Construction (2)
Practical aspects of landscape construction projects, including masonry, stone, brick, wood and steel. Labor and equipment management. Planting techniques. Economics of design. 1 lecture, 1 laboratory. Prerequisite: AE 124

AE 131 Farm Surveying (2)
Care and use of surveying equipment. Land measurement. Differential leveling. Laying out contours and ditch lines. Writing and interpreting field notes. 1 lecture, 1 laboratory. Prerequisite: Math 112 or equivalent

AE 132 Applied Farm Surveying (2)
Methods of plane table mapping, use of contour maps, planimeter and profiles in calculating earth yardage and reservoir capacity. Borrow pit and land leveling problems. 1 lecture, 1 laboratory. Prerequisite: AE 131

AE 221 Farm Machinery (2)
Basic principles of machines. Materials and construction. Lubrication and maintenance. Selection, operation, and adjustment of seed bed preparation equipment. Seeding, planting, harvesting, and commercial fertilizer equipment. 1 lecture, 1 laboratory. Prerequisite: AE 241, Math 112

AE 227 Farm Power (2)
Internal combustion engine, fundamentals, both gasoline and diesel. Troubleshooting, overhauling, and making major adjustments and repairs. 1 lecture, 1 laboratory. Prerequisite: AE 122, 241, Math 112

AE 233 Pest Control Equipment (3)
Principles of machines and power units as applied to various types of spraying, dusting, and fumigation equipment used in structural and agricultural industries. Structural pest control equipment. Structural repair techniques. 2 lectures, 1 laboratory. Prerequisite: AE 122, Math 101 or 112
AE 240 Irrigation (4)

Principles and practices of irrigation. Irrigation design engineering. Pumps, wells, water conveyance and measurement. Surface, sub-surface and sprinkler irrigation. Science of plant-soil-water relationships. Water requirements of crops. Leaching and drainage problems. 3 lectures, 1 laboratory. Prerequisite: AE 131, SS 121, Math 101 or 112

AE 241 Farm Tractors (2)

Field and shop practice in the operation, service, and adjustment of the modern farm tractor; including both wheel and track types with gasoline and diesel power units. 1 lecture, 1 laboratory.

AE 244 Farm Equipment Projects (1-3)

Construction or modification of implements, trailers, livestock equipment, etc. 1 laboratory per unit. Prerequisite: AE 121, 123

DESCRIPTIONS OF COURSES IN AGRICULTURE

Ag 311 Fundamentals of Agricultural Science (3)

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

Ag 521 Curriculum and Methods in Agriculture (3)

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

Ag 590 Seminar in Agriculture (1-6)

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

Student Reading "Moment", "Lift and Drag" Loads on Wind Tunnel Balance (Subsonic Wind Tunnel)

Performing Circuit Analysis in the Laboratory to Verify a Classroom Solution
THE ENGINEERING DIVISION

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

Cal Poly's instructional philosophy emphasizes laboratory and field work with constant interplay between general principles and practical applications. This is often called the "learn by doing" philosophy. The whole plan adds "know how" to "know why." An extra dimension is added to the more typical engineering programs; that is, learning to apply the theory acquired in basic core courses. Cal Poly not only places heavy emphasis on excellence in the technical aspects of the preparation for Bachelor of Science Degrees in Engineering, but also makes a particular point of preparing a student for his overall role as a member of the engineering profession. Basic fundamentals and principles are taught and used in the solution of industrial problems.

The Kellogg Campus offers six engineering majors which lead to the Bachelor of Science Degree. These are: Aerospace, Chemical, Civil, Electronic, Industrial, and Mechanical Engineering.

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

The curriculum at Cal Poly involves relatively equal amounts of basic mathematics and science, engineering core courses and general education in the humanistic-social field. It is one that prepares students to meet the demands of the nation's changing industries by applying fundamentals of their profession to the engineering techniques of the present and future.

The program is one of analysis and design, instrumentation and synthesis. Graduates work in design, development, supervision, systems, applied research, test engineering, production and manufacturing, methods engineering, sales and field engineering. The courses in manufacturing processes enable students to learn the capabilities and limitations of these processes, so that they as engineers make the best use of this knowledge in their work and planning.

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

The State of California has shown its confidence in the Kellogg Campus engineering program by providing a ten million dollar plant with some of the finest facilities to be found in the nation for undergraduate engineering education. The engineering faculty members typically have more than ten years of professional experience as successful practicing engineers, and in addition, advanced education. The broad acceptance of the Cal Poly engineering program is demonstrated by the multiplicity of opportunities and offers to engineering graduates. During the last several years there has been an increasing number of companies coming to the campus seeking engineers.

There are cooperative work-study programs for senior students with leading local industries. Many of the major firms have made contributions of gifts of equipment, scholarships, awards and other forms of aid. The campus has become a center for professional engineering societies meetings. A close liaison is maintained with the profession and industry.
Since a typical engineering education involves several years of college science and mathematics, the high school student or junior college student contemplating the engineering profession would do well to take a strong scientific program involving mathematics, physics, chemistry and English, and if possible shop, mechanical drawing and related courses.

AEROSPACE ENGINEERING DEPARTMENT

Department Head, Rodney D. Sutherland

George R. Graves  Horatio O. Morgan  Albert D. Sanford

Conrad F. Newberry

Each of the four years work in the Aerospace Engineering curriculum is devoted to careful study of basic engineering theory. These basic principles have a solid foundation in mathematics, physics, mechanics, fluids, thermodynamics and design. As the theory is studied, it is applied in the laboratory through the media of laboratory experiments, demonstrations and testing.

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

Graduates of the Aerospace Engineering Department find employment in many varied fields associated with the manufacture and flight of military and commercial missiles, space vehicles and aircraft. Their employment may be in aerodynamics, propulsion systems, aerospace testing and research, stress analysis, flight test engineering and design groups. Graduates are employed by aerospace vehicle and component manufacturers, airlines, government test bases, research laboratories, and propulsion unit manufacturers.

It is recommended that the high school student planning a career in Aerospace Engineering take a balanced program including mathematics, physical science, mechanical drawing and shops. The junior college student planning to transfer into this department would do well to meet, insofar as possible, the requirements of the Aerospace curriculum.

The department occupies new facilities consisting of an Aerospace Laboratory, wind tunnel, structural test laboratory, aircraft construction shop and general laboratories. The laboratories are equipped with the latest instruments and test equipment available for the study and investigation of most phases of aerospace engineering. The facilities and equipment coupled with the required applied shop and laboratory courses, provide an opportunity for the student to gain a knowledge of industrial practices as well as an excellent theoretical background.

Aerospace engineering students have the opportunity to join the student branch of the American Institute of Aeronautics and Astronautics, a national society organized for the advancement of aerospace knowledge.

CURRICULUM IN AEROSPACE ENGINEERING

<table>
<thead>
<tr>
<th>Freshman</th>
<th>F</th>
<th>W</th>
<th>S</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aerospace Engineering Fundamentals (Aero 124, 125, 126)</td>
<td>3</td>
<td>3</td>
<td>2</td>
</tr>
<tr>
<td>Automatic Programming for Digital Computers (Math 221)</td>
<td></td>
<td></td>
<td>1</td>
</tr>
<tr>
<td>Engineering Drafting (ME 121, 122)</td>
<td>2</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>Descriptive Geometry (ME 125)</td>
<td></td>
<td></td>
<td>2</td>
</tr>
<tr>
<td>Metal Processes (MPE 142, 144)</td>
<td></td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Welding Survey (WE 144)</td>
<td></td>
<td></td>
<td>1</td>
</tr>
<tr>
<td>Production Welding Processes I (WE 145)</td>
<td></td>
<td></td>
<td>1</td>
</tr>
<tr>
<td>College Algebra and Trigonometry (Math 117)</td>
<td>5</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Analytic Geometry and Calculus (Math 118, 201)</td>
<td></td>
<td>5</td>
<td>3</td>
</tr>
<tr>
<td>General Physics (Phys 131, 132)</td>
<td></td>
<td>4</td>
<td>4</td>
</tr>
<tr>
<td>Freshman Composition (Eng 104, 105, 106)</td>
<td>3</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>Health Education (PE 107)</td>
<td></td>
<td></td>
<td>2</td>
</tr>
<tr>
<td>Physical Education (PE 141)</td>
<td>½</td>
<td>½</td>
<td>½</td>
</tr>
</tbody>
</table>

17½ 17½ 17½
Aero 124  Aerospace Engineering Fundamentals  (3)
Application of basic engineering fundamentals to aircraft and missile systems. Basic theory of flight. Dimensional analysis and scientific notation. Slide rule and graphing techniques. Report writing fundamentals. Pressure, temperature and basic aerospace experiments. Wind tunnel familiarization. 1 lecture, 2 laboratories. Concurrent: Math 117

Aero 125  Aerospace Engineering Fundamentals  (3)
The atmosphere, Archimedes' principle, properties of real fluids, viscosity, Reynolds' number, Stokes' law, laminar and turbulent boundary layers, effect of streamlining. 1 lecture, 2 laboratories. Prerequisite: Aero 124. Concurrent: Math 118

† To be selected from the General Education list.

DESCRIPTIONS OF COURSES IN AEROSPACE ENGINEERING
Aero 126  Aerospace Engineering Fundamentals (2)
Basic theory of rockets and introduction to space flight. Angular velocity experiments, aircraft engine testing. Environmental testing procedures. 1 lecture, 1 laboratory. Prerequisite: Aero 125. Concurrent: Math 201

Aero 205  Introduction to Aerospace Structures (3)

Aero 206  Introduction to Aerospace Structures (4)
Beam deflections. Restrained, continuous and curved beams. Columns. Failure under combined and fluctuating stresses. Fatigue and stress concentrations. Determination and testing of the physical properties of materials used in aircraft. Effect of heat treatment on material properties. Use of the SR-4 rosette for determining principal strains. 3 lectures, 1 laboratory. Prerequisite: Aero 205. Concurrent: Math 203

Aero 240  Additional Engineering Laboratory (1-2)
Elective project work. Total credit limited to four units, with not more than two units in any one quarter. 1 or 2 laboratories. Prerequisite: Permission of instructor.

Aero 247  Aerospace Design and Layout (2)
Preliminary design aspects of aerospace system layout. Airfoil, wing, and power plant selection with emphasis on NASA airfoil sections, wing planform shapes, and powerplant layout. 2 laboratories. Prerequisite: Phys 131, Math 201

Aero 248  Aerospace Design and Layout (2)
Preliminary design aspects of aerospace system layout. Effect of configuration upon vehicle performance, structural integrity, and stability. 2 laboratories. Prerequisite: Aero 247

Aero 249  Aerospace Design and Layout (2)
Preliminary design of aerospace systems in response to request for proposal issued by Staff. Includes effects of configuration on aerodynamic characteristics, performance, structural integrity and stability. 2 laboratories. Prerequisite: Aero 248

Aero 251  Aerospace Construction Laboratory (1)
Fundamentals of sheet metal fabrication of aircraft structures and components. Principles of riveting, fastening and joining aircraft structures. 1 laboratory. Prerequisite: MPE 142, 144, WE 144, 145

Aero 252  Aerospace Construction Laboratory (1)
Assembly of sheet metal components. Corrosion protection; coatings, plating, painting. Special fastening and joining techniques. Resistance welding techniques. Plastics and reinforced fiberglass. 1 laboratory. Prerequisite: Aero 251

Aero 301  Aerodynamics (3)
Introduction to incompressible flow aerodynamics. Equations of continuity, momentum and energy. Introduction to viscous flow. Navier-Stokes equations. 3 lectures. Prerequisite: Math 318

Aero 302  Aerodynamics (4)
Potential flow, vorticity, circulation, sources and sinks, two dimensional wing theory, effect of flaps, three dimensional wing theory, finite span wing, vortex systems. 3 lectures, 1 laboratory. Prerequisite: Aero 301

Aero 304  Aerodynamic Heating (3)
Heating of aerodynamic surfaces due to supersonic and hypersonic velocities. Application of analog and digital computer techniques to transient heat conduction problems. Investigation of radiative cooling. Re-entry heating. 3 lectures. Prerequisite: Math 316
Engineering Division

Aero 309 Flight Vibrations (3)
Single and multi-degree of freedom bodies. Graphical methods of solution. The phase plane method for random forcing functions. Applications of series methods of solution. Introduction to aeroelasticity and flutter. 3 lectures. Prerequisite: Math 316

Aero 327 Aerospace Structures (3)
Analysis of aircraft and missile structural components; combined stress and failure theories; column and sheet-stringer panel analysis. Shear-resistant and tension-field beams; single and multicell box beams, unsymmetrical and tapered beams. Bulkhead and cutout analysis. 2 lectures, 1 laboratory. Prerequisite: Aero 206, Math 316

Aero 328 Aerospace Structures (3)

Aero 347 Experimental Design Analysis (2)
Introduction to practical methods of experimental design based on fundamental laws of engineering. Design decisions verified by written analysis. Methods of handling multi-variable problems. Mechanical simulation of electrical systems and electrical simulation of mechanical systems. Error analysis. Applications to fluid flow systems, dynamic systems and structures. 2 laboratories. Prerequisite: Aero 301, 304, 309, 328

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 Propulsion Systems (3)
Analysis of aircraft and missile engines with respect to thrust and energy utilization. Thermodynamic processes. One-dimensional flow; isentropic, variable area duct, normal shock, constant area duct with friction, frictionless constant area duct with heat transfer. Two-dimensional flow. 3 lectures. Prerequisite: Aero 304, ME 301

Aero 402 Propulsion Systems (3)
Fuel burning performance of aircraft and missile power plants. Thermodynamic analysis, and structural and mechanical requirements. Emphasis on turboprop, turbojet, ramjet and liquid and solid-fuel rocket engines. 3 lectures. Prerequisite: Aero 401

Aero 403 Rocket Propulsion (3)

Aero 404 Supersonic Aerodynamics and Wind Tunnel Testing (3)

Aero 405 Aerodynamics (3)
Performance analysis of aircraft and missiles. Variation in performance with change of configuration. Introduction to stability and control, static and dynamic stability. 3 lectures. Prerequisite: Aero 404, Math 317
Kepler's laws of motion and satellite orbits, orbital transfers. Space vehicle motion, despinning of satellites. Performance and optimization of single and multistage rockets. 2 lectures. Prerequisite: Aero 405

Indeterminate structures, frame analysis, treatment of plates and shells, shear lag and deformation, effect of skin cutout, application of structural theory to the design of aircraft components. 3 lectures. Prerequisite: Aero 328

Extension of aeronautical engineering principles to rockets and missiles; theory of design; propulsion systems and controls; flight characteristics and guidance. 3 lectures. Prerequisite: Aero 405

Design of aircraft components and systems. Static systems, design parameters. Design verification by written analysis. 2 laboratories. Prerequisite: Aero 301, 304, 309, 328

Design of aircraft, missile and rocket system components. Dynamic systems, design parameters. Design verification by written analysis. 2 laboratories. Prerequisite: Aero 444

Advanced design of aircraft, missile, rocket systems and components. Design verification by written analysis. 2 laboratories. Prerequisite: Aero 445

Use of laboratory instruments to develop the technique of obtaining engineering measurements. Special assigned problems in the field of aerospace engineering. 2 laboratories. Prerequisite: EL 223, Aero 347

Selection and completion of a project under a minimum of supervision. Projects typical of problems which graduates must solve in their fields of employment. Project results are presented in a formal report. Minimum 120 hours total time. Prerequisite: Senior standing, EL 223, Aero 252, 347

Preparation, oral presentation, and discussion by students of technical papers on recent engineering developments. 2 lectures. Prerequisite: Aero 462
Chemical Engineering is that branch of professional engineering which embraces the development and application of processes in which chemical and physical changes of material are involved. Broadly, the chemical engineering field includes the design, development, and production of many products such as fuels, plastics, paper, foods, and building materials.

Cal Poly’s program involves a high degree of correlation of science and its application to manufacturing processes. The program is unique in that it is directed primarily toward employment at the Bachelor of Science degree level rather than primarily toward graduate work. The student is given course work in skills which are readily applied in industry.

The Chemical Engineering curriculum contains sufficient laboratory and application courses to fit the student for employment in a wide variety of expanding fields. It prepares graduates for work in the development and application of manufacturing processes involving chemical and physical changes. Graduates will plan, design, develop, construct, test and operate process equipment and plants for rocket fuels, plastics, rubber products, nuclear materials, petroleum, petrochemicals, heavy chemicals, industrial gases, paint, pharmaceuticals, agrochemicals, foods, etc.

Numerous opportunities for chemical engineers are also found in the aerospace, electronics, housewares, toys, building materials and other industries. Graduates obtain employment in practically every field of industry, and in such governmental agencies as air pollution control, military and space exploration.

It is recommended that a high school or transfer student planning to complete this curriculum should take a maximum of chemistry, physics and mathematics courses.

### CURRICULUM IN CHEMICAL ENGINEERING

#### Freshman

<table>
<thead>
<tr>
<th>Course</th>
<th>F</th>
<th>W</th>
<th>S</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chemical Engineering Fundamentals (ChE 131, 132)</td>
<td>2</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>Plastics Fundamentals (ChE 133)</td>
<td></td>
<td></td>
<td>2</td>
</tr>
<tr>
<td>Plastics Mold-Die Design (ChE 123)</td>
<td></td>
<td></td>
<td>2</td>
</tr>
<tr>
<td>Chemical Engineering Laboratory (ChE 144, 145)</td>
<td>1</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>Engineering Drafting (ME 121, 122)</td>
<td>2</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>Metal Processes (MPE 142, 144)</td>
<td>1</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Welding Survey (WE 144)</td>
<td></td>
<td></td>
<td>1</td>
</tr>
<tr>
<td>Production Welding Processes I (WE 145)</td>
<td></td>
<td></td>
<td>1</td>
</tr>
<tr>
<td>General Chemistry (Chem 321, 322, 323)</td>
<td>4</td>
<td>4</td>
<td>4</td>
</tr>
<tr>
<td>College Algebra and Trigonometry (Math 117)</td>
<td>5</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Analytic Geometry and Calculus (Math 118, 201)</td>
<td>5</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Freshman Composition (Eng 104, 105)</td>
<td>3</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>General Psychology I (Psy 202)</td>
<td></td>
<td></td>
<td>3</td>
</tr>
<tr>
<td>Health Education (PE 107)</td>
<td></td>
<td></td>
<td>2</td>
</tr>
<tr>
<td>Physical Education (PE 141)</td>
<td></td>
<td>½</td>
<td>½</td>
</tr>
</tbody>
</table>

| Total | 18½ | 18½ | 18½ |

#### Sophomore

<table>
<thead>
<tr>
<th>Course</th>
<th>F</th>
<th>W</th>
<th>S</th>
</tr>
</thead>
<tbody>
<tr>
<td>Stoichiometry (ChE 201)</td>
<td>3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Chemical Engineering Laboratory (ChE 246)</td>
<td></td>
<td></td>
<td>1</td>
</tr>
<tr>
<td>Engineering Statics (ME 211)</td>
<td>3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Strength of Materials (ME 218, 219)</td>
<td>3</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Materials Test Laboratory (ME 249)</td>
<td></td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Electrical Engineering (EE 231, 232)</td>
<td></td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>Analytic Geometry and Calculus (Math 202, 203)</td>
<td>3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Differential Equations (Math 316)</td>
<td></td>
<td></td>
<td>3</td>
</tr>
<tr>
<td>Organic Chemistry (Chem 326, 327, 330)</td>
<td>4</td>
<td>4</td>
<td>4</td>
</tr>
<tr>
<td>General Physics (Phys 131, 132, 133)</td>
<td>4</td>
<td>4</td>
<td>4</td>
</tr>
<tr>
<td>Physical Education (PE 141)</td>
<td>½</td>
<td>½</td>
<td>½</td>
</tr>
</tbody>
</table>

| Total | 17½ | 18½ | 18½ |
### Junior Courses

<table>
<thead>
<tr>
<th>Course Description</th>
<th>F</th>
<th>W</th>
<th>S</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chemical Engineering Thermodynamics (ChE 302, 303)</td>
<td>3</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>Plastics Chemistry (ChE 332)</td>
<td>3</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>Fluid Mechanics (ME 311, 312)</td>
<td>3</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>Heat Transfer (ME 313)</td>
<td>3</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>Engineering Dynamics (ME 212)</td>
<td>3</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>Thermodynamics (ME 301)</td>
<td>3</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>Metallurgy (WE 304)</td>
<td>2</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>Metallurgy Laboratory (WE 343)</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Electronic Engineering (EL 222, 223)</td>
<td>3</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>Physical Chemistry II and III (Chem. 432, 433)</td>
<td>4</td>
<td>4</td>
<td>4</td>
</tr>
<tr>
<td>Technical Writing (Eng 219)</td>
<td>3</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>Literature or Philosophy</td>
<td>3</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>Applied Biology (Bio 110)</td>
<td>3</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>Technical Elective</td>
<td>3</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>Principles of Economics (Ec 201, 202)</td>
<td>3</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>American Civilization (Am Civ 301, 302, 303)</td>
<td>3</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>Electives</td>
<td>3</td>
<td>3</td>
<td>3</td>
</tr>
</tbody>
</table>

**Total Units:** 17 17 16

### Senior Courses

<table>
<thead>
<tr>
<th>Course Description</th>
<th>F</th>
<th>W</th>
<th>S</th>
</tr>
</thead>
<tbody>
<tr>
<td>Unit Processes (ChE 421, 422, 423)</td>
<td>3</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>Senior Project (ChE 461, 462)</td>
<td>2</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>Undergraduate Seminar (ChE 463)</td>
<td>2</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>Plastics Manufacturing (MPE 448)</td>
<td>2</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>Technical Elective</td>
<td>3</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>Principles of Economics (Ec 201, 202)</td>
<td>3</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>Literature or Philosophy</td>
<td>3</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>American Civilization (Am Civ 301, 302, 303)</td>
<td>3</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>Electives</td>
<td>3</td>
<td>3</td>
<td>3</td>
</tr>
</tbody>
</table>

**Total Units:** 17 16 17

### Descriptions of Courses in Chemical Engineering

**ChE 131, 132 Chemical Engineering Fundamentals (2) (2)**

Introduction to the general field of Chemical Engineering. Elementary problems in energy balance and chemical reactions involving heat and fluid flow. 1 lecture, 1 laboratory.

**ChE 133 Plastics Fundamentals (2)**

Composition, characteristics and uses of commercially important synthetic materials including polymeric (plastic) materials. Economic principles of material selection. 2 lectures.

**ChE 123 Plastics Mold-Die Design (2)**

Detailed working drawing of parts fabricated from synthetic materials. Emphasis on problems of mold and die design. 1 lecture, 1 laboratory. Prerequisite: ME 122

**ChE 144, 145 Chemical Engineering Laboratory (1) (1)**

Experiments with measurement of the basic processes. A.S.T.M. and other standard industry tests. Determination of heat flow, fluid flow, energy balance, temperature and pressure. 1 laboratory.

**ChE 201 Stoichiometry (3)**

Basic material and energy balances in chemical processes. Calculations on the efficiency yield and economics of various refining and manufacturing operations. 3 lectures. Prerequisite: Chem 323, ChE 132 (May be concurrent).

**ChE 240 Additional Engineering Laboratory (1-2)**

Elective project work. Total credit limited to four units, with not more than two units in any one quarter. 1 or 2 laboratories. Prerequisite: Permission of instructor.

*To be selected from the General Education list.*
ChE 246  Chemical Engineering Laboratory  (1)
Experiments and measurements with various types of equipment used in chemical processing: pumps, refrigerators, heat exchangers, heating devices, distillations systems and allied basic equipment. 1 laboratory. Prerequisite: ChE 145

ChE 302, 303  Chemical Engineering Thermodynamics  (3) (3)
Thermodynamic properties of various substances. Application of thermodynamics to process analysis, phase and chemical equilibria through the use of examples and problems. 3 lectures. Prerequisite: ME 301

ChE 332  Plastics Chemistry  (3)
Polymer structure and reactions, solutions of polymers and molecular weight, properties of plastics reactions in polymer formation. Emphasis on processes involved in manufacture of the various materials. 1 lecture, 2 laboratories. Prerequisite: Chem 321, 322

ChE 400  Special Problems for Advanced Undergraduates  (1-2)
Individual or group investigation, research, studies, or surveys of selected problems. Total credit limited to 4 units, with a maximum of 2 units per quarter.

ChE 421, 422, 423  Unit Processes  (3) (3) (3)
Problems in typical design situations for process equipment. Absorbers, dehumidifiers, fractionators, crystallizers, filters, and allied process equipment. Design and operation of evaporators, extractors. 2 lectures, 1 laboratory. Prerequisite: ChE 303

ChE 461, 462  Senior Project  (2) (2)
Selection and completion of a project under a minimum of supervision. Projects typical of problems in the Chemical Engineering field. Results to be presented in a formal report. Minimum requirement of 120 hours total time. Prerequisite: Senior standing.

ChE 463  Undergraduate Seminar  (2)
General discussion of new developments, policies, practices and procedures. Each student responsible for preparation and presentation of a report on some development in his field. 2 lectures. Prerequisite: Senior standing.
The program in Civil Engineering prepares graduates to enter this profession in design, construction, or maintenance capacities on such projects as freeways, highways, major buildings, dams, bridges, aqueducts, pipelines, airports, water supply, waste disposal, flood control, and urban development.

Graduates are employed by governmental agencies at federal, state, and municipal levels. Many are employed by contractors and private consulting firms. Some enter employment with manufacturers as maintenance and sales engineers. Others enter teaching, research, materials testing, city planning, and administrative fields.

Many projects, including freeways, water supply and control facilities, waste disposal units, and new housing developments are in progress in the immediate area. In addition, new construction on the campus offers excellent opportunities for demonstration as well as numerous field and practical applications of classroom and laboratory assignments.

CURRICULUM IN CIVIL ENGINEERING

<table>
<thead>
<tr>
<th>Freshman</th>
<th>F</th>
<th>W</th>
<th>S</th>
</tr>
</thead>
<tbody>
<tr>
<td>Introduction to Civil Engineering (CE 121)</td>
<td>2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Civil Engineering Computations (CE 122)</td>
<td>2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Elementary Surveying (CE 134)</td>
<td>3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Advanced Surveying (CE 135)</td>
<td>3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Route Surveying (CE 136)</td>
<td></td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Engineering Drafting (ME 121, 122)</td>
<td>2</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>Descriptive Geometry (ME 125)</td>
<td></td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>Metal Processes (MPE 142, 144)</td>
<td>1</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Sheet Metal Processes (MPE 155)</td>
<td></td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Welding Survey (WE 144)</td>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>College Algebra and Trigonometry (Math 117)</td>
<td>5</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Analytic Geometry and Calculus (Math 118, 201)</td>
<td>5</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>General Physics (Phys 131)</td>
<td></td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>Freshman Composition (Eng 104, 105, 106)</td>
<td>3</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>Health Education (PE 107)</td>
<td></td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>Physical Education (PE 141)</td>
<td></td>
<td>½</td>
<td>½</td>
</tr>
<tr>
<td></td>
<td>17½</td>
<td>17½</td>
<td>17½</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Sophomore</th>
<th>F</th>
<th>W</th>
<th>S</th>
</tr>
</thead>
<tbody>
<tr>
<td>Highway Engineering, Planning (CE 221)</td>
<td>2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Highway Engineering, Traffic (CE 222)</td>
<td>2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Highway Engineering, Structural (CE 226)</td>
<td>3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Civil Engineering Drafting (CE 224)</td>
<td></td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Engineering Statics (ME 211)</td>
<td></td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Engineering Dynamics (ME 212)</td>
<td></td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Strength of Materials (ME 218, 219)</td>
<td>3</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Materials Test Laboratory (ME 249)</td>
<td></td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Production Welding Processes II (WE 146)</td>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Analytic Geometry and Calculus (Math 202, 203)</td>
<td>3</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>General Physics (Phys 132, 133)</td>
<td>4</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>Applied Biology (Bio 110)</td>
<td></td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Technical Writing (Eng 219)</td>
<td>2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Public Speaking (Sp 200)</td>
<td></td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Principles of Economics (Ec 201, 202)</td>
<td>3</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Physical Education (PE 141)</td>
<td></td>
<td>½</td>
<td>½</td>
</tr>
<tr>
<td></td>
<td>17½</td>
<td>16½</td>
<td>18½</td>
</tr>
</tbody>
</table>


### Engineering Division

<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>Economics of Engineering Decision (CE 302)</td>
<td>3</td>
</tr>
<tr>
<td>Elementary Structural Analysis (CE 304)</td>
<td>3</td>
</tr>
<tr>
<td>Slatically Indeterminate Structures (CE 305)</td>
<td>3</td>
</tr>
<tr>
<td>Steel Structures Design (CE 306)</td>
<td>3</td>
</tr>
<tr>
<td>Engineering Soil Mechanics (CE 323)</td>
<td>3</td>
</tr>
<tr>
<td>Hydraulic Engineering (CE 332)</td>
<td>3</td>
</tr>
<tr>
<td>Hydrology (CE 333)</td>
<td>2</td>
</tr>
<tr>
<td>Concrete Mixture Design (CE 342)</td>
<td>2</td>
</tr>
<tr>
<td>Thermodynamics (ME 301)</td>
<td>3</td>
</tr>
<tr>
<td>Fluid Mechanics (ME 311)</td>
<td>3</td>
</tr>
<tr>
<td>Principles and Practices of Electrical Engineering (EE 231, 232)</td>
<td>3</td>
</tr>
<tr>
<td>Electronic Engineering (EL 222)</td>
<td>3</td>
</tr>
<tr>
<td>General Chemistry (Chem 321, 322)</td>
<td>4</td>
</tr>
<tr>
<td>Engineering Geology (PSc 325)</td>
<td>4</td>
</tr>
<tr>
<td>Literature or Philosophy</td>
<td>3</td>
</tr>
<tr>
<td>Electives</td>
<td>2</td>
</tr>
</tbody>
</table>

**Total Credits:** 18 18 18

### Senior

<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>Engineering Law, Contracts and Specifications (CE 403)</td>
<td>3</td>
</tr>
<tr>
<td>Reinforced Concrete Design (CE 421)</td>
<td>3</td>
</tr>
<tr>
<td>Water Supply Engineering (CE 431)</td>
<td>3</td>
</tr>
<tr>
<td>Water Quality Engineering (CE 432)</td>
<td>3</td>
</tr>
<tr>
<td>Timber Structures Design (CE 433)</td>
<td>3</td>
</tr>
<tr>
<td>Senior Project (CE 461, 462)</td>
<td>2</td>
</tr>
<tr>
<td>Undergraduate Seminar (CE 463)</td>
<td>2</td>
</tr>
<tr>
<td>Metallurgy (WE 304)</td>
<td>2</td>
</tr>
<tr>
<td>Metallurgy Lab (WE 343)</td>
<td>1</td>
</tr>
<tr>
<td>American Civilization (Am Civ 301, 302, 303)</td>
<td>3</td>
</tr>
<tr>
<td>General Psychology 1 (Psy 202)</td>
<td>3</td>
</tr>
<tr>
<td>Literature</td>
<td>3</td>
</tr>
<tr>
<td>Electives</td>
<td>3 6</td>
</tr>
</tbody>
</table>

**Total Credits:** 16 18 17

### Descriptions of Courses in Civil Engineering

**CE 121 Introduction to Civil Engineering** (2)

Introduction to the scope and diversity of civil engineering educational and professional activities, including the functions of civil engineering design and construction groups; technical and social responsibilities of the civil engineer; oral and written engineering reports. 1 lecture, 1 laboratory.

**CE 122 Civil Engineering Computations** (2)

Introduction to the use of the slide rule, calculators and the digital computer in the solution of civil engineering problems. 1 lecture, 1 laboratory.

**CE 134 Elementary Surveying** (3)

Use and care of surveying instruments, fundamental surveying methods, traverse measurements, and area computations. 1 lecture, 2 laboratories. Prerequisite: Trigonometry.

**CE 135 Advanced Surveying** (3)

Adjustments. Elements of topographic, hydrographic, geodetic surveying. Precise equipment and control surveys, city and land surveys. Astronomical observations. State plane coordinates. 1 lecture, 2 laboratories. Prerequisite: CE 134

*To be selected from the General Education list.*
CE 136 Route Surveying (3)
Route location and layout. Simple, transition and vertical curves. Earthwork computation. Introduction to electronic and photogrammetric methods. 1 lecture, 2 laboratories. Prerequisite: CE 135

CE 221 Highway Engineering, Planning (2)
Highway administration, finance and planning. Geometric design, drainage, location. 1 lecture, 1 laboratory. Prerequisite: CE 136

CE 222 Highway Engineering, Traffic (2)
Traffic surveys and routing studies. Parking and public transit planning. Driver and vehicular characteristics. Traffic control and accident prevention. 1 lecture, 1 laboratory. Prerequisite: CE 221

CE 224 Civil Engineering Drafting (3)
Structural, topographic, plan and profile and survey drawing practices. Line and lettering work, use of drafting machines and office practices are stressed. 1 lecture, 2 laboratories. Prerequisite: ME 122

CE 226 Highway Engineering, Structural (2)
Design of rigid and flexible pavements. Soil stabilization. Highway construction and maintenance. 1 lecture, 1 laboratory. Prerequisite: CE 222

CE 240 Additional Engineering Laboratory (1-2)
Total credit limited to 4 units, with not more than 2 units in any one quarter. 1 or 2 laboratories.

CE 302 Economics of Engineering Decisions (3)
Principles governing the economic aspects of engineering decisions. Retirement and replacement studies. Effect of taxes on engineering decisions. 3 lectures.

CE 304 Elementary Structural Analysis (3)
Analysis of statically determinate beams, trusses and three-hinged arches. Graphical and analytical methods of solution. Influence lines. 3 lectures. Prerequisite: CE 241, ME 219

CE 305 Statically Indeterminate Structures (3)
Analysis of statically indeterminate structures by analytical and graphical methods. 3 lectures. Prerequisite: CE 304

CE 306 Steel Structures Design (3)
Analysis and design of steel members and their connections. Study of applicable steel design codes and specifications. 3 lectures. Prerequisite: CE 305

CE 323 Engineering Soil Mechanics (3)
Structure, identification and classification of soil for engineering purposes. Determination of physical properties of soils by laboratory experiments including consolidation, shearing strength, permeability. Application to problems. 2 lectures, 1 laboratory. Prerequisite: CE 342, ME 249

CE 332 Hydraulic Engineering (3)
Principles of hydrostatics, hydrokinetics, and hydrodynamics. Problems involving dam analyses, flow in open channels, flow through pipes, pipe networks, pump-pipe-reservoir systems, surge tanks, water hammer, and turbines. 2 lectures, 1 laboratory. Prerequisite: ME 311

CE 333 Hydrology (2)
Introduction to the hydrologic cycle. Measurement of precipitation, statistical methods for analysis of data, ground water, flood mitigation, state-discharge relations, stream flow and runoff computations, reservoir management. 1 lecture, 1 laboratory. Prerequisite: CE 332
CE 342  Concrete Mixture Design  (2)
Study of concrete materials. Methods of design and control of concrete mixtures. Tests for acceptability of materials. Responsibilities and position of the inspector. 2 laboratories. Prerequisite: ME 249

CE 400  Special Problems for Advanced Undergraduates  (1-2)
Individual or group investigation, research, studies, or surveys of selected problems. Total credit limited to 4 units, with a maximum of 2 units per quarter.

*CE 402  Civil Engineering Computer Applications  (1)
Application of digital computer techniques to the solution of civil engineering problems. 1 lecture. Prerequisite: Math 117

CE 403  Engineering Law, Contracts & Specifications  (3)
Basic principles of law and contract documents as applied to civil engineering practices; varieties of construction contracts; relationship of owner, engineer and contractor. 3 lectures.

CE 421  Reinforced Concrete Design  (3)
Analysis and design of reinforced concrete structures. 2 lectures, 1 laboratory. Prerequisite: CE 306

*CE 423  Substructure Design  (3)
Analysis and design of foundations and substructures. 2 lectures, 1 laboratory. Prerequisite: CE 421, 437

*CE 427  Photogrammetry  (3)
Interpretation of aerial photographs. Stereoscopy. Application of aerial surveying to engineering problems, mapping. 2 lectures, 1 laboratory. Prerequisite: CE 133

CE 431  Water Supply Engineering  (3)
Economic design of a water supply system. Statistics for determination of demand, collection, storage, water treatment and quality control, the physical characteristics of water, and distribution. 2 lectures, 1 laboratory. Prerequisite: CE 333, Chem 322, Bio 110

CE 432  Water Quality Engineering  (3)
Characteristics of waste waters; analysis and treatment of sewage and industrial wastes. Basic design of waste treatment plants and sewerage systems. 2 lectures, 1 laboratory. Prerequisite: CE 431

CE 433  Timber Structures Design  (3)
Analysis and design of timber members and their connections. 1 lecture, 2 laboratories. Prerequisite: CE 421

* CE 434  Industrial and Radioactive Wastes  (3)
Source of industrial water pollutants; processes for prevention and treatment of industrial wastes. Elements of radioactive wastes and disposal methods. 2 lectures, 1 laboratory. Prerequisite: CE 432

CE 435  Construction Costs and Estimates  (3)
Construction costs and estimates from the viewpoint of the construction engineer. Estimating procedures considering labor, material, equipment and overhead. 2 lectures, 1 laboratory.

CE 436  Construction Equipment and Methods  (3)
Application and maintenance of construction equipment, construction planning, scheduling methods and procedures. 2 lectures, 1 laboratory.
CE 437 Foundation Soil Engineering (3)
Consolidation of soil and settlement of structures. Strength properties of soil, stability of slopes. 2 lectures, 1 laboratory. Prerequisite: CE 323

*CE 442 Masonry Design (3)
Design of brick and block structures. Emphasis on seismic analysis of these structures. 1 lecture, 2 laboratories. Prerequisite: CE 421

*CE 443 Flexible Pavement Design Laboratory (2)
A study of asphalt materials. Methods of design, control and testing of flexible pavement asphaltic mixtures. 2 laboratories. Prerequisite: CE 323

CE 461, 462 Senior Project (2) (2)
Selection and completion of a project under a minimum of supervision. Projects typical of problems which graduates must solve in their field of employment. Presentation of project in a formal report. 120 hours minimum per total senior project. Prerequisite: Senior standing.

CE 463 Undergraduate Seminar (2)
Seminar discussion of new developments, policies, practices and procedures. Preparation and presentation by each student of an engineering development in his chosen field. 2 lectures. Prerequisite: Senior standing.

* To be offered when course enrollment justifies.
The program in electronic engineering prepares students for the application of science in that branch of engineering concerned with communications, electronic control of mechanical and electrical operations, computer design and application, microwave theory and techniques, and electrical metrology.

Graduates of this department are employed by a very broad cross section of industry, utilities, governmental agencies, sales organizations, and educational institutions. The work of these graduates is concerned chiefly with application engineering, design and development, test and evaluation, technical operations, and engineering sales. The broad use of electronic devices by State and Federal agencies, business offices, military installations, and the home is increasing the opportunities for field engineering and self employment in technical services.

The four-year course is planned so that the student starts in his freshman year with a series of courses in electronic technology. At the same time, the student is also preparing himself in mathematics and physics for the more advanced engineering courses which begin the second year. This plan provides: (1) an opportunity to explore the field before undertaking engineering courses, (2) skills and techniques for early employment as a technician, (3) a descriptive background for engineering courses, and (4) strong motivation for the study of mathematics, physics, and engineering courses.

The laboratory work is organized to parallel closely the type of work the young engineer is usually assigned during his first few years of employment after graduation. The student starts in the freshman year with very closely supervised jobs, proceeds from directed experiments in analysis to student planned investigation, and advances to some senior year projects which involve engineering synthesis.

It is recommended that the high school student planning a career in electronic engineering take a balanced program including mathematics, physical science, drawing, and shops. The junior college student planning to transfer into this department would do well to meet, insofar as possible, the requirements of this curriculum.

The department occupies new facilities consisting of laboratories, shops, and auxiliary rooms. The laboratories are equipped with the latest instruments and test equipment available for the study and investigation of most phases of electronics. The facilities and equipment, coupled with "learn by doing" techniques, provide an opportunity for the student to gain a knowledge of industrial practices as well as an excellent theoretical background.

The department sponsors a student branch of the Institute of Electrical and Electronic Engineers and an amateur radio group.
<table>
<thead>
<tr>
<th></th>
<th>F</th>
<th>W</th>
<th>S</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Freshman</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Basic Electronics (EL 107, 108, 109)</td>
<td>2</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>Basic Electronics Laboratory (EL 147, 148, 149)</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Automatic Programming for Digital Computers (Math 221)</td>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Engineering Problems (EL 150)</td>
<td></td>
<td></td>
<td>1</td>
</tr>
<tr>
<td>Metal Processes (MPE 142, 144)</td>
<td></td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Welding Engineering (WE 144)</td>
<td></td>
<td></td>
<td>1</td>
</tr>
<tr>
<td>General Chemistry (Chem 321, 322)</td>
<td>4</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>College Algebra and Trigonometry (Math 117)</td>
<td>5</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Analytic Geometry and Calculus (Math 118, 201)</td>
<td>5</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>General Physics (Phys 131)</td>
<td></td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>Freshman Composition (Eng 104, 105, 106)</td>
<td>3</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>Health Education (PE 107)</td>
<td></td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>Physical Education (PE 141)</td>
<td></td>
<td>½</td>
<td>½</td>
</tr>
<tr>
<td></td>
<td>16 ½</td>
<td>17 ½</td>
<td>17 ½</td>
</tr>
</tbody>
</table>

|                |   |   |   |
| **Sophomore**  |   |   |   |
| Electronics (EL 208, 209) |   | 3 | 3 |
| Electronics Laboratory (EL 248, 249) |   | 1 | 1 |
| Fundamentals of Electrical Engineering (EE 211, 212, 213) | 3 | 3 | 3 |
| Electrical Engineering Laboratory (EE 252, 253) |   | 1 | 1 |
| Electronic Measurements (EL 224) |   | 2 |   |
| Drafting for Electronics (EL 246) |   | 2 |   |
| Engineering Statics (ME 211) |   | 3 |   |
| General Physics (Phys 132) |   | 4 |   |
| Production Welding Processes I (WE 145) |   | 1 |   |
| Sheet Metal Processes (MPE 155) |   |   | 1 |
| Analytic Geometry and Calculus (Math 202, 203) | 3 | 3 |   |
| Differential Equations (Math 316) |   | 3 |   |
| Physics of Electricity and Magnetism (Phys 204) | 4 |   |   |
| Engineering Drafting (ME 121, 122) | 2 | 2 |   |
| Physical Education (PE 141) |   | ½ | ½ |
| Electives |   | 3 |   |
|                | 18½ | 17 ½ | 17 ½ |

|                |   |   |   |
| **Junior**    |   |   |   |
| Networks (EL 301, 302, 303) |   | 3 | 3 |
| Networks Laboratory (EL 341, 342, 343) |   | 1 | 1 |
| Electronic Circuits (EL 304, 305, 306) | 3 | 3 | 3 |
| Electronic Circuits Laboratory (EL 344, 345, 346) | 1 | 1 | 1 |
| Engineering Dynamics (ME 212) |   | 3 |   |
| General Psychology (Psy 202) |   | 3 |   |
| Electric Machines (EE 313) |   | 3 |   |
| Thermodynamics (ME 301) |   | 3 |   |
| Engineering Materials (ME 314) |   | 3 |   |
| Differential Equations (Math 317) |   | 3 |   |
| Applied Biology (Bio 110) |   | 3 |   |
| Principles of Economics (Ec 201, 202) |   | 3 | 3 |
|                | 17 | 17 | 17 |
DESCRIPTIO NS OF COURSES IN ELECTRONIC ENGINEERING

**EL 107, 108, 109  Basic Electronics (2) (2) (2)**
Fundamentals of DC circuits and networks, inductance, capacitance, magnetism and meters. Fundamentals of AC circuits, reactance, impedance, resonance, and transformers. Problem solving and applications of basic electronic concepts which provide a fundamental background for the beginning student. 2 lectures. Prerequisite: Math 118 concurrent with EL 108

**EL 147, 148, 149  Basic Electronics Laboratory (1) (1) (1)**
Directed assignments facilitating an understanding of the operation and construction of electrical instruments, electronic equipment, basic electronic devices and basic circuits. Emphasis on use of test equipment. 1 laboratory. Concurrent: EL 107, 108, 109

**EL 150  Engineering Problems (1)**
Solution of selected engineering problems with special emphasis on programming for digital computers. 1 lecture.

**EL 208, 209  Electronics (3) (3)**
Internal behavior of vacuum, gaseous and semiconductor devices. Mathematical and graphical analysis, equivalent circuits. 3 lectures. Prerequisite: Math 201, Chem 321, Phys 132. Concurrent: EL 248, 249

**EL 222  Electronic Engineering (3)**
Theory of operation and application of electronic devices. 2 lectures, 1 laboratory. Prerequisite: Math 201, EE 231

**EL 223  Electronic Engineering (3)**
Introduction to the analysis of feedback control systems; introduction to digital and analog computer techniques. Emphasis on associated electronic circuits and components. 2 lectures, 1 laboratory. Prerequisite: Math 316, EL 222

**EL 224  Electronic Measurements (2)**
Techniques applicable to control, calibration and pulse measurements. 1 lecture, 1 laboratory. Prerequisite: Math 201

**EL 240  Additional Engineering Laboratory (1-2)**
Total credit limited to 4 units, with not more than 2 units in any one quarter.

*To be selected from the General Education list.*
EL 246 Drafting for Electronics (2)
Schematic drafting. Electronic and industrial symbols. Symmetry and balance. Schematic delineation, projection. Graphic integration. 1 lecture, 1 laboratory. Prerequisite: ME 122

EL 248, 249 Electronic Laboratory (1) (1)
Fundamental experiments concerned with the more common types of vacuum, gaseous and semiconductor devices. 1 laboratory. Concurrent: EL 208, 209

EL 301, 302, 303 Networks (3) (3) (3)
Formulation and solution of network equations by classical and Laplace transform methods. Complex frequency, poles and zeros, reactive networks, filters. Transmission line equations and their solution. Smith charts, matching lines with loss. 3 lectures. Prerequisite: EE 213, 252; EL 209, 249. Concurrent or prerequisite: Math 317

EL 304, 305, 306 Electronic Circuits (3) (3) (3)
Semiconductors and tubes as circuit elements. Amplification, feedback and stabilization. Oscillators and frequency stability. Wave shaping and pulse techniques. RF amplifiers, modulation, detection and frequency conversion. 3 lectures. Prerequisite: EE 213, 252; EL 209, 249

EL 341, 342, 343 Networks Laboratory (1) (1) (1)
Experimental consideration of the characteristics and behavior of selected networks. Transmission line measurements, stub matching, transmission line charts. 1 laboratory. Prerequisite: EE 213, 252; EL 209, 249

EL 344, 345, 346 Electronic Circuits Laboratory (1) (1) (1)
Experimental determination of the important operating characteristics of audio and voltage amplifiers, tuned radio frequency power and voltage amplifiers, RF oscillators, modulators, detectors, discriminators, and frequency converters. Standard performance testing. 1 laboratory. Prerequisite: EE 213, 252; EL 209, 249

EL 400 Special Problems for Advanced Undergraduates (1-2)
Individual or group investigation, research, studies, or surveys of selected problems. Total credit limited to 4 units, with a maximum of 2 units per quarter.

EL 402 Electromagnetic Fields (3)
Static and quasi-static fields; laws of Coulomb, Gauss, Ohm, Faraday, Ampere; equations of electrostatic and magnetic fields, boundary value problems; introduction to time varying fields. Vector analysis used throughout. 3 lectures. Prerequisite: EE 213, Math 317

EL 403 Microwave Engineering (3)
Microwave generation and energy propagation with emphasis on physical concepts and application to guided waves. 3 lectures.

EL 404 Digital Circuits Design (3)
Generation and modification of pulse waveforms and design of logic, gating, multivibrator, and negative resistance switching circuits. Design and analysis of magnetic memory and switching elements. 3 lectures. Prerequisite: Senior standing, EL 303, 306

EL 405 Communications Engineering (3)
Unified treatment of various types of transmission systems with emphasis on the role of system bandwidth and noise in limiting the transmission of information. Information theory as applied to contemporary communication techniques. 3 lectures. Prerequisite: Senior standing, EL 303, 306
EL 413 Control Systems Engineering (3)
Analysis and design of feedback control systems. Root-locus and frequency response techniques. Systems performance criteria, methods of improving transient and steady response by use of compensating filters. 3 lectures. Prerequisite: Senior standing. EL 303, 306; EE 313

EL 442 Systems Laboratory (1)
Selected laboratory exercises based upon the course work of EL 413. 1 laboratory. Prerequisite: Senior standing. EL 303, 306; EE 313

EL 443 Microwave Laboratory (1)
Laboratory exercises and applications of microwaves. 1 laboratory. Concurrent: EL 403

EL 444 Digital Circuits Laboratory (1)
Selected laboratory exercises from topics covered in EL 404. 1 laboratory. Concurrent: EL 404

EL 445 Communications Laboratory (1)
Demonstrations of the individual aspects of communication techniques. 1 laboratory. Concurrent: EL 406

EL 451, 452, 453 Industrial Electronics (1) (1) (1)
Selected engineering activity with industry. Design, test, evaluation, and analysis responsibilities of the junior engineer. Prerequisite: Senior standing.

EL 461, 462 Senior Project (2) (2)
Selection and completion of a project under a minimum of supervision. Project results are presented in a formal report. Minimum 120 hours total time.

EL 463 Undergraduate Seminar (2)
Discussion of new developments in the fields of communications and industrial electronics, with particular reference to field of employment. Job analysis. 2 lectures.

DESCRIPTIONS OF COURSES IN ELECTRICAL ENGINEERING

EE 211, 212, 213 Fundamentals of Electrical Engineering (3) (3) (3)
Electrical circuits and parameters. Introduction to network theorems. Energy sources, magnetic circuits and amplifiers, transformers, alternating current circuits and parameters, complex algebra, single phase circuits, symbolic treatment, polyphase circuits, symmetrical components. Analysis of non-sinusoidal waves by Fourier series. 3 lectures. Prerequisite: Math 201, Phys 132. Prerequisite or concurrent: Phys 204

EE 231, 232, 233 Principles and Practices of Electrical Engineering (3) (3) (3)
Electrical principles. Electric and magnetic circuits. Electrical machines. Machine controls and applications. Industrial wiring systems. Control and measurements including electronic devices. For nonelectronic engineering majors. 2 lectures, 1 laboratory. Prerequisite: Math 201

EE 252, 253 Electrical Engineering Laboratory (1) (1)
Selected laboratory exercises in electrical engineering. 1 laboratory. Prerequisite or concurrent: EE 212, 213

EE 313 Electric Machines (3)
Physical and electrical characteristics of the more common types of DC and AC machinery. Provides background facilitating selection of appropriate machine for a specific job. 2 lectures, 1 laboratory. Prerequisite: EE 213, 253
INDUSTRIAL ENGINEERING DEPARTMENT

Department Head, Joseph P. Wymer
Robert A. Quaney Leonhard M. Myers J. Garrard Wright

The industrial engineering program prepares graduates for a variety of assignments in industry such as manufacturing engineering, production planning and control, plant layout and materials handling, methods and standards, quality control, operations research, systems and procedures, engineering liaison and other duties concerned with improving efficiency and quality.

Emphasis is placed on planning the use of tools and equipment rather than designing the equipment; on the production rate and quality of the product rather than on designing the product itself. Parallel emphasis is placed on the managerial and financial aspects of planning, production, and sales.

A major distinction between industrial engineering and other branches of engineering is that the industrial engineer must consider not only the behavior of things such as tools and equipment, but must also include in his plan the behavior of people as they operate together in organizations, whether these organizations are simple or complex.

Excellent production facilities are available to make the instruction realistic and characteristic of the requirements of industry. Many local industries have permitted industrial engineering students to work on student projects in their plants.

### CURRICULUM IN INDUSTRIAL ENGINEERING

<table>
<thead>
<tr>
<th>Freshman</th>
<th>F</th>
<th>W</th>
<th>S</th>
</tr>
</thead>
<tbody>
<tr>
<td>Industrial Engineering (IE 111)</td>
<td>3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Motion and Time Study (IE 122, 123)</td>
<td></td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>Molding and Casting (IE 134)</td>
<td></td>
<td></td>
<td>2</td>
</tr>
<tr>
<td>Industrial Engineering Laboratory (IE 141)</td>
<td></td>
<td></td>
<td>1</td>
</tr>
<tr>
<td>Engineering Drafting (ME 121, 122, 123)</td>
<td></td>
<td></td>
<td>2</td>
</tr>
<tr>
<td>Metal Processes (MPE 142, 143)</td>
<td></td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Sheet Metal Processes (MPE 155, 156)</td>
<td></td>
<td></td>
<td>1</td>
</tr>
<tr>
<td>Welding Survey (WE 144)</td>
<td></td>
<td></td>
<td>1</td>
</tr>
<tr>
<td>Production Welding Processes I, II (WE 145, 146)</td>
<td></td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Freshman Composition (Eng 104, 105)</td>
<td></td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>College Algebra and Trigonometry (Math 117)</td>
<td></td>
<td></td>
<td>5</td>
</tr>
<tr>
<td>Analytic Geometry and Calculus (Math 118, 201)</td>
<td></td>
<td></td>
<td>5</td>
</tr>
<tr>
<td>General Physics (Phys 131, 132)</td>
<td></td>
<td></td>
<td>4</td>
</tr>
<tr>
<td>Physical Education (PE 141)</td>
<td>½</td>
<td>½</td>
<td>½</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Sophomore</th>
<th>F</th>
<th>W</th>
<th>S</th>
</tr>
</thead>
<tbody>
<tr>
<td>Industrial Incentives (IE 214)</td>
<td>3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Production Processes (IE 222, 223)</td>
<td></td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>Industrial Costs and Controls (IE 232, 233)</td>
<td></td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>Production Planning and Control (IE 236)</td>
<td></td>
<td></td>
<td>4</td>
</tr>
<tr>
<td>Engineering Statics and Dynamics (ME 211, 212)</td>
<td></td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>Manufacturing Metrology (MPE 141)</td>
<td></td>
<td></td>
<td>1</td>
</tr>
<tr>
<td>Metal Processes (MPE 144, 146, 148)</td>
<td></td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Analytic Geometry and Calculus (Math 202, 203)</td>
<td></td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>Statistical Methods in Engineering (Math 309)</td>
<td></td>
<td></td>
<td>3</td>
</tr>
<tr>
<td>Automatic Programming for Digital Computers (Math 221)</td>
<td></td>
<td></td>
<td>1</td>
</tr>
<tr>
<td>General Physics (Phys 133)</td>
<td></td>
<td></td>
<td>4</td>
</tr>
<tr>
<td>* Literature or Philosophy</td>
<td></td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Applied Biology (Bio 110)</td>
<td></td>
<td></td>
<td>3</td>
</tr>
<tr>
<td>Health Education (PE 107)</td>
<td></td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>Physical Education (PE 141)</td>
<td>½</td>
<td>½</td>
<td>½</td>
</tr>
</tbody>
</table>

*To be selected from General Education list.
## DESCRIPTIONS OF COURSES IN INDUSTRIAL ENGINEERING

### IE 111 Industrial Engineering (3)
Introduction to the field of industrial engineering. Relationship of the industrial engineer to various divisions of business organizations, including manufacturing, sales and services. 3 lectures.

### IE 122, 123 Motion and Time Study (3) (3)
Theory and application of methods analysis as related to production design, work place layout, tools and equipment, and services. Micromotion studies, flow process charts and diagrams, man-machine charting, etc. Principles and techniques used in establishing standard times, time study, standard data, formula application, predetermined motion times, work sampling, etc. 2 lectures, 1 laboratory.

### IE 134 Molding and Casting (2)
Shaping of metals while in the liquid state; commonly used molding and casting techniques for both ferrous and non-ferrous materials and alloys. 1 lecture, 1 laboratory.

### IE 141 Industrial Engineering Laboratory (1)
Engineering approach to problem solving. Slide rule, elementary industrial engineering problems. Introduction to digital computer applications to industrial systems. 1 laboratory.

### IE 202 Production Processes (3)
Manufacturing processes such as foundry, forging, plastics, chemical milling, powder metallurgy, sponge and solid rubber; raw material processing such as steel, aluminum, glass, cloth and chemicals; finishing processes such as degreasing, painting, plating, and other surface treatments. For majors other than IE. 3 lectures.

Prerequisite: MPE 143, WE 145

*To be selected from General Education list.*
IE 214  Industrial Incentives (3)
Types of incentives used in industry. Individual and group incentive plans, bonus
plans, and suggestion systems. 3 lectures. Prerequisite: IE 122, IE 123

IE 222  Production Processes (3)
Manufacturing processes. Forging, drawing, extruding, mixing, milling, calender-
ing, etc. Ferrous and non-ferrous metals, plastics and rubber processes. New manu-
ufacturing techniques such as high energy forming, chemical milling, electrical
machining, and numerical control. 2 lectures, 1 laboratory. Prerequisite: MPE 143,
WE 145, IE 134

IE 223  Electronics Production Processes (3)
Manufacturing processes as used in the electronics industry from fabrication of
sample chassis to manufacturing of complex printed circuits and master consoles.
For majors other than IE 2 lectures, 1 laboratory. Prerequisite: IE 222 or 202.

IE 232, 233  Industrial Costs and Controls (3) (3)
Engineering approach to cost recording, budgetary procedures and controls.
Estimating production costs. Engineering problems used to teach fundamentals.
Current techniques in mechanizing the cost recording and cost control functions.
2 lectures, 1 laboratory. Prerequisite: IE 111

IE 236  Production Planning and Control (4)
Principles of planning and controlling manufacturing activities. Product develop-
ment, forecasting, scheduling and loading, process planning and routing, materials
planning and control, dispatching, progress reporting, and corrective action. Quanti-
tative methods. Design of planning and control systems. Case studies of actual
systems. 3 lectures, 1 laboratory. Prerequisite: IE 111

IE 240  Additional Engineering Laboratory (1-2)
Total credit limited to 4 units, with not more than 2 units in any one quarter.
1 or 2 laboratories.

IE 324  Production Engineering I (3)
Principles of designing and developing detailed production plans for given prod-
ucts. Selection of production processes, sequence of operations, equipment, facilities,
methods, tool plans and requirements. Estimating costs. Value engineering and cost
analysis techniques. Short-run as well as long-run production techniques. 2 lectures,
1 laboratory. Prerequisite: IE 222, 236, MPE 146, WE 146

IE 325  Production Engineering II (3)
Manufacturing techniques. Jigs, fixtures, dies and special purpose tooling. Manu-
ufacturing economy and reliability. Automating the manufacturing process. Tooling
required for integrated methods, transfer mechanisms, production accessories, elec-
tromechanical tooling devices. 2 lectures, 1 laboratory. Prerequisite: IE 324, ME 123

IE 331, 332  Plant Layout and Material Handling (3) (3)
Product development, production analysis, selection and utilization of plant equip-
ment, material flow principles, material handling, plant layout. Prerequisite: IE 223

IE 343  Production Engineering III (2)
Estimation, scheduling, and manufacture of selected items on a simulated indus-
trial production line, utilizing the tooling designed and manufactured in IE 325.
2 laboratories. Prerequisite: IE 325

IE 344  Industrial Processes Laboratory (2)
Operation and use of modern machine tools, plastics and metal-forming machin-
ery. Operation by the student of representative types of equipment. 2 laboratories.
Prerequisite: IE 223, MPE 146
IE 400 Special Problems for Advanced Undergraduates (1-2)
Individual or group investigation, research, studies, or surveys of selected problems. Total credit limited to 4 units, with a maximum of 2 units per quarter.

IE 404 Industrial Organization (3)
Principles of industrial organization and control. Organizational relationships, departmentalization, centralization, decentralization, etc. Case histories utilized to illustrate the principle and theory. 3 lectures. Prerequisite: Senior standing.

IE 405 Engineering Economy (3)
Techniques for comparing the relative economies of engineering and manufacturing investments. Use of the scientific method and compound interest and depreciation formulas to compare alternatives before and after federal income taxes. Increment and sunk costs; retirement and replacement studies; sensitivity analysis; concepts of cash flow and capital rationing; consideration of intangibles. 3 lectures. Prerequisite: Junior standing in IE courses.

IE 406 Systems and Procedures (3)
Techniques of analysis and design applied to systems and procedures. Development of overall systems. Writing required procedures to implement efficient execution of assigned functions. 2 lectures, 1 laboratory. Prerequisite: Senior standing.

IE 415 Quality Control (3)
Systems of inspection, analysis and action taken to control manufacturing processes. Sampling plans, control charts, statistical analysis, and other tools used by management to control costs and improve quality. 3 lectures. Prerequisite: IE 324, Math 309

IE 416 Introduction to Operations Research (3)
Application of statistical methods, linear programming, queuing and other analysis techniques to problems encountered in industry. 3 lectures. Prerequisite: Senior standing.

IE 419 Reliability Concepts and Techniques (3)
Reliability concepts and techniques as they are used in various types of industrial organizations. Analysis of the influence of reliability on such factors as complexity, state of the art, environment and workmanship. Component reliability related to systems requirements. 3 lectures. Prerequisite: Senior standing.

IE 428 Industrial Data Processing (3)
Production applications of various computers and combinations of supporting data processing equipment. Engineering studies of systems, methods and equipment applications. Problems in inventory control, production control, payroll, etc., requiring data processing equipment. 2 lectures, 1 laboratory. Prerequisite: Junior standing.

IE 446 Die Casting (1)
Principles and techniques of hot chamber and cold chamber die casting. Comparison of the relative economy of die casting with other methods of manufacturing the same parts. Fundamentals of die design and construction. 1 laboratory. Prerequisite: IE 134

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

IE 463 Undergraduate Seminar (2)
Preparation, oral presentation, and discussion by students of technical papers on recent engineering developments. 2 lectures. Prerequisite: Senior standing.
MECHANICAL ENGINEERING DEPARTMENT

Department Head, Walter E. Holtz

Robert L. Beardmore  Robert G. Fenev  Harvey A. Mylander
Walter J. Ebersole  James D. Goodin  Kenneth J. Schneider
George P. Engkelke  Edward D. Galbraith  Edwin H. Williams
Max Epps  Charles J. Kessler  Darryl C. Zell

Mechanical engineering deals with equipment, machines and products which are characterized by their utilization of the strength and rigidity of structural materials, the useful properties of fluids, the conversion of energy from fuels to useful work, and the interrelation of wheels, gears, and levers.

Graduates obtain employment with manufacturers, contractors, public utilities, and governmental agencies. Types of work performed by graduates include plant engineering, machine tool, and pipe design, engineering testing, sales engineering, air conditioning, refrigeration, construction supervision, and maintenance planning.

It is recommended that the high school student planning a career in mechanical engineering take a balanced high school program including mathematics, physical sciences, mechanical drawing, and shops. The junior college student planning to transfer into this department would do well to meet, insofar as possible, the requirements of the curriculum in mechanical engineering.

During the junior year, students will have an opportunity to choose several areas of specialization within the field of mechanical engineering. Included among these are advanced machine design, tool design, heat power, nuclear physics and nuclear engineering, and advanced mechanics. An elective sequence in electronic engineering is also available.

The department occupies four laboratories where the principles developed in the classroom can be applied to the operation and testing of heat transfer equipment, fluid-handling apparatus, heat power equipment, internal combustion engines, and engineering materials. An additional laboratory is devoted to the study of dynamic phenomena.

CURRICULUM IN MECHANICAL ENGINEERING

<table>
<thead>
<tr>
<th>Freshman</th>
<th>F</th>
<th>W</th>
<th>S</th>
</tr>
</thead>
<tbody>
<tr>
<td>Engineering Drafting (ME 121, 122, 123)</td>
<td>2</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>Mechanical Engineering (ME 131, 132, 133)</td>
<td>3</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>Mechanical Engineering Laboratory (ME 144)</td>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Welding Survey (WE 144)</td>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Welding Production Processes I and II (WE 145, 146)</td>
<td>1</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Metal Processes (MPE 142)</td>
<td></td>
<td></td>
<td>1</td>
</tr>
<tr>
<td>College Algebra and Trigonometry (Math 117)</td>
<td>5</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Analytic Geometry and Calculus (Math 118, 201)</td>
<td>5</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>General Chemistry (Chem 321, 322)</td>
<td>4</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>General Physics (Phys 131)</td>
<td></td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>Freshman Composition (Eng 104, 105)</td>
<td>3</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>General Psychology (Psy 202)</td>
<td></td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Health Education (PE 107)</td>
<td></td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>Physical Education (PE 141)</td>
<td>½</td>
<td>½</td>
<td>½</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>18½</strong></td>
<td><strong>18½</strong></td>
<td><strong>18½</strong></td>
</tr>
</tbody>
</table>
## Sophomore

<table>
<thead>
<tr>
<th>Course Description</th>
<th>F</th>
<th>W</th>
<th>S</th>
</tr>
</thead>
<tbody>
<tr>
<td>Engineering Statics (ME 214)</td>
<td>3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Engineering Kinematics (ME 215)</td>
<td></td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Engineering Kinetics (ME 216)</td>
<td></td>
<td></td>
<td>3</td>
</tr>
<tr>
<td>Strength of Materials (ME 218, 219)</td>
<td></td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>Materials Test Laboratory (ME 249)</td>
<td></td>
<td></td>
<td>1</td>
</tr>
<tr>
<td>Descriptive Geometry (ME 125)</td>
<td></td>
<td></td>
<td>2</td>
</tr>
<tr>
<td>Manufacturing Metrology (MPE 141)</td>
<td></td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Metal Processes (MPE 143-144)</td>
<td></td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>Sheet Metal Processes (MPE 155)</td>
<td></td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Metal Processes (MPE 146)</td>
<td></td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Light Metal Production Processes (MPE 156)</td>
<td></td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Manufacturing Processes Laboratory (MPE 148)</td>
<td></td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Analytic Geometry and Calculus (Math 202, 203)</td>
<td></td>
<td>3</td>
<td>1</td>
</tr>
<tr>
<td>Differential Equations (Math 316)</td>
<td></td>
<td></td>
<td>3</td>
</tr>
<tr>
<td>General Physics (Phys 132, 133)</td>
<td></td>
<td>4</td>
<td>4</td>
</tr>
<tr>
<td>Technical Writing (Eng 219)</td>
<td></td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>Applied Biology (Bio 110)</td>
<td></td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>† Literature</td>
<td></td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Physical Education (PE 141)</td>
<td>½</td>
<td>½</td>
<td>½</td>
</tr>
<tr>
<td><strong>Total Units</strong></td>
<td>16½</td>
<td>18½</td>
<td>16½</td>
</tr>
</tbody>
</table>

## Junior

<table>
<thead>
<tr>
<th>Course Description</th>
<th>F</th>
<th>W</th>
<th>S</th>
</tr>
</thead>
<tbody>
<tr>
<td>Thermodynamics (ME 301, 302)</td>
<td>3</td>
<td></td>
<td>3</td>
</tr>
<tr>
<td>Fluid Mechanics (ME 311, 312)</td>
<td>3</td>
<td></td>
<td>3</td>
</tr>
<tr>
<td>Machine Design (ME 324, 325)</td>
<td>3</td>
<td></td>
<td>3</td>
</tr>
<tr>
<td>Heat Transfer (ME 313)</td>
<td></td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Production Processes (IE 202)</td>
<td></td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Mechanical Vibrations (ME 315)</td>
<td></td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Metallurgy (WE 304)</td>
<td></td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>Metallurgical Laboratory (WE 343)</td>
<td></td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Mechanical Engineering Laboratory (ME 345, 346)</td>
<td></td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Technical Electives</td>
<td></td>
<td>6</td>
<td></td>
</tr>
<tr>
<td>Electrical Engineering (EE 231, 232, 233)</td>
<td>3</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>Electronic Engineering (EL 222, 223)</td>
<td>3</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td><strong>Total Units</strong></td>
<td>18</td>
<td>18</td>
<td>17</td>
</tr>
</tbody>
</table>

## Senior

<table>
<thead>
<tr>
<th>Course Description</th>
<th>F</th>
<th>W</th>
<th>S</th>
</tr>
</thead>
<tbody>
<tr>
<td>Senior Project (ME 461, 462)</td>
<td>2</td>
<td></td>
<td>2</td>
</tr>
<tr>
<td>Undergraduate Seminar (ME 463)</td>
<td></td>
<td></td>
<td>2</td>
</tr>
<tr>
<td>Advanced Engineering Measurement (ME 435)</td>
<td></td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>* Technical Electives</td>
<td>3</td>
<td>6</td>
<td>3</td>
</tr>
<tr>
<td>Principles of Economics (Ec 201, 202)</td>
<td>3</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>American Civilization (Am Civ 301, 302, 303)</td>
<td>3</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>† Literature or Philosophy</td>
<td>3</td>
<td>3</td>
<td>6</td>
</tr>
<tr>
<td>Electives</td>
<td>16</td>
<td>17</td>
<td>17</td>
</tr>
</tbody>
</table>

## Descriptions of Courses in Mechanical Engineering

**ME 121 Engineering Drafting (2)**

Freehand lettering, pictorial drawings. Drafting methods for geometric constructions, multiplanar projections, auxiliary views, sectional views. Emphasis on industrial techniques and standards. 1 lecture, 1 laboratory. Prerequisite: 1 year of high school drafting recommended.

* To be selected with the approval of the student's adviser.
† To be selected from the General Education List.
ME 122 Engineering Drafting (2)
Techniques of dimensioning- castings, forgings and machined parts. Relationship between engineering drawings and shop processes. Intersections of surfaces. Development of surfaces. 1 lecture, 1 laboratory. Prerequisite: ME 122

ME 123 Engineering Drafting (2)
Detail working drawings of typical machine parts. Precision dimensions, limits and tolerances. Screw threads, shop notes, assembly drawings, parts lists. Threaded fasteners, rivets, keys and springs. Welding drawings. Piping drawings. Elements of structural and architectural drawing. 1 lecture, 1 laboratory. Prerequisite: ME 122

ME 125 Descriptive Geometry (2)
Solution of typical drafting room problems by graphical methods of multiview projection. Construction of fundamental views. Perpendicular, parallel and skew lines. Relationships of points, lines, and planes. Intersections of planes. Dihedral angles. 2 laboratories. Prerequisite: ME 121

ME 131 Mechanical Engineering (3)
Problem solving in mechanical engineering. Problems dealing with the basic concepts of dimension, time, temperature, pressure, motion and energy. Fundamentals of engineering experimentation and data presentation. 2 lectures, 1 laboratory.

ME 132 Mechanical Engineering (2)
Extension of problem solving. Problems involving basic computational methods including slide rule and elementary concepts of digital computer programming. 1 lecture, 1 laboratory.

ME 133 Mechanical Engineering (2)
Introduction to machine design techniques and the design and selection of power transmission elements such as couplings; U-joints; roller and silent chains; V, flat, and gear belts; gears and gear transmissions; cans; friction drives. 1 lecture, 1 laboratory.

ME 144 Mechanical Engineering Laboratory (1)
Basic mechanical engineering measurements. Experimental determination of speed, time, pressure, temperature, density, viscosity, and related properties, using instruments found in general use in industry. Preparation of formal engineering reports. 1 laboratory. Concurrent: ME 131

ME 211, 212 Engineering Statics and Dynamics (3) (3)
Equilibrium, trusses, friction and vector statics; relative velocity and acceleration, Newton’s laws of motion, work and energy, impulse and momentum, impact and mechanical vibrations. For majors in EL, ChE, CE, IE, Math and Physical Sciences. 3 lectures. Prerequisite: Phys 131, Math 201 for ME 211, Math 202 for ME 212

ME 213 Engineering Kinematics and Dynamics (3)
Kinematics of linear and angular motion, relative velocity and acceleration; force, mass and acceleration; work and energy. For students majoring in EL, CE, ChE, IE, Math and Physical Sciences transferring a formal course in statics from a junior college. 3 lectures. Prerequisite: Math 202, at least 3 quarter units of statics.

ME 214 Engineering Statics (3)
Two and three dimensional equilibrium employing free-body diagrams; structures including two and three dimensional trusses and frames; principles of static friction involved with blocks, wedges and belts. 3 lectures. Prerequisite: Phys 131, Math 201

ME 215 Engineering Kinematics (3)
Kinematics covering basic motion, centroids, relative linear velocity and acceleration with applications to planetary gearing. 3 lectures. Prerequisite: ME 214, Math 202
ME 216 Engineering Kinetics (3)
Newton's laws of motion; force, mass, and acceleration; work and energy, conservation of energy; linear and angular impulse and momentum, conservation of momentum, impact and gyroscopic motion; introduction to theory of mechanical vibration. 3 lectures. Prerequisite: ME 215, Math 203. Concurrent: Math 316

ME 218 Strength of Materials (3)
Properties of materials, stress-strain diagrams, mechanical hysteresis and creep; design loads, working stresses and factor of safety; deflections and stresses in structural and machine members. Use of Mohr's Circle for principal stresses; stress concentration. Combined axial and torsional loads with application to helical springs; load, shear, and moment diagrams for beams; riveted and welded joints. 3 lectures. Prerequisite: ME 214 or ME 211 and Math 201

ME 219 Strength of Materials (3)
Deflection and stress in structural and machine members under combined axial, torsional, and flexural loading; deflection and slope of beams by various methods; deflection, slope, load, shear and moment curve transposition by multiple integration and differentiation; statically indeterminate members; columns, concentric and eccentric loading. 3 lectures. Prerequisite: ME 218

ME 240 Additional Engineering Laboratory (1-2)
Total credit limited to 4 units, with not more than 2 units in any one quarter. 1 or 2 laboratories

ME 249 Materials Test Laboratory (1)
Commercial tests of materials. Familiarity with the physical properties of industrial materials. 1 laboratory. Prerequisite: ME 144 or CE 122. Concurrent: ME 218

ME 301 Thermodynamics (3)
The general energy equation, equations of state, First Law of Thermodynamics. Applications are considered and analyzed through the assignment of problems and exercises. 3 lectures. Prerequisite: Phys 132, Math 203

ME 302 Thermodynamics (3)
Entropy and the Second Law, various thermodynamic cycles, and the relationships that obtain in the study of imperfect gases. Fundamentals of heat transfer applications are considered and analyzed through the assignment of problems and exercises. 3 lectures. Prerequisite: ME 301

ME 311 Fluid Mechanics (3)
Analysis and problems dealing with the various basic properties of fluids. These include: fluid statics; Bernoulli's Equation, the general energy equation of flow, impulse and momentum, and the flow of real fluids in closed conduits. 3 lectures. Prerequisite: ME 212 or 213 or 216; Math 203

ME 312 Fluid Mechanics (3)
Analysis and problems dealing with fluid measurement. Incompressible and compressible flow in orifices, nozzles, Venturi meters. Compressible flow in conduits and about immersed objects. Dynamic similitude, dimensional analysis and fluid machines. 3 lectures. Prerequisite: ME 311

ME 313 Heat Transfer (3)
Basic principles of heat transfer and their application to the design of industrial equipment. Steady state and transient problems of conduction by analytical and numerical methods. Free and forced convection. Transfer of radiant energy. 3 lectures. Prerequisite: ME 301, 311, Math 316

ME 314 Engineering Materials (3)
Structure, composition and physical properties of commercially useful materials. Selection of materials for specific applications. Heat treatment. Corrosion of metals and alloys; protective coatings. 3 lectures. Prerequisite: Phys 131
ME 315 Mechanical Vibrations (3)
Damped and forced vibrations, transient and steady state motions, vibration isolation, commercial vibration control and measuring hardware and electrical analogs of vibratory systems; balance and critical speeds of rotating machine members, flywheel and multicylinder engine balancing. Actual case studies of vibration isolation and machine balancing. 3 lectures. Prerequisite: ME 216, Math 316

ME 324 Machine Design (3)
Design and application of machine components such as shafts, brakes, clutches, gears and cams. Design factor selection and approach to design problems. Acceleration and loading of machine members. Designing with friction materials. 3 lectures. Prerequisite: ME 216, 219

ME 325 Machine Design (3)
Design and application of machine elements such as mechanisms, bearings, ways, sleeves, and bushings. Lubrication of machine elements, gaskets, seals, "O" rings. Fastening methods and devices. Design techniques and the design of a simple machine. 2 lectures, 1 laboratory. Prerequisite: ME 324, IE 202, MPE 144, 156

ME 326 Machine Design (3)
Design of machine frames and castings. Tolerances and surface roughness for machine elements and assemblies. Design of complete machines. Checking designs and redesigning machine failures. 1 lecture, 2 laboratories. Prerequisite: ME 325, 334, 216

ME 345 Mechanical Engineering Laboratory (1)
Application of basic measurement techniques to actual equipment and the interpretation of results. Includes experiments in mechanics, instrumentation, turbo-machinery, and elementary performance testing of mechanical equipment. Experimental results compared with analytical determinations. Preparation of formal engineering reports. 1 laboratory. Prerequisite: ME 144

ME 346 Mechanical Engineering Laboratory (1)
Experiments in the application of thermodynamics and fluid mechanics theory to various types of equipment. Determinations of the efficiency of equipment using various heat cycles, modes of heat transfer and operation. Determination of caloric value of various fuels and the study of fluid flow phenomena. Preparation of formal engineering reports. 1 laboratory. Prerequisite: ME 144, 301, 311

ME 400 Special Problems for Advanced Undergraduates (1-2)
Individual or group investigation, research, studies, or surveys of selected problems. Total credit limited to 4 units, with a maximum of 2 units per quarter.

* ME 408, 409 Nuclear Engineering (3) (3)
Engineering considerations in design, control, and operation of nuclear reactors; materials of construction; thermal, hydraulic and mechanical problems; instrumentation and control; isotope preparation; radiation hazards, shielding and disposal of radioactive waste; power from nuclear fuels. 3 lectures. Prerequisite: ME 313, WE 304, Math 316, Phys 211

* ME 411 Heat Power (3)
Application of thermodynamics to actual power cycles, Turbine theory. Modern combustion gas and vapor power plants and auxiliaries. Economics of power generation. 3 lectures. Prerequisite: ME 302

* To be offered when course enrollment justifies.
* ME 412 Heat Power (3)
Theory and application of fuels, fuel systems, aspiration, combustion, detonation; mechanism, lubrication and performance of internal combustion engines. 3 lectures. Prerequisite: ME 302, 313

* ME 414 Advanced Dynamics (3)
Applications of Lagrange's equations and Hamilton's principle to systems having many degrees of freedom, gyrodynamics, trajectory studies of rigid and elastic bodies. 3 lectures. Prerequisite: ME 315, Math 318

* ME 415 Advanced Dynamics (3)
Analysis of transient response, beam vibration by Rayleigh's Method, method of influence, coefficients, iteration procedure, fundamentals of servo-mechanisms including theory of dynamic stability. 3 lectures. Prerequisite: ME 414, Math 317

* ME 417 Environmental Engineering (3)
Environmental requirements for human habitation, psychrometrics, building heating and cooling loads, air temperature and humidity control. 3 lectures. Prerequisite: ME 302, 313

* ME 418 Environmental Engineering (3)
Air cleaning and distribution, radiant heating and cooling, design of the complete air conditioning system. 2 lectures, 1 laboratory. Prerequisite: ME 417

* ME 420 Creativity (2)
A survey of creativity. Learning the skill and technique of creative thought. Demonstration of creative solutions to problems. 2 lectures. Prerequisite: Junior standing.

* ME 421 Mechanisms (2)
Application of special mechanisms to practical problems in engineering. Geneva wheels, ratchets, couplings, universal joints, governors, escapements, straight line motion mechanisms. 1 lecture, 1 laboratory. Prerequisite: ME 216

* ME 431, 432 Tool Design (3) (3)
Design of manufacturing tools such as jigs, fixtures, and dies. Materials, tolerance balancing, and toolroom methods as design factors. 2 lectures, 1 laboratory. Prerequisite: ME 326

ME 435 Advanced Engineering Measurements (2)
Application of sensing, modifying and signal read-out devices to problems of engineering measurement and control. System response and errors are studied for typical installations. 1 lecture, 1 laboratory. Prerequisite: ME 302, 312, 315, EL 222

* ME 438 Advanced Machine Design (3)
Creativity and human engineering in machine design. Power source selection. Design of electrical, pneumatic, and hydraulic control systems for machines. Design of compression, extension, torsion, flat, wire form, and power springs. 2 lectures, 1 laboratory. Prerequisite: ME 326

* ME 439 Advanced Machine Design (3)
Design and use of power screws, flexible shafts, flywheels, and high-speed machinery. Heat treatment required for machine functions. Dimensional control. Standard machine components, vari-speed drives or reducers, and feed mechanisms. Recent design developments. 2 lectures, 1 laboratory. Prerequisite: ME 315, 438

* ME 440 Analog Computation (3)
Application of the electronic analog computer to the solution of typical problems in engineering. 2 lectures, 1 laboratory. Prerequisite: ME 216 or 212; Math 316

* To be offered when course enrollment justifies.
ME 441 Control Systems (3)
Introduction to automatic control system analysis and design. Mechanical, electromechanical, hydraulic and pneumatic systems will be treated. For non-Electronic Engineering majors. 3 lectures. Prerequisite: Math 316, El 223, EE 233, ME 312, 315

ME 461, 462 Senior Project (2) (2)
Selection and completion of a project under a minimum of supervision. Projects typical of problems which graduates must solve in their fields of employment. Project results are presented in a formal report. Minimum 120 hours total time. Prerequisite: Senior standing, ME 325 and all required MPE courses.

ME 463 Undergraduate Seminar (2)
General discussion of new developments, policies, practices, and procedures in regular seminar. Each individual is responsible for the preparation and presentation of an engineering development in his chosen field. 2 lecture-problem sessions. Prerequisite: Senior standing.

* To be offered when course enrollment justifies.
Instruction in engineering manufacturing and shop practice has two objectives: (1) to give the student a foundation in the basic skills and (2) to give an understanding of the part machine tools play in present-day engineering and manufacturing enterprises.

The purpose of these laboratories is to help the engineering student in gaining an understanding of tools and materials, as well as the capabilities and limitations of certain machine tools. This type of experience assists the student in developing sound judgment by relating experience to theory.

The department occupies eight laboratories which are equipped with the latest machine tools. These laboratories are also equipped with the tools, attachments, and precision instruments for the construction of dies, tools, jigs, and fixtures such as are found in modern industry. Punch presses, die-sinking machines, plastic presses and plastic mold-making equipment are provided for engineering students taking advanced courses.

DESCRIPTIONS OF COURSES IN METAL PROCESSES ENGINEERING

MPE 141 Manufacturing Metrology (1)
Actual experience in linear metrology. Basic principles of measuring size, flatness, roundness, angles and threads. Dimensional control concepts and methods of non-precision and precision measurement. 1 laboratory.

MPE 142 Metal Processes (1)
Fundamentals of lathe operation, including straight and taper turning between centers, chuck work, and thread cutting. Also feeds, speeds, and tool grinding. 1 laboratory.

MPE 143 Metal Processes (1)
Fundamentals of lathe operation including taper turning, taper boring, thread cutting, other chucking operations, and machinability of metals. 1 laboratory. Prerequisite: MPE 142

MPE 144 Metal Processes (1)
Fundamentals of milling machine and shaper operation including precision setup and plain surfacing operations. 1 laboratory. Prerequisite: MPE 142

MPE 146 Metal Processes (1)
Advanced milling machine and shaper practice including contoured and angular surfacing operations, boring, serrations, rack and spur gear cutting. 1 laboratory. Prerequisite: MPE 144

MPE 148 Manufacturing Processes Laboratory (1)
Advanced milling machine, shaper, and lathe practice, including accessories and attachments. Also instruction in cylindrical, surface, tool and cutter grinding and honing. Injection, transfer, compression and vacuum molding of plastics. 1 laboratory. Prerequisite: MPE 141, 143, 146

MPE 155 Sheet Metal Processes (1)
Basic sheet metal processes including the techniques of hand and machine operation used in layout, cutting, forming, assembling and finishing. 1 laboratory.
MPE 156  Light Metal Production Processes  (1)
Application of light metal processes related to design and production of durable goods with emphasis upon dies, jigs, and fixtures used in stamping and press work. Involves processes from design through manufacturing and marketing. 1 laboratory. Prerequisite: MPE 155

MPE 240  Machine Tools  (1-2)
Advanced individual instruction on all machine tools. Construction and repair of laboratory equipment. Total credit limited to 4 units. 1 or 2 laboratories. Prerequisite: MPE 144

MPE 448  Plastics Manufacturing  (2)
Theory reinforced with experience using modern laboratory equipment. Plastic material, equipment and processing. Injection, compression and transfer molding; mixing, laminating, and vacuum forming. 1 lecture, 1 laboratory. Prerequisite: Senior standing.
It is the aim of this department to give students in the engineering division of the college an opportunity to gain both theoretical and practical knowledge of techniques and applications of the principal welding processes.

Facilities include general oxyacetylene welding equipment, automatic and manual flame cutting apparatus, general arc welding equipment, including both AC and DC types, automatic and manual inert-gas shielded arc welding equipment, seam and spot welding machines, automatic submerged-melt arc welding equipment, modern resistance welding and x-ray and other non-destructive testing equipment.

**DESCRIPTIONS OF COURSES IN WELDING**

**WE 144 Welding Survey (1)**
General survey of all major welding processes, weld nomenclature, types of joints, welding symbols, weld inspection, and thermal effects of welding. Basic oxyacetylene welding techniques and safety. 1 laboratory.

**WE 145 Production Welding Processes I (1)**
Studies of the tungsten-inert-gas welding process, the resistance welding processes, brazing and braze welding. 1 laboratory. Prerequisite: WE 144

**WE 146 Production Welding Processes II (1)**
Fundamentals of metallic arc welding including equipment, electrodes and basic procedures. Oxygen cutting. High speed consumable electrode processes. 1 laboratory. Prerequisite: WE 144

**WE 156 Advanced Metallic Arc Welding (1)**
Shielded metallic arc welding of heavy steel plates. Includes butt weld types, uses of backing materials, hard facing, cast iron, and overhead fillets. Basic weld tests. Arc welding of light-gauge steel sheets. 1 laboratory. Prerequisite: WE 146

**WE 240 Additional Welding Laboratory (1-2)**
Total credit limited to 4 units, with not more than 2 units in any one quarter. 1 or 2 laboratories. Application of credit as elective in major department requires approval of major department head. Prerequisite: WE 145 or 146, Permission of Department.

**WE 254 Advanced Welding (1)**
Types and uses of various welding machines, operating costs. Use of structural steel shapes for building machinery and farm equipment. Welding symbols, strength of welded joints, and basic cost estimating problems. 1 laboratory. Prerequisite: WE 156

**WE 304 Metallurgy (2)**
Principles of physical metallurgy. Ferrous and non-ferrous metals and their alloys. Structure of metals. Constitutional diagrams, applications and designations. 2 lectures. Prerequisite: Weld 144, Phys 131, Chem 322

**WE 306 Advanced Physical Metallurgy (3)**
Powder metallurgy and castings materials, processes, design and applications. Tool steels. 3 lectures. Prerequisite: WE 304

**WE 322 Non-Destructive Testing (4)**
Studies of non-destructive testing methods. Practice in x-ray and penetrant inspection. 2 lectures, 2 laboratories. Prerequisite: WE 304
WE 341 Special Problems in Welding (1-3)
Fundamentals of welding metallurgy, weldability of steels, steels and alloys for welded construction. Codes for construction of welded unfired pressure vessels. Design of pressure vessels according to the code used. 1, 2 or 3 laboratories. Prerequisite: WE 156

WE 343 Metallurgy Laboratory (1)
Basic principles of metallography. Thermal treatment of metals. Hardness testing. 1 laboratory. Prerequisite: WE 304

WE 421, 422 Weld Design (3) (2)
Welding processes, applications and limitations. Design of welded joints related to the welding processes, performance of welded joints under various load conditions with various metals and filler metals. Welding costs and tooling methods. WE 421: 3 lectures. WE 422: 2 laboratories. Prerequisite: WE 146, MPE 144, ME 324, or Aero 349 or CE 341. WE 304 recommended.

WE 443 Mechanical Metallurgy (1)
A seminar course on the classification, designation, and properties of metals and alloys. Emphasis on trade nomenclature. 1 laboratory. Prerequisite: Senior standing.
ARTS AND SCIENCES DIVISION
ARTS AND SCIENCES DIVISION

The Arts and Sciences Division has three functions in the educational plan of the California State Polytechnic College. Primarily, it is a service division providing all students of the college with instruction in basic and supporting work common to all curricula. Most of the general education is provided by the Arts and Sciences Division with particular emphasis upon preparing the college's graduates for their roles as active, participating citizens of community, state, and nation. A second function of the division is to offer a broad and varied program of teacher education. Teaching credential programs are available in biological sciences, language arts, mathematics, physical education, physical sciences, and social sciences. These programs offer opportunities in elementary and secondary school teaching. The third function of the division is to provide educational opportunities in its major programs for those who do not choose teaching as an occupation. Each divisional curriculum is designed to prepare its graduates for specific jobs in its area in keeping with the college's philosophy of occupational education. The Department of Music and Art provides supporting courses which contribute to the cultural and social development of students in all divisions of the college.

BUSINESS CURRICULA

Curricula in business are offered leading to the bachelor of science degree in Accountancy, Business Management, and Marketing. Each of these majors is planned to provide degree-level education leading to specific occupations in many aspects of business and commerce.

The business building has classrooms and laboratories well equipped with many types of business machines used in modern industry. The location of the Kellogg Campus in the midst of the highly industrialized Los Angeles area affords unique opportunities for visits to industrial and commercial firms and correlation of classroom work with on-the-job observations of business activities.

Programs are listed on the following pages in alphabetical order by department.

ACCOUNTANCY DEPARTMENT

Department Head, George E. Carlberg

Martin Barrett
George Bovee

James B. Maury, Jr.
Barry Knight

Frank Paul
Jewel M. Riddle

The Accountancy Department has several functions: 1) to provide preparation for students who wish to enter the field of business with a thorough knowledge of the essential principles of accounting; 2) to serve the needs of students in engineering and agriculture; 3) to introduce the "language" of business to arts and sciences majors; and 4) to provide a strong background for students preparing themselves for professional employment in public or private accounting, or as accountants in government service. The student majoring in accountancy may select courses which will prepare him specifically for one of these fields.

The accountancy courses are taught from a framework of modern business complexity so that the student becomes aware of the many factors entering into the "decision-making" process and the part the accountant and his skills contribute to administrative services.
### CURRICULUM IN ACCOUNTANCY

**Freshman**

<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>Principles of Accounting (Acc 121, 122, 123)</td>
<td>3</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>Physical Education (PE 141)</td>
<td>½</td>
<td>½</td>
<td>½</td>
</tr>
<tr>
<td>Calculating Machines (Bus 151)</td>
<td></td>
<td></td>
<td>1</td>
</tr>
<tr>
<td>Introduction to Business (Bus 102)</td>
<td></td>
<td></td>
<td>3</td>
</tr>
<tr>
<td>Business Mathematics (Math 106)</td>
<td></td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>Health Education (PE 107)</td>
<td></td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Basic Mathematics (Math 101)</td>
<td></td>
<td></td>
<td>3</td>
</tr>
<tr>
<td>Marketing Principles (Mktg 201)</td>
<td></td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Public Speaking (Sp 200)</td>
<td></td>
<td>3</td>
<td></td>
</tr>
</tbody>
</table>

**Natural Sciences**

<table>
<thead>
<tr>
<th>Course</th>
<th>4</th>
<th>4</th>
<th>4</th>
</tr>
</thead>
</table>

**Sophomore**

<table>
<thead>
<tr>
<th>Course</th>
<th>F</th>
<th>W</th>
<th>S</th>
</tr>
</thead>
<tbody>
<tr>
<td>Job and Process Cost Accounting (Acc 221)</td>
<td>3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Standard Costs and Analyses (Acc 222)</td>
<td></td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Data Processing (DP 221)</td>
<td></td>
<td></td>
<td>3</td>
</tr>
<tr>
<td>Intermediate Accounting (Acc 321, 322, 323)</td>
<td>3</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>Business Communication (Eng 218)</td>
<td></td>
<td>3</td>
<td></td>
</tr>
</tbody>
</table>

**Literature**

<table>
<thead>
<tr>
<th>Course</th>
<th>3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Principles of Economics (Ec 201, 202, 203)</td>
<td>3</td>
</tr>
<tr>
<td>General Psychology I (Psy 202)</td>
<td>3</td>
</tr>
<tr>
<td>Report Writing (Eng 216)</td>
<td></td>
</tr>
<tr>
<td>Physical Education (PE 141)</td>
<td>1½</td>
</tr>
</tbody>
</table>

**Natural Sciences**

<table>
<thead>
<tr>
<th>Course</th>
<th>3</th>
</tr>
</thead>
</table>

**Electives**

<table>
<thead>
<tr>
<th>Course</th>
<th>3</th>
</tr>
</thead>
</table>

**Junior**

<table>
<thead>
<tr>
<th>Course</th>
<th>F</th>
<th>W</th>
<th>S</th>
</tr>
</thead>
<tbody>
<tr>
<td>Credit Management (Fin 301)</td>
<td>3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Business Law (Bus 301, 302)</td>
<td></td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>American Civilization (Am Civ 301, 302, 303)</td>
<td>3</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>Money and Banking (Ec 308)</td>
<td></td>
<td></td>
<td>3</td>
</tr>
<tr>
<td>Insurance Principles (Fin 303)</td>
<td></td>
<td></td>
<td>3</td>
</tr>
<tr>
<td>Budgeting Principles (Acc 226)</td>
<td></td>
<td></td>
<td>3</td>
</tr>
</tbody>
</table>

**Literature or Philosophy**

<table>
<thead>
<tr>
<th>Course</th>
<th>3</th>
</tr>
</thead>
</table>

**Literature, Art, Philosophy or Music**

<table>
<thead>
<tr>
<th>Course</th>
<th>3</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Course</th>
<th>3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Business Forecasting (Bus 311) or Descriptive Statistics (Math 211)</td>
<td>5</td>
</tr>
</tbody>
</table>

**Senior**

<table>
<thead>
<tr>
<th>Course</th>
<th>F</th>
<th>W</th>
<th>S</th>
</tr>
</thead>
<tbody>
<tr>
<td>Business Finance (Fin 314)</td>
<td>3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Federal Tax Course I (Acc 421)</td>
<td></td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Auditing (Acc 325, 326)</td>
<td>3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Senior Project (Acc 461, 462)</td>
<td>2</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>Undergraduate Seminar (Acc 463)</td>
<td></td>
<td></td>
<td>2</td>
</tr>
<tr>
<td>Directed electives</td>
<td>3</td>
<td>3</td>
<td>6</td>
</tr>
<tr>
<td>Electives</td>
<td>6</td>
<td>9</td>
<td>6</td>
</tr>
</tbody>
</table>

| Course                                    | 17 | 17 | 17 |

* 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.
DESCRIPTIONS OF COURSES IN ACCOUNTANCY

Acc 121, 122, 123 Principles of Accounting (3) (3) (3)
Principles and practices of fundamental double-entry accounting. Problems approach to the subject with illustrations taken from real business situations. Provides information for analysis and allocation purposes. 2 lectures, 1 two-hour activity period.

Acc 221 Job and Process Cost Accounting (3)
The cost accounting cycle; elements of cost of making a product; assignment of manufacturing costs to a product through job order and process cost systems. 2 lectures, 1 two-hour activity period. Prerequisite: Acc 123

Acc 222 Standard Costs and Analyses (3)
Standard and estimated cost accounting systems; analysis and control of distribution costs; differential cost analysis. 2 lectures, 1 two-hour activity period. Prerequisite: Acc 123

Acc 223 Advanced Problems in Cost Accounting (3)
Advanced problems in cost finding and cost control. 2 lectures, 1 two-hour activity period. Prerequisite: Acc 222

Acc 226 Budgeting Principles (3)
Principles and methods of preparing budgets, estimating income, and controlling expenditures of a manufacturing enterprise. Preparation of budgeted balance sheet and income statements. The duties of the sales, production, purchasing, and office managers in the planning and coordinating aspects of budgeting. 2 lectures, 1 two-hour activity period. Prerequisite: Acc 123

Acc 232 Income Taxes (3)
Federal and state income tax structure as related to individuals, including problems intended to provide an understanding of the principles. 3 lectures. (Not applicable for credit toward major in accountancy.)

Acc 306 Accounting Systems (2)
The installation and operation of accounting systems in business, with special attention to internal control. 2 lectures. Prerequisite: Acc 221, 322

Acc 321, 322, 323 Intermediate Accounting (3) (3) (3)
Introduction to advanced theory of accounts and its application. Standards of practice and recent opinions of the American Institute of Certified Public Accountants. Modern financial statement terminology. 2 lectures, 1 two-hour activity period. Prerequisite: Acc 123 and permission of instructor.

Acc 325, 326 Auditing Principles, Practices and Procedures (3) (3)
Theory of auditing and its objectives; procedures and techniques to carry out the objectives; principles of working paper development and preparation; types of opinions rendered by auditors and their responsibilities. 2 lectures, 1 two-hour activity period. Prerequisite: Acc 323

Acc 327 Internal Auditing (3)
Principles of internal control; examination and appraisal of controls; systems designs; techniques of verification, working papers, and other features of auditing applicable to the internal auditor's work. 2 lectures, 1 two-hour activity period. Prerequisite: Acc 222, 323, or consent of instructor.

Acc 400 Special Problems for Advanced Undergraduates (1-2)
Individual or group investigation, research, studies, or surveys of selected problems. Total credit limited to 4 units, with a maximum of 2 units per quarter. Prerequisite: Senior standing or consent of instructor.
Acc 411, 412  Case Studies in Controllership (2) (2)
Analysis of accounting problems and business situations from the broad view-
point of the controller. Studies of actual and simulated business case histories. 2
lectures. Prerequisite: Senior standing.

Acc 421  Federal Tax Course I (3)
Income, expenses, exclusions, deductions, and credits. Emphasis on individual
returns. 2 lectures, 1 two-hour activity period. Prerequisite: Acc 321

Acc 422  Federal Tax Course II (3)
Continuation of Acc 421. Emphasis on estates, trusts, partnerships and corpora-
tions. 2 lectures, 1 two-hour activity period. Prerequisite: Acc 421

Acc 423  Governmental and Institutional Accounting (3)
Accounting for nonprofit institutions and governmental organizations. 2 lectures,
1 two-hour activity period. Prerequisite: Acc 323

Acc 427  Budgetary Control (3)
Analysis of variances in budgetary control, including the break-even point, cost-
volume relationships and the utilization of variable budgets. Current literature on
budgetary control discussed. 3 lectures. Prerequisite: Acc 222, 322

Acc 431, 432, 433  Advanced Accounting (3) (3) (3)
Partnerships, joint ventures, home office and branch, consolidated financial state-
ments, statement of affairs, receiverships, realization and liquidation statements,
estates and trusts, and actuarial problems. 2 lectures, 1 two-hour activity period.
Prerequisite: Acc 323

Acc 441, 442  Internship in Accounting (2) (2)
On-the-job training with a business in the field of accounting. The experience
must be new to the student so that learning takes place. Reports on various phases
of the internship submitted as required by the faculty coordinator. Prerequisite:
Permission of the instructor.

Acc 461, 462  Senior Project (2) (2)
Selection and completion of a project under minimum of supervision. Project
typical of problems which graduates must solve in their fields of employment.
Formal report is required. Required minimum of 120 hours.

Acc 463  Undergraduate Seminar (2)
Study and discussion by students of recent developments in the student's major
fields. 2 meetings. Prerequisite: Senior standing or special permission.

Acc 475  C.P.A. Law Problems (3)
Business law questions given in the C.P.A. examination. Fundamental principles
of the law of contracts, agency, bailments, sales, negotiable instruments, partners-
ships, corporations, real and personal property, wills, insurance, suretyship, bank-
ruptcy and other subjects. 3 lectures. Prerequisite: Acc 433, Bus 302 or consent of
instructor.

Acc 476  C.P.A. Auditing Problems (3)
Standards and objectives; reports; internal control; examination of internal and
external records; working papers; procedures; and other related topics. 2 lectures,
1 two-hour activity period. Prerequisite: Acc 433 or consent of the instructor.

Acc 477  C.P.A. Practice Problems and Theory (6)
Contemporary accounting theory with emphasis upon pronouncements of the
American Institute of Certified Public Accountants, the American Accounting As-
sociation, and the Securities and Exchange Commission. Application to advanced
problems of the type found in the C.P.A. examinations. 2-two hour lectures. 2 two-
hour activity periods. Prerequisite: Acc 433 or consent of instructor.
BIOLOGICAL SCIENCES DEPARTMENT

Department Head, Jerome E. Dimitman

Ralph W. Ames  Donald C. Force  Harold L. Lint
Lawrence M. Blakely  Vernon L. Gregory  Edward T. Roche
Howard S. Brown  JoAnn S. Jensen  Fred Shafia
Jack L. Erspamer  Lamar M. Knill  Glenn R. Stewart
Bruce L. Firstman  Laszlo J. Szijj

A four-year curriculum leading to the Bachelor of Science Degree in Biological Sciences with options in Botany, Biology, Bacteriology, and Zoology is offered by the department. In addition, a wide variety of courses is offered to support other major departments. Curricular requirements are designed to provide a broad and fundamental basis essential to an understanding of the field of biology, yet allow sufficient latitude, through a wide selection of electives, for concentration in various fields. Agricultural majors obtain sufficient background in bacteriology, botany, entomology, plant pathology and zoology to understand the basic principles involved in their applied courses. Courses are offered to fulfill the general education requirements in life science, and adequate undergraduate preparation is provided for beginning work at the graduate level. The departmental facilities include laboratories provided with modern scientific equipment, and greenhouses for practical work in the plant sciences. The campus is centrally located for field work in desert, mountain, seashore and coastal locations.

CURRICULAR OPTIONS

Biology
This option prepares the student for elementary or secondary teaching and for employment in many diverse areas of life science, including Park and Forest Service work, and related positions.

Botany
This option leads to preparation for work in the plant sciences such as mycology, plant pathology, plant physiology, and taxonomy.

Microbiology
This option prepares the student for employment in microbiology and related areas as in public health, sanitation, the industrial and pharmaceutical industries, and medical and research laboratory work. It also prepares the student for entrance into graduate schools in microbiology, and into medical and dental schools.

Zoology
This option prepares the student for work in various fields of animal science, such as fish and game, wildlife, entomology, museum work, and conservation. It also prepares the student for graduate and pre-professional schools.

CURRICULUM IN BIOLOGICAL SCIENCES

<table>
<thead>
<tr>
<th>Freshman</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>Physical Education (PE 141)</td>
<td>½</td>
<td>½</td>
<td>½</td>
</tr>
<tr>
<td>Health Education (PE 107)</td>
<td>2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Basic Biology (Bio 115)</td>
<td>3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Basic Biology Laboratory (Bio 145)</td>
<td>2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>General Chemistry (Chem 321, 322)</td>
<td>4</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>Introduction to Mathematical Analysis (Math 110, 111)</td>
<td>3</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>General Zoology (Zoo 134, 135)</td>
<td>4</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>Organic Chemistry (Chem 326)</td>
<td>4</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Electives and courses to complete major</td>
<td>2</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>16½</td>
<td>16½</td>
<td>16½</td>
</tr>
</tbody>
</table>
## Sophomore

<table>
<thead>
<tr>
<th>Course</th>
<th>F</th>
<th>W</th>
<th>S</th>
</tr>
</thead>
<tbody>
<tr>
<td>Physical Education (PE 141)</td>
<td>½</td>
<td>½</td>
<td>½</td>
</tr>
<tr>
<td>General Botany (Bot 124, 125)</td>
<td>5</td>
<td>5</td>
<td>5</td>
</tr>
<tr>
<td>Genetics (Bio 303)</td>
<td>3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>General Entomology (Ent 126)</td>
<td>4</td>
<td></td>
<td></td>
</tr>
<tr>
<td>College Physics (Phys 121, 122, 123)</td>
<td>4</td>
<td>4</td>
<td>4</td>
</tr>
<tr>
<td>* Literature</td>
<td>3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>* Literature, Philosophy, Art, or Music</td>
<td>3</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>Principles of Economics (Ec 201, 202)</td>
<td>3</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>Introduction to Mathematical Analysis (Math 204)</td>
<td>3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Electives and courses to complete major</td>
<td>2</td>
<td>2</td>
<td></td>
</tr>
</tbody>
</table>

| Total                                              | 18½ | 17½ | 16½ |

## Junior

<table>
<thead>
<tr>
<th>Course</th>
<th>F</th>
<th>W</th>
<th>S</th>
</tr>
</thead>
<tbody>
<tr>
<td>General Bacteriology (Bact 221)</td>
<td>4</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Principles of Evolution (Bio 213)</td>
<td>3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Public Speaking (Sp 200)</td>
<td>3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>American Civilization (Am Civ 301, 302, 303)</td>
<td>3</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>General Psychology (Psy 202)</td>
<td>3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Biochemistry I (Chem 328)</td>
<td>4</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Electives and courses to complete major</td>
<td>9</td>
<td>7</td>
<td>8</td>
</tr>
</tbody>
</table>

| Total                                              | 16 | 17 | 17 |

## Senior

<table>
<thead>
<tr>
<th>Course</th>
<th>F</th>
<th>W</th>
<th>S</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cellular Physiology (Bio 335)</td>
<td>4</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Principles of Ecology (Bio 325)</td>
<td>3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Taxonomy of Higher Plants (Bot 343)</td>
<td>3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Senior Project (Bio 461, 462)</td>
<td>2</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>Undergraduate Seminar (Bio 463)</td>
<td>2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Electives and courses to complete major</td>
<td>10</td>
<td>9</td>
<td>11</td>
</tr>
</tbody>
</table>

| Total                                              | 16 | 14 | 16 |

### BIOLOGY OPTION (ADD COURSES BELOW TO BASIC CURRICULUM)

#### Sophomore

<table>
<thead>
<tr>
<th>Course</th>
<th>F</th>
<th>W</th>
<th>S</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bio 200 History of Biology</td>
<td></td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Bio 201 Conservation of Natural Resources</td>
<td></td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>bio 322 Plant Physiology</td>
<td></td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>Bio 335 Plant Anatomy</td>
<td></td>
<td>4</td>
<td></td>
</tr>
</tbody>
</table>

#### Junior

<table>
<thead>
<tr>
<th>Course</th>
<th>F</th>
<th>W</th>
<th>S</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ent 334 Advanced Entomology</td>
<td></td>
<td></td>
<td>3</td>
</tr>
<tr>
<td>Zoo 329 Ornithology</td>
<td></td>
<td></td>
<td>3</td>
</tr>
<tr>
<td>Zoo 341 Mammalogy</td>
<td></td>
<td></td>
<td>3</td>
</tr>
</tbody>
</table>

### BOTANY OPTION (ADD COURSES BELOW TO BASIC CURRICULUM)

#### Sophomore

<table>
<thead>
<tr>
<th>Course</th>
<th>F</th>
<th>W</th>
<th>S</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bot 236 Families of Flowering Plants</td>
<td></td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Path 223 General Plant Pathology</td>
<td></td>
<td>4</td>
<td></td>
</tr>
</tbody>
</table>

#### Junior

<table>
<thead>
<tr>
<th>Course</th>
<th>F</th>
<th>W</th>
<th>S</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bot 307 Economic Botany</td>
<td></td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Bot 322 Plant Physiology</td>
<td></td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>Bot 333 Morphology of Non-vascular Plants</td>
<td></td>
<td>4</td>
<td></td>
</tr>
</tbody>
</table>

* To be selected from General Education list.
### MICROBIOLOGY OPTION (ADD COURSES BELOW TO BASIC CURRICULUM)

<table>
<thead>
<tr>
<th>Sophomore</th>
<th>Senior</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bio 225 Microtechnique (3)</td>
<td>Bact 423 Pathogenic Bacteriology (4)</td>
</tr>
<tr>
<td>Junior</td>
<td>Bact 426 Mycology (4)</td>
</tr>
<tr>
<td>Bact 322 Dairy Bacteriology (4)</td>
<td>Bact 431 General Virology (3)</td>
</tr>
<tr>
<td>Bact 332 Soil Microbiology (4)</td>
<td>Bact 432 Advanced Microbiology (3)</td>
</tr>
<tr>
<td>Bact 333 Sanitary and Industrial Bacteriology (3)</td>
<td>Bact 433 Serology (3)</td>
</tr>
<tr>
<td></td>
<td>Bact 443 Immunology (3)</td>
</tr>
</tbody>
</table>

### ZOOLOGY OPTION (ADD COURSES BELOW TO BASIC CURRICULUM)

<table>
<thead>
<tr>
<th>Sophomore</th>
<th>Senior</th>
</tr>
</thead>
<tbody>
<tr>
<td>Zoo 224 Animal Physiology (4)</td>
<td>Zoo 329 Ornithology (3)</td>
</tr>
<tr>
<td>Junior</td>
<td>Zoo 341 Mammalogy (3)</td>
</tr>
<tr>
<td>Zoo 236 Invertebrate Zoology (4)</td>
<td>Zoo 422 Histology (4)</td>
</tr>
<tr>
<td>Zoo 323 Embryology (4)</td>
<td>Zoo 425 Parasitology (4)</td>
</tr>
<tr>
<td>Zoo 326 Comparative Anatomy of Vertebrates (4)</td>
<td>Zoo 429 Herpetology (3)</td>
</tr>
<tr>
<td></td>
<td>Zoo 435 Arthropod Vectors (3)</td>
</tr>
</tbody>
</table>

### DESCRIPTIONS OF COURSES IN BACTERIOLOGY

**Bact 221 General Bacteriology (4)**

Morphology, classification, physiology, and cultivation of bacteria; relation of bacteria to health of man, animals, and plants. 2 lectures, 2 laboratories. Prerequisite: Bio 145; Chem 321 or 324

* **Bact 322 Dairy Bacteriology (4)**

Microorganisms involved in dairy products, milk, milk powders, butter, cheese, ice cream and casein adhesives. 2 lectures, 2 laboratories. Prerequisite: Bact 221

**Bact 332 Soil Microbiology (4)**

Methods of studying soil microflora-plant rhizosphere relationships; methods of sampling and isolating microorganisms from soil; assay of antibiotics from antagonistic soil microorganisms. 2 lectures, 2 laboratories. Prerequisite: Bact 221, Chem 326

**Bact 333 Sanitary and Industrial Bacteriology (3)**

Sanitary and industrial application of microbiology stressing food, dairy, water, air, and sewage; practical aspects of environmental sanitation emphasized. 2 lectures, 1 laboratory. Prerequisite: Bact 221

**Bact 423 Pathogenic Bacteriology (4)**

Characteristics of disease-producing bacteria, their means of transmission, disease development, and laboratory methods of diagnosis. 2 lectures, 2 laboratories. Prerequisite: Bact 221

* **Bact 424 Food Microbiology (4)**

The microbiology of food stuffs as related to storage, transit, and animal and human nutrition. 2 lectures, 2 laboratories. Prerequisite: Bact 221

**Bact 431 General Virology (3)**

Chemical composition and physical structure of viruses; their mechanism of reproduction; relationship to man, animals and plants. Introduction to diagnostic techniques used in the isolation and identification of viruses. 2 lectures, 1 laboratory. Prerequisite: Bact 221 and Chem 326

**Bact 432 Advanced Microbiology (3)**

Physiological characteristics of micro-organisms with emphasis upon morphology, growth, nutrition and metabolism of the cell. 2 lectures, 1 laboratory. Prerequisite: Bact 221 and Chem 326

* Offered in odd-numbered years only.
### California State Polytechnic College

**Bact 433 Serology (3)**
Theory and practice of serological methods involving antigen-antibody reactions. 2 lectures, 1 laboratory. Prerequisite: Bact 221

**Bact 443 Immunology (3)**
Principles of immunology involving a study of the mechanisms of resistance to infection and the procedures involved in evaluating the immune response. 2 lectures, 1 laboratory. Prerequisite: Bact 221

### Descriptions of Courses in Biology

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Course Type</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bio 110</td>
<td>Applied Biology</td>
<td>(3)</td>
<td>Biology of man with application to engineering and industry. 3 lectures.</td>
</tr>
<tr>
<td>Bio 115</td>
<td>Basic Biology</td>
<td>(3)</td>
<td>Introduction to living things; basic structure and function of plants and animals and their relationship to the physical world. 3 lectures.</td>
</tr>
<tr>
<td>Bio 145</td>
<td>Basic Biology Laboratory</td>
<td>(2)</td>
<td>Laboratory techniques in the study of cells, plant and animal structure and functions. 2 laboratories. Prerequisite: To be taken concurrently with or after Bio 115.</td>
</tr>
<tr>
<td>Bio 200</td>
<td>History of Biology</td>
<td>(3)</td>
<td>Chronological resume of events, inventions, discoveries, and workers contributing to growth of biological sciences. Less emphasis on purely medical events than those of general biological importance. 3 lectures.</td>
</tr>
<tr>
<td><strong>Bio 201</strong></td>
<td>Conservation of Natural Resources</td>
<td>(3)</td>
<td>Fundamental concepts, practices, local and national laws concerning conservation of natural resources of the United States with emphasis on California and the western states. 3 lectures. Prerequisite: Consent of instructor.</td>
</tr>
<tr>
<td>Bio 213</td>
<td>Principles of Evolution</td>
<td>(3)</td>
<td>Introduction to plant and animal evolution. 3 lectures. Prerequisite: Bio 145</td>
</tr>
<tr>
<td>Bio 225</td>
<td>Microtechnique</td>
<td>(3)</td>
<td>Methods of preparing plant and animal tissues for microscopic study. 1 lecture, 2 laboratories. Prerequisite: Bio 145</td>
</tr>
<tr>
<td>Bio 228</td>
<td>Natural Sciences</td>
<td>(4)</td>
<td>Basic principles of ecology and natural history with emphasis on classification and identification of major plant groups; study of natural communities with emphasis on interrelations between organisms and their environment; study of relationships within and among biological communities. 2 lectures, 2 laboratories. Prerequisite: Bio 227</td>
</tr>
<tr>
<td>Bio 229</td>
<td>Natural Sciences</td>
<td>(4)</td>
<td>Natural History of California; field examination of representative natural communities, with detailed study of plants and animals associated with each; emphasis on identification of plants, animals and environmental factors. 2 lectures, 2 laboratories. Prerequisite: Bio 228</td>
</tr>
<tr>
<td>Bio 303</td>
<td>Genetics</td>
<td>(3)</td>
<td>Principles of heredity and variation. 3 lectures. Prerequisite: Bio 115</td>
</tr>
<tr>
<td>Bio 325</td>
<td>Principles of Ecology</td>
<td>(3)</td>
<td>Response of plants and animals to their environment. 2 lectures, 1 laboratory. Prerequisite: Bot 124 or Zoo 134</td>
</tr>
</tbody>
</table>

* Offered in odd-numbered years only.
** Offered in even-numbered years only.
Arts and Sciences Division

* Bio 332 Fresh Water Biology (4)
Ecology, taxonomy, morphology and natural history of major plant and animal groups in various fresh water habitats, and their relationship to fisheries, wildlife management, water sanitation, and conservation. 2 lectures, 2 laboratories. Prerequisite: Bot 125, Zoo 134, 135

Bio 341 Biotechniques (2)
Botanical techniques; collecting, preservation, preparation of botanical specimens. 2 laboratories. Prerequisite: Bot 124

Bio 342 Biotechniques (2)
Zoological techniques; collecting, preservation, preparation of zoological specimens. 2 laboratories. Prerequisite: Zoo 134

Bio 352 Genetics Laboratory (2)
Laboratory techniques in genetics. 2 laboratories. Taken concurrently with or after Bio 303

Bio 400 Special Problems for Advanced Undergraduates (1-2)
Individual or group investigation, research, studies, or surveys of selected problems. Total credit limited to 4 units, with a maximum of 2 units per quarter. Prerequisite: Senior standing or consent of instructor.

* Bio 421 Advanced Genetics (3)
Continuation of studies in genetics with emphasis at the biochemical level. Further work on mutations, chromosomal aberrations, radiation effects and their use in plant and animal studies. 3 lectures. Prerequisite: Bio 303

Bio 423 General Cytology (4)
Detailed study of plant and animal cells, structurally and functionally. 2 lectures, 2 laboratories. Prerequisite: Bot 124, Zoo 134

Bio 431 Radiation Biology (4)
Introduction to radioisotope techniques, radiometric analyses, radiation safety and health physics as applied to life sciences and public health. 2 lectures, 2 laboratories. Prerequisite: Bio 145, Chem 321

* Bio 432 Isotope Tracers (3)
Use of radio isotopes with special emphasis on agricultural applications. Plant and soil science techniques and methods utilizing radiometric analyses. 1 lecture, 2 laboratories. Prerequisite: Bio 431, or Chem 334

Bio 435 Cellular Physiology (4)
Physical mechanisms at the cellular level. 2 lectures, 2 laboratories. Prerequisite: Chem 328

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

Bio 463 Undergraduate Seminar (2)
Study and discussion of recent developments in the field of biology. 2 meetings. Prerequisite: Bio 462

Bio 521 Curriculum and Methods in the Biological Sciences (3)
Curricula, methods, devices, and procedures that may be used effectively in organizing and conducting high school biology courses. 2 lectures, 1 laboratory. Prerequisite: Graduate standing and admission to teacher preparation program.

* Offered in odd-numbered years only.
Bio 590 Seminar in Biology (1-2)

Arrangements to be made with faculty. Topics in disciplines of biology offered according to interests and needs of students. Each seminar to have a sub-title identifying the discipline. 1-3 units in one quarter, maximum of 9 units. Prerequisite: Graduate standing.

DESCRIPTIONS OF COURSES IN BOTANY

Bot 116 Basic Concepts of Taxonomy (1)
Gross morphology and taxonomy of flowering plants as applied to the study of plant materials. 1 laboratory.

Bot 120 Agricultural Botany (4)
Principles of structure, function, and classification of seed plants and fungi with special application to agriculture. 3 lectures, 1 laboratory. Prerequisite: Bio 145

Bot 124 General Botany (5)
Structure and function of plants. 3 lectures, 2 laboratories. Prerequisite: Bio 145

Bot 125 General Botany (5)
Comparative morphology and phylogenetic relationships of plant groups from bacteria to angiosperms. 3 lectures, 2 laboratories. Prerequisite: Bio 145

** Bot 236 Families of Flowering Plants (3)
Recognition of the major orders and families of flowering plants. 1 lecture, 2 laboratories. Prerequisite: Bio 145 or Bot 116

** Bot 249 Taxonomy of Grasses (2)
Structure and variation in grasses. Use of a key in identification. Recognition of tribes of the grass family. Use of vegetative characters in identification of common hay and pasture grasses. 2 laboratories. Prerequisite: Bio 145

* Bot 307 Economic Botany (3)
Sources and uses of plant products utilized by man. 3 lectures. Prerequisite: Bio 145

Bot 322 Plant Physiology (4)
Functions of plants; water relations, metabolism and plant growth. 2 lectures, 2 laboratories. Prerequisite: Bot 120 or 124

Bot 333 Morphology of Non-vascular Plants (4)
Comparative structure, life history and relationships of algae, mosses, liverworts and lichens. 2 lectures, 2 laboratories. Prerequisite: Bot 125

* Bot 334 Morphology of Vascular Plants (4)
Evolution of the plant kingdom as illustrated by comparative morphology of major plant groups. 2 lectures, 2 laboratories. Prerequisite: Bot 125

** Bot 335 Plant Anatomy (4)
Microscopic study of representative common plants dealing with origin, development, and structure of cells, tissues and tissue systems in roots, stems, and leaves. 2 lectures, 2 laboratories. Prerequisite: Bot 124

Bot 343 Taxonomy of Higher Plants (3)
General principles of classification of plants; procedures for identification of unknown plants; preparation and use of specimens. 1 lecture, 2 laboratories. Prerequisite: Bot 116, 120; Bot 124 or 125

* Bot 422 Advanced Plant Physiology (4)
Selected major aspects of plant water relations, metabolism and growth treated in depth. Emphasis on experimental investigations. Student initiative in experimental and library research will be encouraged. 2 lectures, 2 laboratories. Prerequisite: Bot 322

* Offered in odd-numbered years only.
** Offered in even-numbered years only.
Bot 423 Mineral Nutrition of Plants (3)
Present day concepts of inorganic nutrition in plants, effects of hydrogen ion, deficiency and excess diseases, nitrogen metabolism, photosynthesis; relationship of plant nutrition to animal nutrition. 3 lectures. Prerequisite: Bot 322

Bot 426 Mycology (4)
Morphological, cultural, and pathological characteristics of fungi. 2 lectures, 2 laboratories. Prerequisite: Bot 122 or consent of instructor.

* Bot 427 Medical Mycology (4)
Characteristics, habits and laboratory identification of fungi inciting human and animal diseases. 2 lectures, 2 laboratories. Prerequisite: Bact 221

DESCRIPTIONS OF COURSES IN ENTOMOLOGY

Ent 126 General Entomology (4)
Basic principles of insect classification, with a survey of the orders and important families. Structure, development, and behavior of insects. General principles of control. 2 lectures, 2 laboratories.

** Ent 331 Insect Taxonomy (3)
Classification of insects; taxonomic categories and procedures; nomenclature and literature. 1 lecture, 2 laboratories. Prerequisite: Ent 126

* Ent 334 Morphology of Immature Insects (3)
Classification of immature insects; taxonomic categories; methods of preparation for preservation and study. 1 lecture, 2 laboratories. Prerequisite: Ent 126

Ent 423 Structure and Function in Insects (4)
Comparative anatomy and physiology of insects. 2 lectures, 2 laboratories. Prerequisite: Ent 126

* Ent 431 Insect Pathology (3)
Infectious and non-infectious diseases of insects involving the principles of insect microbiology and pathology. 2 lectures, 1 laboratory. Prerequisite: Ent 126, Bact 221

DESCRIPTIONS OF COURSES IN PLANT PATHOLOGY

Path 223 General Plant Pathology (4)
Principles of the nature and control of plant diseases caused by bacteria, fungi, nematodes, viruses, and physiological factors. 2 lectures, 2 laboratories. Prerequisite: Bot 120 or 125

Path 324 Advanced Plant Pathology (4)
Methods and materials used in the diagnosis of plant diseases; special reference to techniques for differentiation of plant disease problems. 2 lectures, 2 laboratories. Prerequisite: Path 223

* Path 335 Fungi Attacking Wood Products (3)
Recognition and identification of fungi found in timber products. Types of damage, means of prevention, and control measures. 2 lectures, 1 laboratory.

** Path 423 Plant Nematology (3)
Classification of nematodes associated with economic plants; basic morphology, biology and control of important plant nematodes. 2 lectures, 1 laboratory. Prerequisite: Path 223, Zoo 135

DESCRIPTIONS OF COURSES IN ZOOLOGY

Zoo 134 General Zoology (4)
Structure and function of vertebrate organ systems, with emphasis on man and domestic animals; study of interrelationships within the Phylum Chordata. 2 lectures, 2 laboratories. Prerequisite: Bio 145

* Offered in odd-numbered years only.
** Offered in even-numbered years only.
Zoo 135 General Zoology (4)
Invertebrate animals from Protozoa to Chordates. Study of the variety and distribution of invertebrate life, with emphasis on those forms of economic and medical importance. 2 lectures, 2 laboratories. Prerequisite: Bio 145

Zoo 234, 235 Human Anatomy and Physiology (4) (4)
Structure and function of organ systems of man. Planned for Physical Education and non-biological science majors. 3 lectures, 1 laboratory. Prerequisite: Bio 145

Zoo 236 Invertebrate Zoology (4)
A systematic and comparative survey of all invertebrate groups, including the minor phyla, with emphasis on morphology and phylogeny. (Insects and parasites are omitted.) 2 lectures, 2 laboratories and field work.

** Zoo 323 Embryology (4)
Embryonic development of the vertebrate body. 2 lectures, 2 laboratories. Prerequisite: Zoo 134

Zoo 324 Animal Physiology (4)
Introduction to functions of vertebrate and invertebrate organ systems. 2 lectures, 2 laboratories. Prerequisite: Zoo 134, 135

Zoo 326 Comparative Anatomy of Vertebrates (4)
Comparative structure of vertebrate organ systems. 2 lectures, 2 laboratories. Prerequisite: Zoo 134

Zoo 329 Ornithology (3)
Identification, structure, physiology, ecology, behavior and economic importance of birds, especially of Pacific Coast region. 2 lectures, 1 laboratory or field exercises and field project. Prerequisite: Zoo 134

Zoo 341 Mammalogy (3)
Morphology, classification, distribution, ecology, behavior and economic importance of mammals; identification, life histories, and field study of local species. 2 lectures, 1 laboratory. Prerequisite: Zoo 134 or equivalent.

** Zoo 417 Helminthology (3)
An intensified study of helminths living in and on other organisms. Their life cycles, natural history, physiology and anatomy, taxonomy and latest methods of control of harmful species. 2 lectures, 1 laboratory. Prerequisite: Zoo 135

Zoo 422 Histology (4)
Microscopic study of vertebrate tissues: organology and correlation of form with function. 2 lectures, 2 laboratories. Prerequisite: Zoo 134

Zoo 425 Parasitology (4)
Study of the protozoan and helminth parasites of man and lower animals. Life histories, control, epidemiology and economic importance. 2 lectures, 2 laboratories. Prerequisite: Zoo 135

Zoo 429 Herpetology (3)
Morphology, classification, distribution, ecology, behavior and economic importance of amphibians and reptiles; identification, life histories, and field study of local species. 2 lectures, 1 laboratory. Prerequisite: Zoo 134 or equivalent.

** Zoo 435 Arthropod Vectors (3)
Role of insects, mites, ticks and other arthropods in causation and transmission of human diseases. Classification, structure, and life histories of arthropods and parasites. 2 lectures, 1 laboratory. Prerequisite: Ent 126 or Zoo 425

** Offered in even-numbered years only.
The Business Management program prepares students for employment in the administrative and technical functions of both small and large business. The curriculum provides opportunities for employment in the business community. Specialized course work is designed to shorten the essential period of apprenticeship all executives must serve. Correlated theory and practice are provided early in the program so that the student will know both the why and how of business operation.

The course offerings of this department enable the graduate to understand the basic principles of business and realize the close relationship among the various aspects of the business world. Students are prepared for a wide range of positions in industry, commerce, finance, insurance, real estate, secondary education, data processing, and public service; e.g., proprietor-manager, management trainee, executive trainee, department head in a large business, purchasing agent, department store buyer, credit manager, office manager, contract administrator, bank manager, real estate manager, records supervisor, systems analyst, programmer, business teacher in secondary schools, and executive secretary. In addition to a wide offering of courses in business the student selects courses from the general education list to help him better understand his relationships in society and his responsibilities as a citizen in a community.

The student will select an option in Industrial Management; Data Processing; or Office management; or the concentration in Finance, Real Estate, and Insurance to complete the curriculum.

CURRICULAR OPTIONS AND CONCENTRATIONS

Industrial Management

The student takes courses providing him background in industrial operations and techniques to equip him for management occupations in industry.

Data Processing

The option in Data Processing provides entry employment opportunities in this significant aspect of modern business activity.

Office Management

This option provides skills and background needed by the executive office manager. By choice of additional courses the student may be prepared to seek qualification as a Certified Professional Secretary. By proper selection of electives, this option provides preparation for secondary teaching upon completion of a fifth year.

Finance, Real Estate and Insurance

The courses in this concentration prepare the student for employment in this growing occupational area. Elective courses may be used to enhance any of the three sub-areas.
## CURRICULUM IN BUSINESS MANAGEMENT

### Freshman

<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)</td>
<td>3</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Business Communication (Eng 218)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Principles of Accounting (Acc 121, 122, 123)</td>
<td>3</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>Physical Education (PE 141)</td>
<td>1/2</td>
<td>1/2</td>
<td></td>
</tr>
<tr>
<td>Introduction to Business (Bus 102)</td>
<td>3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Office Management (Bus 127)</td>
<td>4</td>
<td></td>
<td></td>
</tr>
<tr>
<td>* Mathematics (Math 101, 106)</td>
<td>3</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Principles of Economics (Ec 201, 202, 203)</td>
<td>3</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>Health Education (PE 107)</td>
<td>2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>† Electives and courses to complete major</td>
<td>4</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>** Total</td>
<td>16 1/2</td>
<td>16 1/2</td>
<td>16 1/2</td>
</tr>
</tbody>
</table>

### Sophomore

<table>
<thead>
<tr>
<th>Course</th>
<th>F</th>
<th>W</th>
<th>S</th>
</tr>
</thead>
<tbody>
<tr>
<td>American Civilization (Am Civ 301, 302, 303)</td>
<td>3</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>Physical Education (PE 141)</td>
<td>1/2</td>
<td>1/2</td>
<td>1/2</td>
</tr>
<tr>
<td>Business Law (Bus 301, 302)</td>
<td>3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Marketing Principles (Mktg 201, 202)</td>
<td>3</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Introduction to Data Processing (DP 211)</td>
<td>3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Public Speaking (Sp 200)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>General Psychology (Psy 202)</td>
<td>3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>** Natural Sciences</td>
<td>4</td>
<td>4</td>
<td>4</td>
</tr>
<tr>
<td>† Electives and courses to complete major</td>
<td>3</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>** Total</td>
<td>16 1/2</td>
<td>16 1/2</td>
<td>16 1/2</td>
</tr>
</tbody>
</table>

### Junior

<table>
<thead>
<tr>
<th>Course</th>
<th>F</th>
<th>W</th>
<th>S</th>
</tr>
</thead>
<tbody>
<tr>
<td>Management Principles (Bus 304)</td>
<td>3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Management Processes (Bus 305)</td>
<td>3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Managerial Accounting (Bus 306)</td>
<td>3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Business Forecasting (Bus 311, 312)</td>
<td>3</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Industrial Supervision (Bus 313)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Business Finance (Fin 314)</td>
<td>3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Corporation Finance (Fin 315)</td>
<td>3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Human Relations (Psy 314)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>** Natural Sciences</td>
<td>3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>† Electives and courses to complete major</td>
<td>8</td>
<td>5</td>
<td>8</td>
</tr>
<tr>
<td>** Total</td>
<td>17</td>
<td>17</td>
<td>17</td>
</tr>
</tbody>
</table>

### Senior

<table>
<thead>
<tr>
<th>Course</th>
<th>F</th>
<th>W</th>
<th>S</th>
</tr>
</thead>
<tbody>
<tr>
<td>Senior Project (Bus 461, 462)</td>
<td>2</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>Undergraduate Seminar (Bus 463)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Business Policies (Bus 401)</td>
<td>3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>** Literature</td>
<td>3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>** Literature, Philosophy, Fine or Practical Arts</td>
<td>3</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>† Electives and courses to complete major</td>
<td>8</td>
<td>11</td>
<td>11</td>
</tr>
<tr>
<td>** Total</td>
<td>16</td>
<td>16</td>
<td>16</td>
</tr>
</tbody>
</table>

---

* Math 117 may be substituted for Math 101.  
** To be selected from the General Education list.  
† Unless already acceptable typists, majors will be required to take Bus 141 and/or Bus 142 during their freshman year.  
‡ Students concentrating in Finance, Real Estate and Insurance will select at least 29 units with the approval of the adviser.
## Arts and Sciences Division

### INDUSTRIAL MANAGEMENT OPTION (ADD COURSES BELOW TO BASIC CURRICULUM)

<table>
<thead>
<tr>
<th>Freshman</th>
<th>Junior</th>
</tr>
</thead>
<tbody>
<tr>
<td>IE 111 Industrial Engineering (3)</td>
<td>DP 222 Systems Analysis (3)</td>
</tr>
<tr>
<td>IE 122 Motion Study (3)</td>
<td>Acc 221 Job and Process Cost Accounting, or</td>
</tr>
<tr>
<td>IE 123 Time Study (3)</td>
<td>Ec 302 Business &amp; Government (3)</td>
</tr>
<tr>
<td>IE 236 Production Planning and Control (4)</td>
<td>Mktg 302 Industrial Marketing (3)</td>
</tr>
</tbody>
</table>

**Sophomore**

<table>
<thead>
<tr>
<th>Junior</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mktg 304 Traffic Management (3)</td>
</tr>
<tr>
<td>Bus 315 Quantitative Analysis (3)</td>
</tr>
<tr>
<td>ABM 402 Personnel Management (3)</td>
</tr>
</tbody>
</table>

### DATA PROCESSING OPTION (ADD COURSES BELOW TO BASIC CURRICULUM)

<table>
<thead>
<tr>
<th>Freshman</th>
<th>Junior</th>
</tr>
</thead>
<tbody>
<tr>
<td>Phil 202 Logic (3)</td>
<td>DP 311 Computer Programming for Business (3)</td>
</tr>
<tr>
<td>Phil 105 Symbolic Logic and Set Theory (3)</td>
<td>DP 313 Critical Path Scheduling Methods (3)</td>
</tr>
</tbody>
</table>

**Sophomore**

<table>
<thead>
<tr>
<th>Junior</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bus 315 Quantitative Analysis (3)</td>
</tr>
</tbody>
</table>

### OFFICE MANAGEMENT OPTION (ADD COURSES BELOW TO BASIC CURRICULUM)

<table>
<thead>
<tr>
<th>Freshman</th>
<th>Junior</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bus 141-2 Typewriting (2)</td>
<td>Acc 226 Budgeting Principles (3)</td>
</tr>
<tr>
<td>Bus 151 Business Computations (1)</td>
<td>Fin 301 Credit Management (3)</td>
</tr>
<tr>
<td>Eng 216 Report Writing (3)</td>
<td>Fin 303 Insurance (3)</td>
</tr>
<tr>
<td>Acc 221 Job and Process Cost Accounting (3)</td>
<td>Mktg 303 Retail Store Management (3)</td>
</tr>
</tbody>
</table>

**Sophomore**

<table>
<thead>
<tr>
<th>Senior</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fin 404 Investments (3)</td>
</tr>
<tr>
<td>ABM 402 Personnel Management (3)</td>
</tr>
</tbody>
</table>

### DESCRIPTIONS OF COURSES IN BUSINESS MANAGEMENT

**Bus 102 Introduction to Business (3)**

Survey of the American business system in its economic and social environment, including the basic forms of business enterprises and familiarization with the college's programs for opportunities therein. 3 lectures.

**Bus 127 Office Management (4)**

Basic office procedures and practices. Knowledge and techniques necessary to work in or manage a business office. Use of the latest types of mechanical equipment found in the business office. 3 lectures, 1 two-hour activity period.

**Bus 141, 142, 143 Typewriting (1) (1) (1)**

Fundamentals of the touch system. Training in preparing business forms and business letters. 2 one-hour activity periods.

**Bus 151 Business Computations (1)**

Experience in the use and selection of adding and listing machines and rotary and printing calculators. Application of this experience to problems in interest, depreciation, sinking funds, annuities. 2 one-hour activity periods.
Bus 244, 245, 246 Shorthand (2) (2) (2)

The most effective techniques for recording and transcribing personal dictation. 4 hours activity. Prerequisite: Bus 245, Bus 244 or 60 wpm; Bus 246, Bus 245 or 80 wpm.

Bus 301 Business Law (3)

The nature and sources of law. The law of contracts, including offer and acceptance, consideration, competent parties, illegality, fraud, mistake and duress, and performance and discharge. The law of sales including transfer of property between buyer and seller, warranties, remedies. Emphasis on California law. Casebook method. 3 lectures. Prerequisite: Junior standing or consent of instructor.

Bus 302 Business Law (3)

Law of negotiable instruments, partnerships, and corporations. Emphasis on California law. Casebook method. 3 lectures. Prerequisite: Bus 301 and Acc 122

Bus 304 Management Principles (3)

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

Bus 305 Management Processes (3)

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

Bus 306 Managerial Accounting (3)

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

Bus 308 Problems of Small Business (3)


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

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

Bus 313 Industrial Supervision (3)

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

Bus 315 Quantitative Analysis in Business (3)

Identification and solution of business problems by quantitative methods and techniques. Introduction to quantitative tools of analysis and construction of quantitative models useful in business decision making. Application of electronic computers. 3 lectures. Prerequisite: DP 211, Bus 312

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

Individual activities similar to those of an actual office. Practical application of the secretarial skills, including use of typewriter, adding machines or calculators, filing, duplicating machines, shorthand, machine dictation, shorthand transcription and machine transcription. 2 lectures and 2 laboratories. Prerequisite: Junior standing or consent of instructor.
Bus 400 Special Problems for Advanced Undergraduates (1-2)
Individual or group investigation, research, studies, or surveys of selected problems. Total credit limited to 4 units, with a maximum of 2 units per quarter. Prerequisite: Senior standing or consent of instructor.

Bus 401 Business Policies and Management (3)
A case study approach to current administrative and management problems and policies. All phases of business—marketing, sales, finance, personnel organization, procurement, facilities and budgetary control are involved. 3 lectures. Prerequisite: Senior standing.

Bus 402 Inventory Control (2)
Management problems of production, maintaining proper control records, financing, and materials handling and storage. Analysis and discussion of typical situation-problems. 2 lectures.

Bus 441, 442 Internship in Business Management (2) (2)
On-the-job training with a business in some phase of business management. The experience must be new to the student so that learning takes place. Analytical reports of work accomplished by each student are made periodically to the faculty coordinator. Prerequisite: Permission of the instructor.

Bus 461, 462 Senior Project (2) (2)
Selection and completion of a project under a minimum of supervision. Projects typical of problems which graduates must solve in their fields of employment. Formal report is required. Prerequisite: Senior standing. Required minimum of 120 hours.

Bus 463 Undergraduate Seminar (2)
Study and discussion by students of recent developments in the student's major fields. 2 lectures. Prerequisite: Senior standing or special permission.

Bus 521 Curriculum and Methods in Secondary Business Subjects (3)
Objectives, organization, and content of business curriculum in secondary schools. Methods of teaching, materials, and evaluation of procedures. 3 lectures. Prerequisite: Admission to teacher education program and graduate standing.

Bus 590 Seminar in Business Education (3)
Identification and analysis of problems in the organization, administration, and teaching of business subjects in secondary schools. Current trends. Directed research. 3 lectures. Prerequisite: Bus 521. May be repeated for maximum credit of 6 units.

DESCRIPTIONS OF COURSES IN DATA PROCESSING

DP 211 Introduction to Data Processing (3)
The functions and application of data processing equipment in modern business. Understanding punched card machines and computers as management tools for high speed processing of accounting, marketing, and other information. Analysis and discussion of typical situation-problems. 3 lectures.

DP 222 Systems Analysis (3)
Initiating, planning, executing, and implementing systems improvements in business. Analysis of business systems from a “total systems” concept using techniques such as flow charting, procedural analysis, and simplification studies. Analysis and discussion of typical situation-problems. 3 lectures. Prerequisite: DP 211

DP 223 Electronic Data Processing Systems (3)
Study of applications of computers to complex systems and large clerical operations. Equipment evaluation, feasibility studies, and conversion problems. 3 lectures. Prerequisite: DP 222
**DP 311 Computer Programming for Business (3)**
Applications of the IBM 1620 to business data processing problems. Use of SPS (Symbolic Programming System) as a business oriented programming language. Block diagramming and programming representative business problems for solution on a 1620 computer. 3 lectures. Prerequisite: DP 211

**DP 313 Critical Path Scheduling Methods (3)**
Representation of inter-related activities as a network of events. Network construction, analysis, and maintenance. Use of the computer to determine the critical path and provide management reports. Latest CPM techniques as evolved from PERT and PERT-COST. 3 lectures. Prerequisite: DP 223, 311

**DESCRIPTIONS OF COURSES IN FINANCE, REAL ESTATE, AND INSURANCE**

**Fin 301 Credit Management (3)**
Problems of the credit manager in reducing credit risks, determining sources of credit information, application of credit terms, laws relating to credit instruments, and collection problems. Analysis and discussion of typical situation-problems. 3 lectures. Prerequisite: Acc 123

**Fin 302 Real Estate (3)**

**Fin 303 Insurance Principles (3)**
Principles of insurance as they affect the conduct of a business. Coverage of risks on materials and merchandise, transportation and business interruption. Analysis and discussion of typical situation-problems. 3 lectures.

**Fin 314 Business Finance (3)**
Monetary and banking principles as they apply to the problems of financing business, including promotion, types of organization, long and short-term capital, dividends, involvements, and expansion. Analysis and discussion of typical situation-problems. 3 lectures. Prerequisite: Acc 123

**Fin 315 Corporation Finance (3)**
Principles of determining most desirable channels for the management and investment of business funds. Analysis and evaluation of corporate securities and their price fluctuation. 3 lectures. Prerequisite: Fin 314 or consent of instructor.

**Fin 404 Investments (3)**
Mechanics of investment in insurance, real estate, industrials, railroad, public utilities, and financial institutions. Selection methods, fundamentals, and principles of investment analysis illustrated by case work. 3 lectures. Prerequisite: Fin 315

**Fin 405 Security Analysis (3)**
Analysis and evaluation of corporate securities and their price fluctuation. 3 lectures. Prerequisite: Fin 404

**Fin 406 Law of Trusts and Estates (3)**
Legal problems concerning the disposal of estates of deceased persons by will and under statutes of descent and distribution, probating estates of deceased persons, creation of trusts, both inter vivos and testamentary, duties and liabilities of trustees, rights of beneficiaries of trust. 3 lectures. Prerequisite: Bus 302
Fin 407 Real Estate Law (3)
Rights and liabilities surrounding the acquisition, possession and transfer of real property. Definition and description of land including easements, deeds, recording, covenants in deeds, zoning ordinances, contracts for sales of land, evidence of title, escrow transactions, mortgages, foreclosure and redemption, liens, community property, descent, landlord and tenant. Emphasis on California law. 3 lectures. Pre-requisite: Fin 302

Fin 409 Property and Liability Insurance (3)
Personal and business applications of the various types of property and liability insurance. Emphasis on surveying procedures and integrated insurance planning. Analysis and discussion of typical situation-problems. 3 lectures. Prerequisite: Fin 303

Fin 410 Real Estate Finance (3)
Techniques of mortgaging, the nature of mortgage and equity capital. Primary and secondary financing, financing long-term leases, monetary policy affecting real estate transactions, appraising for mortgage lending. Procedures in financing real estate sales and exchanges developed by discussion and case studies. 3 lectures. Prerequisite: Fin 407

Fin 413 Life Insurance (3)
Personal and business applications of the various types of life insurance. Emphasis on estate and family planning. Provides background for CLU examinations. Analysis and discussion of typical situation-problems. 3 lectures. Prerequisite: Fin 303

Fin 415 Risk Management (3)
Methods of handling risk and uncertainty as applied to the business organization. Assumption of risk, transfer of risk, self insurance, control of hazards, perils, and loss protection and prevention. Emphasis on tools and analysis of risk management using current problems and cases. 3 lectures. Prerequisite: Fin 303, 409

Fin 416 Comparative Financial Institutions (3)
A study of financial institutions as sources of funds; corporate supervision of funds; growth and development of insurance companies; consumer credit institutions, mortgage companies, inventory financing institutions. Analysis and discussion of typical situation-problems. 3 lectures. Prerequisite: Ec 308
The Economics Department serves students in the Agriculture, Engineering, and Arts and Sciences Divisions by providing courses that contribute to the general education of all students, develop vocational proficiencies, and meet the needs of economics majors.

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

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

The major in economics has the following objectives: First, to prepare economic analysts for positions in business, industry, agriculture, and in the various levels of government; second, to prepare students for research or management trainee positions in various fields, such as public administration, labor unions, industry, finance, insurance; third, while not primarily designed as such, it will furnish undergraduate preparation for those students who may wish to pursue graduate work in the field of economics.

**CURRICULUM IN ECONOMICS**

**Freshman**

<table>
<thead>
<tr>
<th>Course</th>
<th>F</th>
<th>W</th>
<th>S</th>
</tr>
</thead>
<tbody>
<tr>
<td>Principles of Economics (Ec 201, 202, 203)</td>
<td>3</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>Principles of Accounting (Acc 121, 122, 123)</td>
<td>3</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>Introduction to Mathematical Analysis (Math 110, 111)</td>
<td>3</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>Freshman Composition (Eng 104, 105, 106)</td>
<td>3</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>Natural Science</td>
<td>4</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>Health Education (PE 107)</td>
<td>2</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>Electives</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>16 ½</td>
<td>16 ½</td>
<td>17 ½</td>
</tr>
</tbody>
</table>

**Sophomore**

<table>
<thead>
<tr>
<th>Course</th>
<th>F</th>
<th>W</th>
<th>S</th>
</tr>
</thead>
<tbody>
<tr>
<td>Price and Income Analysis (Ec 251)</td>
<td>5</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Money and Banking (Ec 308)</td>
<td>3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Economics of Capital Markets (Ec 309)</td>
<td>3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Introduction to Mathematical Analysis (Math 204)</td>
<td>3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Automatic Programming for Digital Computers (Math 221)</td>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mathematical Statistics, I, II (Math 311, 322)</td>
<td>3</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Report Writing (Eng 216)</td>
<td>3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>General Psychology (Psy 202)</td>
<td>½</td>
<td>½</td>
<td>½</td>
</tr>
<tr>
<td>Physical Education (PE 141)</td>
<td>6</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>Electives</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>16 ½</td>
<td>16 ½</td>
<td>16 ½</td>
</tr>
</tbody>
</table>

* To be selected from General Education list.
<table>
<thead>
<tr>
<th>Course</th>
<th>Instructor</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>Quantitative Economic Methods (Ec 322)</td>
<td></td>
<td>5</td>
</tr>
<tr>
<td>Economic Programming (Ec 322)</td>
<td></td>
<td>5</td>
</tr>
<tr>
<td>Economic Conditions Analysis (Ec 323)</td>
<td></td>
<td>3</td>
</tr>
<tr>
<td>Public Finance (Ec 301)</td>
<td></td>
<td>4</td>
</tr>
<tr>
<td>Business and Government (Ec 302)</td>
<td></td>
<td>3</td>
</tr>
<tr>
<td>American Civilization (Am Civ 301, 302, 303)</td>
<td></td>
<td>3</td>
</tr>
<tr>
<td>Natural Science</td>
<td></td>
<td>4</td>
</tr>
<tr>
<td>Public Speaking (Sp 200)</td>
<td></td>
<td>3</td>
</tr>
<tr>
<td>Electives</td>
<td></td>
<td>5</td>
</tr>
</tbody>
</table>

**Junior Project (Ec 461, 462)**

<table>
<thead>
<tr>
<th>Course</th>
<th>Instructor</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>Economic Development (Ec 402)</td>
<td></td>
<td>3</td>
</tr>
<tr>
<td>Comparative Economic Systems (Ec 403)</td>
<td></td>
<td>3</td>
</tr>
<tr>
<td>Labor Economics (Ec 414)</td>
<td></td>
<td>3</td>
</tr>
<tr>
<td>Managerial Economics and Operations Analysis (Ec 413)</td>
<td></td>
<td>3</td>
</tr>
<tr>
<td>Senior Project (Ec 461, 462)</td>
<td></td>
<td>2</td>
</tr>
<tr>
<td>Undergraduate Seminar (Ec 463)</td>
<td></td>
<td>2</td>
</tr>
<tr>
<td>* Literature</td>
<td></td>
<td>3</td>
</tr>
<tr>
<td>* Literature, Philosophy, or Arts</td>
<td></td>
<td>3</td>
</tr>
<tr>
<td>Electives</td>
<td></td>
<td>5</td>
</tr>
</tbody>
</table>

**Senior Project (Ec 461, 462)**

<table>
<thead>
<tr>
<th>Course</th>
<th>Instructor</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>International Trade and Finance (Ec 401)</td>
<td></td>
<td>3</td>
</tr>
<tr>
<td>Economic Development (Ec 402)</td>
<td></td>
<td>3</td>
</tr>
<tr>
<td>Comparative Economic Systems (Ec 403)</td>
<td></td>
<td>3</td>
</tr>
<tr>
<td>Labor Economics (Ec 414)</td>
<td></td>
<td>3</td>
</tr>
<tr>
<td>Managerial Economics and Operations Analysis (Ec 413)</td>
<td></td>
<td>3</td>
</tr>
<tr>
<td>Senior Project (Ec 461, 462)</td>
<td></td>
<td>2</td>
</tr>
<tr>
<td>Undergraduate Seminar (Ec 463)</td>
<td></td>
<td>2</td>
</tr>
<tr>
<td>* Literature</td>
<td></td>
<td>3</td>
</tr>
<tr>
<td>* Literature, Philosophy, or Arts</td>
<td></td>
<td>3</td>
</tr>
<tr>
<td>Electives</td>
<td></td>
<td>5</td>
</tr>
</tbody>
</table>

**DESCRIPTIONS OF COURSES IN ECONOMICS**

**Ec 201, 202, 203 Principles of Economics (3) (3) (3)**

How the economic system works. The forces which determine the efficiency of the allocation, utilization, and distribution of resources. The determinants of national income, output, prices, and employment. Applications of economic analysis. International economic problems. 3 lectures.

**Ec 205 Consumer Economics (3)**

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

**Ec 213 Economic Problems (3)**

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

**Ec 231 Development of Economic Doctrine (3)**

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

**Ec 251 Price and Income Analysis (5)**

Role of prices in organizing economic activities. Forces determining the general level of employment and income. Analysis of the behavior of households, firms, and market prices under various competitive conditions. Distribution of national income. Utilization and growth of the economy. 5 lectures. Prerequisite: Ec 203

**Ec 301 Public Finance (4)**

Principles of government financing and its various economic and social effects; collecting, spending and administration of public funds, particularly at state and local levels. 4 lectures. Prerequisite: Ec 202

* To be selected from General Education list.
Ec 302 Business and Government (3)
Economic significance of controls placed by government upon business; divergent issues arising from present relations of government to business. 3 lectures. Prerequisite: Ec 202

Ec 303 American Industry (3)
Examination of number and size distribution of sellers in selected American industries. Conduct and performance of firms in the context of the industry structure. Examination of actual and optimal government policy in each industry. 3 lectures. Prerequisite: Ec 201

Ec 308 Money and Banking (3)
Relation of money and banking to the general economy; interrelationships between money and banking and production and distribution. 3 lectures. Prerequisite: Ec 202

Ec 309 Economics of Capital Markets (3)
Analysis of the economic foundations upon which money and capital market transactions are based. Institutional and economic factors influencing the prices, uses, and sources of the flow of funds in equity and debt markets. 3 lectures. Prerequisite: Ec 202, 308

Ec 319 Land Economics (3)
Economic principles underlying utilization and conservation of land and natural resources. Economics of urbanization; forces of demand for urban land; factors of supply; factors affecting the location of industries and other enterprises; city growth and structure. Problems of rural and urban land-use and development. 3 lectures.

Ec 321 Quantitative Economic Methods (5)
Introduction to quantitative model building, estimation, verification, and prediction of economic variables. 5 lectures. Prerequisite: Ec 251, Math 204 or equivalent.

Ec 322 Economic Programming (5)
Optimization analysis and programming techniques, including various methods of linear programming, integer programming, quadratic programming, and dynamic programming. 5 lectures. Prerequisite: Ec 202, Math 204 or equivalent, or permission of instructor.

Ec 323 Economic Conditions Analysis (3)
Techniques and procedures of statistical analysis of macroeconomic and microeconomic conditions. 3 lectures. Prerequisite: Ec 321 or equivalent.

Ec 400 Special Problems for Advanced Undergraduates (1-2)
Individual or group investigation, research, studies, or surveys of selected problems. Total credit limited to 4 units, with a maximum of 2 units per quarter. Prerequisite: Senior standing or consent of instructor.

Ec 401 International Trade and Finance (3)
Role and basis of trade between nations. Mechanism of international financial transactions. Barriers to trade between nations and methods of facilitating trade. The position of the United States in international economic matters. 3 lectures. Prerequisite: Ec 202

Ec 402 Economic Development (3)
Pre-conditions and processes of economic growth and development of nations. Analysis in terms of economic theory. History and experience of societies relevant to problems of today's developing nations. 3 lectures. Prerequisite: Ec 203 or 401, or permission of instructor.

Ec 403 Comparative Economic Systems (3)
Examination of alternative economic organizations, ranging from free enterprise to fully planned economies. 3 lectures. Prerequisite: Ec 202
Arts and Sciences Division

Ec 413  Managerial Economics  (3)
Use of economic analysis in formulating business policies; analysis of the social impact of management's role in the economy; integrated application of economic analysis and operations analysis to practical managerial problems. 3 lectures. Prerequisite: Ec 202

Ec 414  Labor Economics  (3)
Economic analysis of the facts and forces in wage determination. Economic importance of access to jobs, unemployment insurance, governmental policy, and union functions, such as health, housing and education. 3 lectures. Prerequisite: Ec 202

Ec 415  Labor Problems and Practices  (3)
Nature, instrumentalities and structure of collective bargaining emphasizing three critical areas: labor management laws, grievance and arbitration procedures, and trends in collective bargaining. 3 lectures. Prerequisite: Ec 414

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

Ec 463  Undergraduate Seminar  (2)
Intensive study of selected economic problems with the application of various techniques of analysis. Prerequisite: Completion of senior project or permission of instructor.

Ec 590  Seminar in Economics  (1-3)
Special problems in selected areas of economics. Each seminar will be structured to meet the needs of individual students. Prerequisite: Graduate standing.
Courses in English, speech, and journalism are designed to serve three purposes: (1) to help the student develop habits of sound thinking and logical organization of material; (2) to provide opportunities for the student to use language accurately, clearly, and interestingly in speaking and writing; and (3) to develop the techniques of reading to the point of understanding others' ideas and using those ideas effectively. The department aims to provide both major and service courses in the fields of English, speech, and journalism and to offer appropriate courses in these fields to meet the general-education needs of students in other majors.

The English 104–105 course sequence is required of all students except those who enter with credit in freshman composition. In addition, one of the following is required: English 106, 216, 218, 219 or Speech 200 or 300. Other courses are offered for department patterns and as electives.

A placement test is given to aid in the assignment of students to the appropriate level of training in language communications. Students who demonstrate considerable deficiency will be assigned to English 4, a preparatory course without credit toward a degree. A passing grade in this course entitles the student to advance to Freshman Composition.

The student majoring in Language Arts will elect an option in Journalism, Speech, or Literature-Language.

**CURRICULAR OPTIONS**

**Journalism**

The journalism option is designed to prepare students for secondary school teaching and for jobs in such journalistic enterprises as community newspapers and technical and house organs.

**Speech**

The speech option is designed to prepare students to teach speech and related subjects at the secondary level. It includes preparation in the methods and techniques of oral interpretation, forensics, and the organization, direction and staging of theatrical performances.

**Literature-Language**

The literature-language option is designed to prepare students for elementary and secondary school teaching. It is designed also to provide a sound basis for professional work in the principal fields of communications.
**Arts and Sciences Division**

**CURRICULUM IN LANGUAGE ARTS**

**Freshman**

<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)</td>
<td>3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Language Communication (Eng 107)</td>
<td></td>
<td></td>
<td>3</td>
</tr>
<tr>
<td><strong>Natural Sciences</strong></td>
<td></td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>Physical Education (PE 141)</td>
<td></td>
<td>½</td>
<td>½</td>
</tr>
<tr>
<td><strong>Mathematics</strong></td>
<td></td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Fundamentals of Journalism (Jour 101)</td>
<td></td>
<td></td>
<td>3</td>
</tr>
<tr>
<td>Western Literary Heritage (Eng 111)</td>
<td></td>
<td></td>
<td>3</td>
</tr>
<tr>
<td>Health Education (PE 107)</td>
<td></td>
<td></td>
<td>2</td>
</tr>
<tr>
<td>History of Civilization (Hist 101, 102, 103)</td>
<td></td>
<td>5</td>
<td>5</td>
</tr>
<tr>
<td>Electives</td>
<td></td>
<td>4</td>
<td></td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>17½</td>
<td>15½</td>
<td>16½</td>
</tr>
</tbody>
</table>

**Sophomore**

<table>
<thead>
<tr>
<th>Course</th>
<th>F</th>
<th>W</th>
<th>S</th>
</tr>
</thead>
<tbody>
<tr>
<td>Physical Education (PE 141)</td>
<td></td>
<td>½</td>
<td>½</td>
</tr>
<tr>
<td><strong>Natural Sciences</strong></td>
<td></td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>Survey of American Literature (Eng 213)</td>
<td></td>
<td></td>
<td>3</td>
</tr>
<tr>
<td>History and Principles of Journalism (Jour 203)</td>
<td></td>
<td></td>
<td>3</td>
</tr>
<tr>
<td>Survey of British Literature (Eng 209)</td>
<td></td>
<td></td>
<td>3</td>
</tr>
<tr>
<td>Public Speaking (Sp 200)</td>
<td></td>
<td></td>
<td>3</td>
</tr>
<tr>
<td>Modern Theatre Practice (Dr. 203)</td>
<td></td>
<td></td>
<td>3</td>
</tr>
<tr>
<td>General Psychology (Psy 202)</td>
<td></td>
<td></td>
<td>3</td>
</tr>
<tr>
<td><strong>Philosophy</strong></td>
<td></td>
<td></td>
<td>3</td>
</tr>
<tr>
<td><strong>Art</strong></td>
<td></td>
<td></td>
<td>2</td>
</tr>
<tr>
<td><strong>Music</strong></td>
<td></td>
<td></td>
<td>2</td>
</tr>
<tr>
<td>Electives and courses to complete major</td>
<td></td>
<td>5</td>
<td>7</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>16½</td>
<td>16½</td>
<td>16½</td>
</tr>
</tbody>
</table>

**Junior**

<table>
<thead>
<tr>
<th>Course</th>
<th>F</th>
<th>W</th>
<th>S</th>
</tr>
</thead>
<tbody>
<tr>
<td>Semantics (Eng 420)</td>
<td></td>
<td></td>
<td>3</td>
</tr>
<tr>
<td>Advanced Composition (Eng 302 or 303)</td>
<td></td>
<td></td>
<td>3</td>
</tr>
<tr>
<td>American Civilization (Am Civ 301, 302, 303)</td>
<td></td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>Speech Composition (Sp 311)</td>
<td></td>
<td></td>
<td>3</td>
</tr>
<tr>
<td>Principles of Economics (Ec 201, 202)</td>
<td></td>
<td></td>
<td>3</td>
</tr>
<tr>
<td>Electives and courses to complete major</td>
<td></td>
<td>5</td>
<td>11</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>17</td>
<td>17</td>
<td>17</td>
</tr>
</tbody>
</table>

**Senior**

<table>
<thead>
<tr>
<th>Course</th>
<th>F</th>
<th>W</th>
<th>S</th>
</tr>
</thead>
<tbody>
<tr>
<td>Senior Project (Lang 461, 462)</td>
<td></td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>Shakespeare (Eng 403)</td>
<td></td>
<td></td>
<td>3</td>
</tr>
<tr>
<td>Undergraduate Seminar (Lang 463)</td>
<td></td>
<td></td>
<td>2</td>
</tr>
<tr>
<td>Electives and courses to complete major</td>
<td></td>
<td>14</td>
<td>14</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>16</td>
<td>16</td>
<td>16</td>
</tr>
</tbody>
</table>

**JOURNALISM OPTION (ADD COURSES BELOW TO BASIC CURRICULUM)**

**Freshman**

<table>
<thead>
<tr>
<th>Course</th>
<th>F</th>
<th>W</th>
<th>S</th>
</tr>
</thead>
<tbody>
<tr>
<td>Jour 131 Elementary Photography</td>
<td></td>
<td></td>
<td>(3)</td>
</tr>
<tr>
<td>Jour 307 Specialized Reporting</td>
<td></td>
<td></td>
<td>(2)</td>
</tr>
<tr>
<td><strong>Sophomore</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Jour 202 Reporting</td>
<td></td>
<td></td>
<td>(3)</td>
</tr>
<tr>
<td>Jour 308 Business and Labor Reporting</td>
<td></td>
<td></td>
<td>(2)</td>
</tr>
<tr>
<td>Jour 206 Techniques of Printing</td>
<td></td>
<td></td>
<td>(3)</td>
</tr>
<tr>
<td>Jour 309 Government, Courts and Law Reporting</td>
<td></td>
<td></td>
<td>(2)</td>
</tr>
<tr>
<td>Jour 251 Practice Journalism</td>
<td></td>
<td></td>
<td>(2)</td>
</tr>
<tr>
<td>Jour 310 Editorial Writing</td>
<td></td>
<td></td>
<td>(2)</td>
</tr>
<tr>
<td><strong>Junior</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Jour 304 Law of the Press</td>
<td></td>
<td></td>
<td>(3)</td>
</tr>
<tr>
<td>Jour 305 Editing</td>
<td></td>
<td></td>
<td>(3)</td>
</tr>
<tr>
<td>Jour 306 Sports Reporting</td>
<td></td>
<td></td>
<td>(2)</td>
</tr>
<tr>
<td>Jour 311 Business and Industrial Journalism</td>
<td></td>
<td></td>
<td>(3)</td>
</tr>
<tr>
<td>Jour 401 Ethics</td>
<td></td>
<td></td>
<td>(3)</td>
</tr>
<tr>
<td>Jour 403 Community Newspaper Management</td>
<td></td>
<td></td>
<td>(3)</td>
</tr>
<tr>
<td><strong>Senior</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*To be taken from General Education list.*
SPEECH OPTION (ADD COURSES BELOW TO BASIC CURRICULUM)

Sophomore
Sp 102 Voice and Dictation (3)
Sp 203 Oral Interpretation (3)
Dr 231 Acting Theory and Technique (3)
Sp 230 Workshop in Forensics (1-2)

Junior
Sp 300 Advanced Public Speaking (3)
Sp 304 Argumentation (3)

Senior
Sp 307 Conference Techniques and Group Discussion (3)
Dr 334 Technique of Directing (3)

LITERATURE-LANGUAGE OPTION (ADD COURSES BELOW TO BASIC CURRICULUM)

Sophomore
Eng 110 The Bible as Literature (3)
Eng 207-8 Survey of British Literature (6)
Eng 212-3 Survey of American Literature (6)

Junior
Eng 305 British Novel (3)
Eng 306 The Modern Novel (3)
Eng 308 The Modern Drama (3)
Eng 310 Modern British and American Poetry (3)

Senior
Eng 401 Chaucer (3)
Eng 405 Literary Criticism (3)
Eng 406 Major American Writers (3)

DESCRIPTIONS OF COURSES IN LITERATURE-LANGUAGE

Eng 4 Preparatory English (3)
For the student who needs additional work in basic usage before he enters English 104. Frequent writing of short papers. Readings. 3 lectures.

Eng 104 Freshman Composition (3)
The fundamentals of English usage. Frequent writing of short papers, chiefly expository. Readings. 3 lectures. Prerequisite: Satisfactory score in placement examination or Eng 4

Eng 105 Freshman Composition (3)
Frequent expository writing, with stress on organization. Technique of the term paper. Readings in mass media. 3 lectures. Prerequisite: Eng 104

Eng 106 Freshman Composition (3)
Frequent papers, primarily critical and evaluative. Readings in four literary types. 3 lectures. Prerequisite: Eng 105

Eng 107 Language Communication (3)
For Language Arts majors and other recommended students in place of Eng 106. Readings in contemporary fiction, drama, and poetry. 3 lectures. Prerequisite: Eng 105

Eng 110 The Bible as Literature (3)
Old and New Testament narrative, poetry, and wisdom literature in the Revised Standard Version. 3 lectures. Prerequisite: Eng 104

Eng 111 Western Literary Heritage (3)
Readings in classical, medieval, and Renaissance literature to the rise of science, with emphasis on the history of ideas. 3 lectures. Prerequisite: Eng 105

Eng 201 Introduction to Modern Fiction (3)
Readings chiefly in the twentieth-century short-story and novel, with emphasis on man's search for knowledge, self-understanding, and values. May not be elected by language arts majors. 3 lectures. Prerequisite: Eng 105
Eng 202 Introduction to Modern Drama (3)
Readings chiefly in twentieth-century drama, with emphasis on man's search for knowledge, self-understanding, and values. May not be elected by language arts majors. 3 lectures. Prerequisite: Eng 105

Eng 203 Introduction to Poetry (3)
Readings chiefly in modern poetry; some biographical and critical material. Emphasis on man's search for knowledge, self-understanding, and values. May not be elected by language arts majors. 3 lectures. Prerequisite: Eng 105

Eng 207, 208, 209 Survey of British Literature (3) (3) (3)
British literature, as exemplifying the history of ideas, from its beginning to the present, with emphasis on the major works. 3 lectures. Prerequisite: Eng 105

Eng 211, 212, 213 Survey of American Literature (3) (3) (3)
Philosophical, religious, political, and literary ideas in American writing from Colonial times to the present. 3 lectures. Prerequisite: Eng 111

Eng 216 Report Writing (3)
Report-writing techniques. Research, organization, and preparation of specialized and technical information. Regular written reports. 3 lectures. Prerequisite: Eng 105

Eng 218 Business Communication (3)
Business-writing techniques and forms. Emphasis on letters of application, inquiry, sales, credit, and customer relations. Oral reports and interviews. 3 lectures. Prerequisite: Eng 105

Eng 219 Technical Writing (2)
Principles and practices of technical writing. Preparation, organization, and communication of technical data; preparation of training materials. 2 lectures. Prerequisite: Eng 105

Eng 302 Advanced Composition—Fiction (3)
Analysis of the short-story form. Practice in applying the techniques of the short narrative. 3 lectures. Prerequisite: Eng 106 or 107

Eng 303 Advanced Composition—Non-fiction (3)
Study of current practices in written composition. Exercises in various types of exposition and magazine article writing. 3 lectures. Prerequisite: Eng 106 or 107

Eng 304 The Development of the Short-Story (3)
Critical analysis; history and evaluation of form. 3 lectures. Prerequisite: Eng 105

Eng 305 British Novel (3)
Development of the novel in England from 1740-1900 with emphasis on its relationship to literary, social, and political backgrounds. Richardson to Conrad. 3 lectures. Prerequisite: Eng 105

Eng 306 The Modern Novel (3)
Development of the novel since 1880, with emphasis on the novel in America and on the Continent. 3 lectures. Prerequisite: Eng 106 or 107

Eng 308 The Modern Drama (3)
Continental, British, and American dramatic trends from the rise of Naturalism. 3 lectures. Prerequisite: Eng 106 or 107

Eng 310 Modern British and American Poetry (3)
Advanced analysis of language and forms of poetry; application of poetic techniques in original works. 3 lectures. Prerequisite: Eng 106 or 107
Eng 401 Chaucer (3)
Study of Chaucer's principal works, with special emphasis on *The Canterbury Tales* and *Troilus and Criseyde*. Consideration of historical influence and major contemporaries. 3 lectures. Prerequisite: Eng 106 or 107

Eng 403 Shakespeare I (3)
Introduction to the major plays. 3 lectures. Prerequisite: Eng 106 or 107

Eng 405 Literary Criticism (3)
Analysis of the works of selected major critics, with emphasis on the moderns. Application of principles in original critical essays. 3 lectures. Prerequisite: Eng 106 or 107

Eng 406 Major American Writers (3)
Intensive reading in such writers as Hawthorne, Melville, Twain, and James. 3 lectures. Prerequisite: Eng 106 or 107

Eng 409 The Grammars of English (3)
The various systems of describing the English language. Not designed for those wishing to correct their deficiencies in usage. 3 lectures. Prerequisite: Eng 106 or 107

Eng 420 Semantics (3)
The symbolic process of English. Relationship of words and phrasings to their referents. Effects of this relationship upon human thought, interpretation, and behavior. 3 lectures. Prerequisite: Eng 106 or 107

Eng 427 Literature and Oral Interpretation for Young People (4)
Readings in myth and folklore and in children's classics from the Eighteenth Century to the present. Two units to be devoted to interpretation and two units to literature. 3 lectures, 1 two-hour laboratory. Prerequisite: Eng 105

**DESCRIPTIONS OF COURSES IN LANGUAGE ARTS**

Lang 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.

Lang 461, 462 Senior Project (2) (2)
Selection and completion of a project under a minimum of supervision. Projects typical of problems the graduate will meet in his chosen field of employment. Results presented in a formal written report. Minimum of 120 hours total time.

Lang 463 Undergraduate Seminar (2)
Reports of senior projects, discussions of professional articles of an appropriate level. 2 lecture-discussions. Prerequisite: Completion of senior project.

Lang 521 Curriculum and Methods in Language Arts (3)
Secondary school curriculum, methods, and materials in language-literature, speech-drama, and journalism. Separate classes in each sub-area if enrollments warrant. Includes school observation. 3 lecture-discussions. Prerequisite: Graduate standing and admission to teacher preparation program.

Lang 590 Seminar in Language Arts (1-3)
Topics in advanced areas of language, literature, speech, drama, or journalism according to the needs and interests of the students enrolled. Each seminar will have a sub-title according to the nature of its content. 1, 2, or 3 lecture-discussions. Prerequisite: Graduate standing and instructor's approval. May be repeated for a total of 9 units.
DESCRIPTIONS OF COURSES IN SPEECH

Sp 102 Voice and Diction (3)
Physiology, mechanics, and function of the vocal mechanism; phonetics and enunciation; exercises and drills to improve the quality, flexibility, and effectiveness of the voice, leading to good usage of standard American speech. 3 lectures.

Sp 141 Laboratory in Voice and Diction Problems (1)
For students with special problems and those failing the teacher candidate screening examination. Correctional exercises and drills in such areas as voice placement, dialect, and enunciation. 1 two-hour laboratory.

Sp 200 Public Speaking (3)
Theory and practice in speech organization, composition, and delivery. Use of research materials. 3 lectures. Prerequisite: Eng 105

Sp 203 Oral Interpretation (3)
Theory, methods, and practice in oral communication of literature, technical reports, criticism, and other written materials. Analysis of literary style as applied to oral communication. Exercises in microphone technique and public performance. 3 lectures.

Sp 230 Forensics Workshop (1-2)
Intercollegiate and intramural competition in debate, oratory, and oral interpretation. Independent projects in specialized fields. 1 or 2 laboratories. May be repeated for not more than 6 units.

Sp 300 Advanced Public Speaking (3)
Advanced techniques of public speaking as applied to business and professional speaking. Oral reports, panel and group discussions, speech analysis, persuasion and argumentation. Emphasis on perfection of individual styles. 3 lectures. Prerequisite: Sp 200

Sp 304 Argumentation (3)
Principles of argumentation; methods of logical proof. Obtaining and organization of evidence, construction of the written brief, analysis of fallacies, and rebuttal technique. Application of principles of argumentation to professional speaking. 3 lectures. Prerequisite: Sp 200

Sp 307 Conference Techniques and Group Discussion (3)
Theory and practice in forms of discussion such as panels, forums, and symposiums; business reporting and group dynamics; parliamentary procedure and formal discussion, brainstorming and other methods of investigative problem solving. 3 lectures. Prerequisite: Sp 200

Sp 311 Speech Composition (3)
Stylistic and organizational skills of public address, written speeches, speech vocabulary, organization, analysis of current public addresses, and speeches for special occasions. 3 lectures. Prerequisite: Sp 200

Sp 403 Speech Techniques in Society (3)
Analysis and performance of persuasive discourse; emotional appeals, propaganda techniques, and audience analysis; written reports on methods of advertisers and political speakers. Persuasive speaking in the democratic society. 3 lectures. Prerequisite: Sp 200

Sp 443 Advanced Projects in Oral Interpretation (1-3)
Planning, directing and producing programs, play and choral readings, and other special projects. 1 to 3 laboratories. May be repeated for not more than 6 units.
Sp 444 Advanced Projects in Forensics (1-3)
Participation and competition in upper division intercollegiate forensics, special projects for professional organizations, directing the high school forensics program and other independent projects in public address. 1 to 3 laboratories. May be repeated for not more than 6 units.

DESCRIPTIONS OF COURSES IN DRAMA

Dr 131 Technical Production I (3)
Principles of backstage organization, scenery construction, makeup, and property construction. Crew work on current productions. 1 lecture, 2 laboratories.

Dr 132 Technical Production II (3)
Principles and technique of stage lighting, elementary scene design, scenery painting, sound and costume. Crew work on current productions. 1 lecture, 2 laboratories.

Dr 203 Modern Theatre Practice (3)
Survey and analysis of theatre practice, including dramatic structure, financial organization, styles and forms of dramatic expression (including cinema and television), production methods, theory of acting and directing and interrelation of the components of theatrical expression. Practical exercises in application of theatre criteria. 3 lectures. Prerequisite: English 105 or permission of instructor.

Dr 231 Acting Theory and Technique (3)
Theory and practice of acting with special attention to body movement, pantomime, improvisation, characterization. 2 lectures, 1 laboratory.

Dr 244 Rehearsal and Performance (1-2)
Practical experience by participation in theatrical production. Technical crews, theatre management, and acting. 1 or 2 laboratories. May be repeated for not more than 6 units.

Dr 301 Playwriting and Dramatic Structure (3)
Intensive study of dramatic structure as applied to theater practice. Theory and practice in playwriting, program structure, and criticism. 3 lectures.

Dr 331 Advanced Acting (3)
Intensive study in styles and forms of acting, with special attention to mastery of technique and comparative study of theories of acting. 2 lectures, 1 laboratory. Prerequisite: Dr 231

Dr 332 Stage Lighting (3)
Theory and practice in stage lighting. Composition, design, switchboard design, instrument selection and purchasing, production planning. Students will serve as crew hands and supervisors for departmental productions. 2 lectures, 1 laboratory. Prerequisite: Dr 132 or permission of instructor.

Dr 334 Technique of Directing (3)
Theory and practice in play selection, analysis and direction; emphasis on composition, movement, coaching, ground plans, style. 2 lectures, 1 laboratory. Prerequisite: Dr 231

Dr 335 Play Production (1-3)
Application of principles of play production and organization to practical theatre situations. Crew supervision, backstage organization and administration, publicity and box office operation. Emphasis on secondary school and community theatre problems. 1 to 3 laboratories. Prerequisite: Permission of instructor.

Dr 411 History of the Theatre (3)
Survey of dramatic art and production from the Greeks to the present. Application of historic principles and styles to contemporary play production and criticism. 3 lectures.
Dr 441 Advanced Projects in Theatre (1-3)
Advanced problems and independent projects in acting, directing, stage design, stage lighting, costuming and staging, including participation in major productions and independent production of experimental student plays. 1 to 3 laboratories. May be repeated for not more than 6 units.

DESCRIPTIONS OF COURSES IN JOURNALISM

Jour 101 Fundamentals of Journalism (3)
Introduction to basic news sources and documents; preliminary study of news writing techniques; journalism basics. 2 lectures, 1 two-hour activity period. Prerequisite: Satisfactory score on placement examination or Eng 4.

Jour 131 Elementary Photography (3)
Basic photography techniques, including taking, processing, and selecting good photos. For those who have had no or very limited experience in photography. 1 lecture, 2 laboratories.

Jour 202 Reporting (3)
Covering and writing the news story; study of journalistic style. 3 lectures. Prerequisite: Jour 101.

Jour 203 History and Principles of Journalism (3)
History, background, and responsibilities of the mass mediums in the progress of man. Special emphasis on development of journalism in the United States. 3 lectures.

Jour 206 Techniques of Printing (3)
Printing processes and the adaptability and possibilities of each; preparation of material for printing. 3 lectures.

Jour 231 Advanced Photography (3)
Advanced work in photographic techniques, including color photography and portrait work. 1 lecture, 2 laboratories. Prerequisite: Jour 131 or demonstrated knowledge of basic photography.

Jour 251 Practice Journalism (1-2)
Laboratory course for beginning staff members of college publications and student news bureau. 1 or 2 laboratories. Prerequisite: Permission of the instructor and satisfactory score in placement examination or Eng 4. Total credit limited to 6 units.

Jour 304 Law of the Press (3)
The fundamentals and applications of libel and right-of-privacy laws as they affect the mass mediums. 3 lectures. Prerequisite: Jour 203.

Jour 305 Editing (3)
Copy editing, headline writing, layout, and makeup. 3 lectures. Prerequisite: Jour 101.

Jour 306 Sports Reporting (2)
Gathering material for and writing sports stories. 2 lectures. Prerequisite: Jour 202.

Jour 307 Specialized Reporting (2)
Study and training in gathering and writing specialized stories such as entertainment, books, travel, home, and food. 2 lectures. Prerequisite: Jour 202.

Jour 308 Business and Labor Reporting (2)
Gathering material for and writing stories pertaining to labor, business, and industry. 2 lectures. Prerequisite: Jour 202.
Jour 309  Government, Courts, and Law Reporting (2)
Study and training in gathering and writing stories pertaining to government and courts; special emphasis on organization and court procedure. 2 lectures. Prerequisite: Jour 202

Jour 310  Editorial Writing (2)
Writing editorials; emphasis on the use of editorial comment. 2 lectures. Prerequisite: Jour 202

Jour 311  Business and Industrial Journalism (3)
The use of printed material in business and industry, including house organs, brochures, and pamphlets; writing and production of these publications. 3 lectures. Prerequisite: Jour 206

Jour 312  Publicity and News Bureau Operations (3)
The use of publicity in business, industry, and government; preparation of the news release; organization and operations of the news bureau. 3 lectures. Prerequisite: Jour 202

Jour 313  Public Relations (3)
The effects of organized information upon public thinking. Dissemination of ideas by commercial, industrial, social, and governmental organizations. Term project. 3 lectures. Prerequisite: Eng 105

Jour 351  Advanced Journalism Practice (1-2)
Laboratory course for experienced staff members of college publications or student news bureau. 1 or 2 laboratories. Prerequisite: Permission of the instructor. Total credit limited to 6 units.

Jour 401  Ethics (3)
A study of the responsibility of the mass mediums and the journalist in today's society. 3 lectures. Prerequisite: Jour 304

Jour 403  Community Newspaper Management (3)
The organization of the community newspaper, including study of advertising and circulation problems and relations with the community. 3 lectures. Prerequisite: Jour 101

Jour 451  Editorial Practice (1-2)
Laboratory course for students holding editorial or equivalent positions on college publications or student news bureau. 1 or 2 laboratories. Prerequisite: Permission of instructor. Total credit limited to 6 units.

DESCRIPTION OF COURSE IN SPANISH
Span 101, 102, 103  Elementary Spanish (3) (3) (3)
Designed to train the student to read, write, speak, and understand Spanish. Audio-lingual approach to language learning. 2 lectures, 1 two-hour laboratory.

DESCRIPTION OF COURSE IN FRENCH
Fr 101, 102, 103  Elementary French (3) (3) (3)
Designed to train the student to read, write, speak and understand French. Audio-lingual approach to language learning. 2 lectures, 1 two-hour laboratory.
The curriculum in marketing is designed to prepare students for positions in that portion of the business field which concerns itself with bringing to users the products of either agriculture or industry. It covers the fields of retail, wholesale, and industrial selling, and provides preparation for such positions as that of salesman, store operator, sales manager, advertising manager, advertising agency executive, and research director. Required courses cover not only those subjects dealing directly with marketing, but also many others involving the structure and organization of business as a whole, so that graduates will have an adequate grasp of the overall problems of an organization, and will be equipped to make their marketing activities an important part of the complete operation.

Courses and the curriculum have been built so as to provide the opportunity for actual work experience as well as theory. Instructors are selected on the basis of their marketing experience, knowledge of theory, and educational backgrounds.

### CURRICULUM IN MARKETING

**Freshman**

<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)</td>
<td>3</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>Business Communications (Eng 218)</td>
<td></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>Principles of Accounting (Acc 121, 122, 123)</td>
<td>3</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>Principles of Economics (Ec 201, 202, 203)</td>
<td>3</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>Health Education (PE 107)</td>
<td></td>
<td></td>
<td>2</td>
</tr>
<tr>
<td>Mathematics (Math 101, 106)</td>
<td></td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>Office Management (Bus 127)</td>
<td></td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>Introduction to Business (Bus 102)</td>
<td></td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Electives</td>
<td>4</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>16½</td>
<td>16½</td>
<td>16½</td>
</tr>
</tbody>
</table>

**Sophomore**

<table>
<thead>
<tr>
<th>Course</th>
<th>F</th>
<th>W</th>
<th>S</th>
</tr>
</thead>
<tbody>
<tr>
<td>Physical Education (PE 141)</td>
<td>½</td>
<td>½</td>
<td>½</td>
</tr>
<tr>
<td>Report Writing (Eng 216)</td>
<td></td>
<td></td>
<td>3</td>
</tr>
<tr>
<td>Marketing Principles (Mktg 201, 202)</td>
<td>3</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Advertising Principles (Mktg 204)</td>
<td></td>
<td></td>
<td>3</td>
</tr>
<tr>
<td>Business Law (Bus 301, 302)</td>
<td>3</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Sales Promotion (Mktg 206)</td>
<td></td>
<td></td>
<td>3</td>
</tr>
<tr>
<td>Salesmanship (Mktg 208)</td>
<td></td>
<td></td>
<td>3</td>
</tr>
<tr>
<td>American Civilization (Am Civ 301, 302, 303)</td>
<td>3</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>Public Speaking (Sp 200)</td>
<td></td>
<td></td>
<td>3</td>
</tr>
<tr>
<td>* Natural Sciences</td>
<td>4</td>
<td>4</td>
<td>4</td>
</tr>
</tbody>
</table>

| **Total**                                   | 16½| 16½| 16½ |

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

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

<table>
<thead>
<tr>
<th>Course Description</th>
<th>Fall</th>
<th>Winter</th>
<th>Spring</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sales Management (Mktg 301)</td>
<td>3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Industrial Marketing (Mktg 302)</td>
<td>3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Retail Store Management (Mktg 303)</td>
<td></td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Traffic Management (Mktg 304)</td>
<td></td>
<td></td>
<td>3</td>
</tr>
<tr>
<td>Management Principles (Bus 304)</td>
<td></td>
<td></td>
<td>3</td>
</tr>
<tr>
<td>Management Processes (Bus 305)</td>
<td></td>
<td></td>
<td>3</td>
</tr>
<tr>
<td>Business Forecasting (Bus 311, 312)</td>
<td>3</td>
<td></td>
<td>3</td>
</tr>
<tr>
<td>Quantitative Analysis (Bus 315)</td>
<td></td>
<td></td>
<td>3</td>
</tr>
<tr>
<td>Managerial Accounting (Bus 306)</td>
<td></td>
<td></td>
<td>3</td>
</tr>
<tr>
<td>Business Finance (Fin 314)</td>
<td></td>
<td></td>
<td>3</td>
</tr>
<tr>
<td>Corporation Finance (Fin 315)</td>
<td></td>
<td></td>
<td>3</td>
</tr>
<tr>
<td>Business and Government (Ec 302)</td>
<td></td>
<td></td>
<td>3</td>
</tr>
<tr>
<td>General Psychology (Psy 202)</td>
<td></td>
<td></td>
<td>3</td>
</tr>
<tr>
<td>Human Relations (Psy 314)</td>
<td></td>
<td></td>
<td>3</td>
</tr>
<tr>
<td>Electives</td>
<td>2</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>17</td>
<td>17</td>
<td>17</td>
</tr>
</tbody>
</table>

### Senior

<table>
<thead>
<tr>
<th>Course Description</th>
<th>Fall</th>
<th>Winter</th>
<th>Spring</th>
</tr>
</thead>
<tbody>
<tr>
<td>Market Analysis and Research (Mktg 401)</td>
<td></td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Interpretation of Research Data (Mktg 402)</td>
<td></td>
<td></td>
<td>3</td>
</tr>
<tr>
<td>Marketing Management (Mktg 403)</td>
<td></td>
<td></td>
<td>3</td>
</tr>
<tr>
<td>International Marketing (Mktg 414)</td>
<td></td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Senior Project (Mktg 461, 462)</td>
<td>2</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>Undergraduate Seminar (Mktg 463)</td>
<td></td>
<td></td>
<td>2</td>
</tr>
<tr>
<td>* Natural Sciences</td>
<td></td>
<td></td>
<td>3</td>
</tr>
<tr>
<td>* Literature</td>
<td></td>
<td></td>
<td>6</td>
</tr>
<tr>
<td>* Literature, Philosophy, Fine or Practical Arts</td>
<td>5</td>
<td>5</td>
<td>8</td>
</tr>
<tr>
<td>Electives</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>16</td>
<td>16</td>
<td>16</td>
</tr>
</tbody>
</table>

### Descriptions of Courses in Marketing

**Mktg 201, 202** *Marketing Principles* *(3) (3)*
A survey of the problems concerned with the marketing of goods and services with emphasis on sound principles and practices. 3 lectures.

**Mktg 204** *Advertising Principles* *(3)*
Technical, economic, and professional aspects of advertising. Campaign organization for effective advertising. Analysis and discussion of typical situation—problems. 3 lectures. Prerequisite: Mktg 202 or permission of instructor.

**Mktg 205** *Advertising Practices* *(3)*
Considerations involved in production and placing of advertising. Copy, layout, production and reproduction processes, media selection and research. Analysis and discussion of typical situation problems. 3 lectures. Prerequisite: Mktg 204

**Mktg 206** *Sales Promotion* *(3)*
Methods of marketing merchandise, channels of distribution, co-ordination of sales and advertising effort, special inducements, and point-of-purchase displays. Analysis and discussion of typical situation problems. 3 lectures. Prerequisite: Mktg 204

**Mktg 208** *Salesmanship* *(3)*
Salesmanship and the role of the salesman in retail and wholesale selling. Sales techniques. Salesmanship and product service. Analysis and discussion of typical situation problems. 3 lectures. (Credit will not be allowed for both ABM 202 and Mktg 208)

* To be selected from the General Education list.
Mktg 301 Sales Management (3)
Organization and operation of sales forces. Determination of market potentials. Methods of remuneration. Analysis and discussion of typical situation problems. 3 lectures. Prerequisite: Mktg 202

Mktg 302 Industrial Marketing (3)
Marketing of products for resale or further manufacture. Analysis and discussion of typical situation-problems. 3 lectures. Prerequisite: Mktg 202

Mktg 303 Retail Store Management (3)
Problems of merchandising, location, layout, display, advertising, records, purchasing, personnel relations, and other considerations of retail operations. Analysis and discussion of typical situation-problems. 3 lectures. Prerequisite: Mktg 202

Mktg 304 Traffic Management (3)
Purchase and sale of transportation. Rate structures and controls. Rate claims and Interstate Commerce Commission proceedings. Study of uses of bills of lading and claims. Storage locations, and routing considerations. Analysis and discussion of typical situation-problems. 3 lectures

Mktg 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.

Mktg 401 Market Analysis and Research (3)
Determination of market potentials, sales areas and sales quotas. Sources of market data. Techniques of quantitative and qualitative market analysis. Analysis and discussion of typical situation-problems. 3 lectures. Prerequisite: Mktg 202; Bus 311 or Math 211

Mktg 402 Interpretation of Business Data (3)
Sources and types of data, their significance and application to forecasting. Analysis and discussion of typical situation-problems. 3 lectures. Prerequisite: Mktg 401

Mktg 403 Marketing Management (3)
Analysis of problems confronting the marketing executive and the development of decision-making techniques used in solving them. 3 lectures. Prerequisite: Senior standing or permission of instructor.

Mktg 414 International Marketing (3)
Analysis and description of marketing problems. Techniques and institutions available for the distribution of goods and services in international markets. 3 lectures. Prerequisite: Mktg 202 or permission of instructor.

Mktg 441, 442 Internship in Marketing (2) (2)
On-the-job training with a business in some phase of marketing, selling, or advertising. The experience must be new to the student so that learning takes place. Analytical reports of work accomplished by each student are made periodically to the faculty co-ordinator. Prerequisite: Permission of instructor.

Mktg 461, 462 Senior Project (2) (2)
Selection and completion of a project under a minimum of supervision. Projects typical of problems which graduates must solve in their fields of employment. Formal report is required. Prerequisite: Senior standing. Required minimum of 120 hours.

Mktg 463 Undergraduate Seminar (2)
Study and discussion by students of recent developments in the students' major field. Two meetings. Prerequisite: Senior standing or special permission.
The Mathematics Department offers courses needed in the agriculture and engineering divisions for the purpose of developing occupational proficiency and courses designed to contribute to the general education of all students.

The major in mathematics is planned with two objectives. First, it is intended to prepare secondary school teachers of mathematics who are aware of the significance of mathematics and of its contributions to modern living. Its second objective is to prepare mathematicians for industrial and governmental employment. The major program requires extensive work in applied mathematics and skills courses with a view to producing mathematicians who are capable of using their knowledge in a wide variety of applications. A high school student planning a major in mathematics should take eight semesters of mathematics, two of physics, and two of chemistry.

**CURRICULUM IN MATHEMATICS**

**Freshman**

<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>Physical Education (PE 141)</td>
<td>½</td>
<td>½</td>
<td>½</td>
</tr>
<tr>
<td>* Biological Science</td>
<td>3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>General Physics (Phys 131)</td>
<td></td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>Analytic Geometry and Calculus (Math 118, 201)</td>
<td>5</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Health Education (PE 107)</td>
<td></td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>General Chemistry (Chem 321, 322)</td>
<td>4</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>Symbolic Logic and Set Theory (Phil 205)</td>
<td>3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Electives</td>
<td>1</td>
<td>1</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td><strong>16½</strong></td>
<td><strong>16½</strong></td>
<td><strong>16½</strong></td>
</tr>
</tbody>
</table>

**Sophomore**

<table>
<thead>
<tr>
<th>Course</th>
<th>F</th>
<th>W</th>
<th>S</th>
</tr>
</thead>
<tbody>
<tr>
<td>Physical Education (PE 141)</td>
<td>½</td>
<td>½</td>
<td>½</td>
</tr>
<tr>
<td>General Physics (Phys 132, 133 or 204)</td>
<td>4</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>Principles of Economics (Ec 201, 202)</td>
<td>3</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>* Literature</td>
<td>3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Analytic Geometry and Calculus (Math 202, 203)</td>
<td>3</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>General Psychology (Psy 202)</td>
<td></td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Economics</td>
<td></td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>* Literature or philosophy</td>
<td></td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>* Literature, philosophy, art or music</td>
<td></td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Differential Equations (Math 316)</td>
<td></td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Electives</td>
<td>3</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td><strong>16½</strong></td>
<td><strong>16½</strong></td>
<td><strong>16½</strong></td>
</tr>
</tbody>
</table>

* To be selected from the General Education list.
**DESCRIPTIONS OF COURSES IN MATHEMATICS**

**Math 1 Preparatory Mathematics (3)**
Fundamentals of arithmetic, denominate numbers, introduction to algebra, percentage, exponents, simultaneous linear equations. Required of all students who show a deficiency in algebra on the placement examination. 3 lectures.

**Math 7 Preparatory Algebra (5)**
Signed numbers, linear equations, literal equations, formula evaluation, functional relationships, graphing linear and quadratic equations, factoring algebraic functions, fractional equations. 5 lectures.

**Math 101 Basic Mathematics (3)**
Graphs, charts, ratio, proportion, variation, basic algebraic operations, linear and quadratic equations, logarithms. 3 lectures. Prerequisite: High School Algebra and Geometry or Math 1.

**Math 106 Business Mathematics (3)**
Simple interest, discounts, compound interest, annuities, sinking funds, amortization, insurance, stocks and bonds. 3 lectures. Prerequisite: Math 101

**Math 110, 111 Introduction to Mathematical Analysis (3) (3)**
Introductory mathematical analysis for agriculture, economics, business management, biological and social science majors. Selected topics from the calculus including differentiation and integration of elementary functions, maxima and minima of functions of several variables including the use of Lagrange multipliers. 3 lectures. Prerequisite: Math 101 or satisfactory score on advanced placement examination.

**Math 112 Basic Mathematics for General Education (3)**
Elements of trigonometry, analytic geometry, and statistics as applied to biological sciences, physical education, social sciences. 3 lectures. Prerequisite: Math 101

**Math 117 College Algebra and Trigonometry (5)**
A unified treatment of the basic principles of college algebra and trigonometry. 5 lectures. Prerequisite: Intermediate Algebra or Math 7.

**Math 118 Analytic Geometry and Calculus (5)**
Introduction to analytic geometry and calculus. 5 lectures. Prerequisite: Math 117

**Math 201, 202, 203 Analytic Geometry and Calculus (3) (3) (3)**
Continuation of analytic geometry and calculus. 3 lectures. Prerequisite: Math 118

**To be selected with approval of adviser.**
<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Units</th>
<th>Description</th>
<th>Prerequisite(s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Math 204</td>
<td>Introduction to Mathematical Analysis</td>
<td>3</td>
<td>Introductory mathematical analysis for agriculture, economics, business management, biological and social science majors. Introduction to differential and difference equations. Elementary properties of vectors and matrices with applications to the solution of linear systems, linear programming, etc. 3 lectures.</td>
<td>Math 111</td>
</tr>
<tr>
<td>Math 205, 206, 207</td>
<td>Basic Concepts of Elementary Mathematics</td>
<td>3 (3)</td>
<td>Historical development of systems of numeration, the evolution of the number concept, the logical basis of the number system, fundamental operations, mensuration, measurement, functions and graphs. Selected topics in algebra and geometry. 3 lectures.</td>
<td>High School Algebra and Geometry.</td>
</tr>
<tr>
<td>Math 211</td>
<td>Descriptive Statistics</td>
<td>3</td>
<td>Graphical representation of statistical data; calculation and uses of various averages, measures of variability, elementary probability and the normal probability curve, simple linear correlation. 3 lectures.</td>
<td>Math 101, 117 or 207</td>
</tr>
<tr>
<td>Math 217</td>
<td>Mathematics of Digital Computers I</td>
<td>3</td>
<td>Boolean algebras and number systems with particular reference to the calculus of binary numbers. 3 lectures.</td>
<td>Math 118</td>
</tr>
<tr>
<td>Math 218</td>
<td>Mathematics of Digital Computers II</td>
<td>3</td>
<td>Logical design of digital computers including arithmetic operations, typical memory devices, input and output units. 3 lectures.</td>
<td>Math 217</td>
</tr>
<tr>
<td>Math 221</td>
<td>Automatic Programming for Digital Computers</td>
<td>1</td>
<td>Solution of scientific and engineering problems using automatic programming for a general purpose computer. Special emphasis will be on formula translation through the use of the Fortran compiler. 1 lecture.</td>
<td>Math 110 or 112 or concurrent enrollment in Math 117</td>
</tr>
<tr>
<td>Math 201</td>
<td>Mathematical Statistics I</td>
<td>3</td>
<td>Probability, distributions for discrete and for continuous variates, expected values and moments, sampling distributions, point estimation. 3 lectures.</td>
<td>Math 202</td>
</tr>
<tr>
<td>Math 202</td>
<td>Statistical Methods in Engineering and the Physical Sciences</td>
<td>3</td>
<td>Use of statistical methods in experimentation, testing, inspection and production. Measurement errors, comparison of two or more means; comparison of two or more variances; correlation; design of engineering experiments. 3 lectures.</td>
<td>Math 201</td>
</tr>
<tr>
<td>Math 304</td>
<td>Programming of Digital Computers</td>
<td>3</td>
<td>Coding of general purpose and special purpose digital computers. Preparation of programs of general purpose computers. Sub-routines. 3 lectures.</td>
<td>Math 217</td>
</tr>
<tr>
<td>Math 307</td>
<td>Introduction to Theory of Equations</td>
<td>3</td>
<td>Complex numbers, general theorems on algebraic equations, solution of the general cubic, methods of solution of algebraic equations. 3 lectures.</td>
<td>Math 201</td>
</tr>
<tr>
<td>Math 309</td>
<td>Statistical Methods in Engineering and the Physical Sciences</td>
<td>3</td>
<td>Use of statistical methods in experimentation, testing, inspection and production. Measurement errors, comparison of two or more means; comparison of two or more variances; correlation; design of engineering experiments. 3 lectures.</td>
<td>Math 202</td>
</tr>
<tr>
<td>Math 311</td>
<td>Mathematical Statistics II</td>
<td>3</td>
<td>Probability, distributions for discrete and for continuous variates, expected values and moments, sampling distributions, point estimation. 3 lectures.</td>
<td>Math 202 or 204</td>
</tr>
<tr>
<td>Math 316</td>
<td>Differential Equations</td>
<td>3</td>
<td>An introduction to first order differential equations and simple linear equations with constant coefficients. Applications to dynamics, electric circuits, and heat flow. 3 lectures.</td>
<td>Math 203</td>
</tr>
</tbody>
</table>
Math 317  Differential Equations (3)
Introduction to Fourier Series and Integrals with applications. Elementary theory of Laplace transformation with applications including the solution of differential equations. 3 lectures. Prerequisite: Math 316

Math 318  Mathematical Analysis of Engineering Problems (3)
Introduction to the algebra and calculus of vectors including the divergence and Stoke's theorem. Introduction to analytic functions of a complex variable. 3 lectures. Prerequisite: Math 316

Math 319  Mathematical Analysis of Engineering Problems (3)
Introduction to the solution of partial differential equations, Fourier integral. 3 lectures. Prerequisite: Math 317

Math 322  Mathematical Statistics II (3)
Maximum likelihood estimators, interval estimation, tests of hypotheses, linear regression, analysis of variance and distribution free methods. 2 lectures, 1 activity period. Prerequisite: Math 311

Math 332  Numerical Methods in Analysis (3)
Numerical solution of algebraic and transcendental equations and systems of equations, finite differences, interpolation, numerical integration, and numerical solution of ordinary differential equations. 3 lectures. Prerequisite: Math 316

Math 400  Special Problems for Advanced Undergraduates (1-2)
Individual or group investigation, research, studies, or surveys of selected problems. Total credit limited to 4 units, with a maximum of 2 units per quarter. Prerequisite: Senior standing or consent of instructor.

Math 404  Vector Analysis (2)
Algebra of free vectors with applications. Introduction to differential and integral calculus of vectors. 2 lectures. Prerequisite: Math 316

Math 405  Vector Analysis (2)
Calculus of scalar and vector functions. Derivation and properties of gradient, divergence, and curl. Applications of analytic vector methods to problems of physics and engineering. 2 lectures. Prerequisite: Math 404

Math 408, 409  Functions of a Complex Variable (2) (2)
Fundamental properties of a complex variable. Integration in the complex plane, power series, contour integration, conformal mapping with applications. 2 lectures. Prerequisite: Math 316

Math 410  Introduction to Modern Algebra (3)
An introduction to abstract algebra, structure of number systems, groups, rings, integral domains and fields. 3 lectures. Prerequisite: Math 203

Math 411  Foundations of Geometry (3)
Selected topics in synthetic and projective geometry; Euclidian and non-Euclidian geometry. 3 lectures. Prerequisite: Math 203

Math 412, 413, 414  Advanced Calculus (3) (3) (3)
Sequences, limits, infinite series, convergence, continuity, derivatives and differentials, partial derivatives, Riemann integration, fundamental theorem of integral calculus, approximate integration, improper integrals, multiple integrals, applications to analysis. 3 lectures. Prerequisite: Math 203

Math 421  Design of Experiments (3)
Methods of constructing and analyzing designs for experimental investigation. Latin-square, split-plot, simple and partially confounded factorial designs, incomplete block designs, treatment of missing data and techniques of experimentation. 2 lectures, 1 activity period. Prerequisite: Math 309 or 322
Math 422  Design of Surveys (3)
Statistical design and analysis of survey investigation. Mathematical development of sampling systems; simple random, stratified, multistage and multiphase sampling designs; estimation; determination of sample size. 2 lectures, 1 activity period. Prerequisite: Math 309 or 322

Math 432  Numerical Methods in Analysis (3)
Expansion and continuation of Math 332. Interpolation and numerical differentiation and integration of formulas of Lagrange, Gauss, Bessel, and Stirling. Numerical solution of ordinary, difference and partial differential equations. 2 lectures, 1 activity period. Prerequisite: Math 332

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

Math 463  Undergraduate Seminar (2)
Discussions through seminar methods of new developments in the fields of student's particular interests. 2 lecture-discussions.

Math 521  Curriculum and Methods in Mathematics (3)
Modern tendencies and general aims of secondary school mathematics. Objectives of and methods for effective teaching in general mathematics, algebra, geometry, and trigonometry. 3 lectures. Prerequisite: Admission to teacher education program and graduate standing.

Math 590  Seminar in Mathematics (1-3)
Topics in advanced mathematics chosen according to the interests and needs of the students enrolled. Each seminar will have a sub-title according to the nature of the content. 1, 2, or 3 lectures. Prerequisite: Instructor's approval and graduate standing. May be repeated for a maximum of 6 units.
Courses in the Music and Art Department are designed to give all artistically inclined students the opportunity to participate in college musical organizations, to further their proficiency in singing and in playing instruments, and to provide instruction in art and audio-visual techniques.

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

Courses in art are provided for teacher preparation and to provide all students an opportunity to develop their talents and aesthetic appreciation. Audio-visual courses provide a cultural background for all students and furnish many kinds of skills and techniques necessary to success in teaching, advertising, sales, and other professional activities.

### DESCRIPTIONS OF COURSES IN MUSIC

**Mu 101 Basic Music Skills (3)**

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

**Mu 111, 112, 113 Class Piano (1) (1) (1)**

Beginning class piano instruction. Development of ability to play simple chords in all keys and to harmonize simple melodies using these chords. Transposition of simple melodies. Technical studies. 1 activity period.

**Mu 141, 341 Stage Orchestra (1) (1)**

Study of dance, jazz and show music. Participation in annual Road Show. Previous experience required. For advanced credit, leadership and solo abilities must be demonstrated. Consent of instructor required. 1 activity period. Total credit limited to 8 units.

**Mu 147 Brass Choir (1)**

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

**Mu 148 Woodwind Choir (1)**

Open to qualified players of woodwind instruments capable of advanced performance. Rehearsal and preparation of woodwind ensemble groups for public performance. Literature includes woodwind quintets, etc. 1 activity period. Total credit limited to 4 units.

**Mu 149 String Choir (1)**

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

**Mu 151, 351 Marching Band (1) (1)**

Marching and playing for athletic events and parades. Previous experience required. Advanced credit only for those with demonstrated instrumental proficiency and leadership qualities. 1 activity period. Total credit limited to 4 units.
Mu 152, 352 Concert Band (1) (1)
Training and experience in wind band repertoire, traditional and contemporary. Previous band experience and consent of instructor required. For advanced credit, student must demonstrate instrumental proficiency and leadership qualities. 1 activity period. Total credit limited to 8 units.

Mu 153, 353 Symphony Orchestra (1) (1)
Training and experience in performance of music from all periods. Previous orchestral experience required. Open to all string players; wind players by consent of instructor only. Advanced credit limited to those with demonstrated leadership and solo ability. 1 activity period. Total credit limited to 12 units.

Mu 161, 361 A Cappella Choir (1) (1)
A cappella singing for both men and women. Standard and contemporary vocal literature. Advanced credit limited to those with demonstrated leadership or solo ability. 1 activity period. Total credit limited to 6 units.

Mu 162 Men's Glee Club (1)
Choral vocal training, study and performance of concert literature. Membership open to all men students. Quartets and soloists selected from this group. 1 activity period. Total credit limited to 6 units.

Mu 163 Women's Glee Club (1)
Choral vocal training, study and performance of concert literature. Membership open to all women students. Small groups and soloists selected from this group. 1 activity period. Total credit limited to 6 units.

Mu 201 Music Theory (3)
Elements of music theory; construction of major and minor scales; intervals, rhythms, sight-singing, musical terms, syllable work. 3 lectures. Prerequisite: Mu 101 or equivalent.

Mu 202 Musicianship (3)
A continuation of music theory, but with emphasis on application of fundamentals learned. Drill in harmonic, melodic, and rhythmic dictation. 3 lectures. Prerequisite: Mu 201

Mu 203 Elementary Harmony (3)
Analysis and writing of four-part harmony, arranging and basic composition. 3 lectures. Prerequisite: Mu 202

Mu 204 Music Appreciation (2)
Introduction to the appreciation of music. Physical aspects of musical instruments and ensembles. The aesthetic aspects of basic forms and styles. Lectures, recordings, films and demonstrations. 2 lectures.

Mu 205 Music Appreciation (2)
An appreciation of music through the study of great composers and their music: baroque, classical and romantic periods. Lectures, recordings, and films. 2 lectures. Prerequisite: Mu 204

Mu 211, 212, 213 Class Piano II (1) (1) (1)
Second year of class piano. Continued development of music reading skills, playing by ear and transposing; emphasis on music for recreational uses in the home, church, and community. 1 activity period. Prerequisite: Mu 113

Mu 231 String Instrument Fundamentals (1)
Fundamentals of playing all string instruments with emphasis on the violin, but including viola, violoncello, bass. No previous experience necessary. For music minors or those interested in learning how to play a string instrument. 1 activity.

Mu 232 Brass Instrument Fundamentals (1)
Fundamentals of playing all brass instruments with emphasis on the trumpet, trombone, baritone, french horn or tuba. No previous experience necessary. For music minors or those interested in learning how to play a brass instrument. 1 activity period.
Mu 233 Woodwind Instrument Fundamentals (1)
Fundamentals of playing a woodwind instrument. Includes study of clarinet, flute, oboe, bassoon, saxophone and related instruments. No previous experience required. For music minors or those who wish to learn how to play a woodwind instrument. 1 activity period.

Mu 237 Class Voice (1)
Fundamental techniques of singing. Problems of tone production, breathing, diction, repertoire, and song interpretations. 1 activity period. May be repeated for a total of 3 units.

Mu 306 Music Appreciation (2)
A study in the appreciation of 20th century music. Famous composers and styles of contemporary music. Recordings, films and lectures. 2 lectures. Prerequisite: Mu 204

Mu 307 Conducting (2)
Elements of baton technique and development of basic skills in conducting with instrumental and vocal groups. 2 lectures. May be repeated for a maximum of 4 units.

Mu 364 Madrigal Singers (1)
Vocal training in the study of and performance of Motets, Madrigals and modern works. Performance for civic groups, Road Show and concerts. Previous vocal experience required. Consent of instructor required. 1 laboratory period. Total credit limited to 6 units.

Mu 401 Music Literature for Children (3)
Music literature especially suited for (but not limited to) children. Instrumental, vocal, and piano music recordings are played, studied, and evaluated. Songs for children played and sung by teacher and students. 3 lectures.

Mu 402 History of Musical Styles (3)
Music from ancient times to the present with emphasis on changing styles. Sociology, customs, physical development of instruments and lives of composers in relation to the development of musical forms and styles in various periods. Research and assigned listening experiences. 3 lectures. Prerequisite: Mu 204; Mu 205 or 206

Mu 431 Theory of Instrumental Instruction (1)
Class instruction in technique and repertoire for advanced students of orchestral and band instruments. 1 activity period. Prerequisite: consent of instructor. May be repeated for a total of 3 units.

Mu 437 Theory of Voice Instruction (1)
Class instruction in advanced techniques and materials. 1 activity period. Prerequisite: consent of instructor. May be repeated for a total of 3 units.

DESCRIPTIONS OF COURSES IN ART

Art 110 The Visual Arts (3)
Appreciation and understanding of the visual arts. A comprehensive survey of the relationships within the arts as well as their respective and collective relationship to the structure of society. 3 lectures.

Art 234 Art Materials and Skills (3)
Development of appreciative and creative skills. Materials involved in elementary expression in art media, emphasizing drawing and graphic work. Selecting, organizing, guiding, and evaluating individual and group activities. 2 lectures, 1 laboratory.
Art 235 Craft Materials and Skills (3)

Basic projects with various craft materials. Ceramics, metal, textiles, wood, and leather. Development of three-dimensional skills and concepts through the materials, and their properties. Evaluative criteria applied to craft materials. 2 lectures, 1 laboratory.

Art 241 Graphic Design (2)

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

Art 244 Fundamentals of Drawing (1-2)

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

Art 249 Watercolor Painting (2)

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

Art 312 Foundations of Modern Art (3)

Analysis of the foundations of the visual arts in modern life, equating the development of contemporary forms with those of other cultural forces. 3 lectures.

Art 339 Advanced Design (3)

Theory and application of aesthetic elements and principles and their relationships to human needs. Projects involving two and three dimensional design for specific functions. Prerequisite: Art 234 or 235 or LA 143 or permission of instructor.

Art 345 Intermediate Drawing (1-2)

The development of method and technique in figurative and perspective drawing. Emphasis on the individual solution of problems in compositions. 1 or 2 two-hour laboratories. Prerequisite: Art 244. May be repeated for a total of 3 units.

Art 439 Advanced Watercolor Painting (3)

Group and individual projects requiring solution in terms of established art principles and applied art theory. Traditional and experimental approach with the emphasis on individual development. 3 two-hour laboratories. Prerequisite: Art 234, 345 and permission of instructor.

Art 446 Advanced Drawing (1-2)

Development of individual concepts and styles through projects involving experimental and traditional drawing methods and media. 1 or 2 two-hour laboratories. Prerequisite: Art 345. May be repeated for a total of 3 units.

DESCRIPTIONS OF COURSES IN AUDIO-VISUAL TECHNIQUES

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

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

AV 440 Educational Television Production Workshop (3)

Theory and practice of educational television with emphasis on practical experience in the various aspects of production; planning, writing, graphics, directing, and studio operations. 1 lecture, 2 two-hour laboratories. May be repeated for a total of 9 units.

AV 441 Automated Instructional Procedures (3)

Automated instructional materials. Theory of programmed learning, current applications, and the state of the art. Laboratory experiences include evaluation and testing of existing programs and machines, construction of sample materials by the student. 1 lecture, 2 two-hour laboratories.
The primary 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 provides an intramural sports program for the students of the college and makes opportunities available for participation in intercollegiate athletics.

Another 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. By proper selection of elective courses, the student can prepare for work in recreation and in social work. Facilities include a gymnasium, swimming pools, outdoor basketball, tennis, and volleyball courts and turfed area for football, baseball, track and field.

**CURRICULAR OPTIONS**

**Physical Education**

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

**Recreation**

Emphasis is placed upon skills required for employment in public, industrial, and commercial recreational programs.

**CURRICULUM IN PHYSICAL EDUCATION**

<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>Basic Mathematics (Math 101)</td>
<td></td>
<td></td>
<td>3</td>
</tr>
<tr>
<td>Health Education (PE 107)</td>
<td></td>
<td></td>
<td>2</td>
</tr>
<tr>
<td>Safety and First Aid (PE 121)</td>
<td></td>
<td></td>
<td>2</td>
</tr>
<tr>
<td>Physical Education (PE 141)</td>
<td>½</td>
<td>½</td>
<td>½</td>
</tr>
<tr>
<td>Orientation to Physical Education (PE 157)</td>
<td>2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Introduction to Recreation (PE 126)</td>
<td>3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Swimming and Water Sports Theory and Practice (PE 123)</td>
<td></td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>Basic Biology (Bio 115, 145)</td>
<td>4</td>
<td>4</td>
<td>4</td>
</tr>
<tr>
<td>General Physical Science (PSc 101, 102, 103) or equivalent</td>
<td></td>
<td>3</td>
<td>2</td>
</tr>
<tr>
<td>Electives and courses to complete major</td>
<td>2</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td><em>To be selected from the General Education list. At least one course will be in literature.</em></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Course</th>
<th>F</th>
<th>W</th>
<th>S</th>
</tr>
</thead>
<tbody>
<tr>
<td>Principles of Economics (Ec 201, 202)</td>
<td>3</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>Principles of Physical Education (PE 201)</td>
<td></td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>Apparatus and Gymnastics (PE 225)</td>
<td></td>
<td></td>
<td>2</td>
</tr>
<tr>
<td>Public Speaking (Sp 200)</td>
<td></td>
<td></td>
<td>3</td>
</tr>
<tr>
<td>Human Anatomy and Physiology (Zoo 234, 235)</td>
<td>4</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>Physical Education (PE 141)</td>
<td>½</td>
<td>½</td>
<td>½</td>
</tr>
<tr>
<td>General Psychology (Psy 202)</td>
<td></td>
<td></td>
<td>3</td>
</tr>
<tr>
<td>Wrestling Theory and Practice (PE 221)</td>
<td></td>
<td></td>
<td>2</td>
</tr>
<tr>
<td>Advanced Swimming and Lifesaving (PE 245)</td>
<td></td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>Electives and courses to complete major</td>
<td>3</td>
<td>4</td>
<td>4</td>
</tr>
</tbody>
</table>

*To be selected from the General Education list. At least one course will be in literature.*
California State Polytechnic College

### Junior

<table>
<thead>
<tr>
<th>Course Description</th>
<th>F</th>
<th>W</th>
<th>S</th>
</tr>
</thead>
<tbody>
<tr>
<td>American Civilization (Am Civ 301, 302, 303)</td>
<td>3</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>Introduction to Dance (PE 334)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Kinesiology (PE 302)</td>
<td></td>
<td></td>
<td>3</td>
</tr>
<tr>
<td>Techniques of Officiating (PE 337)</td>
<td></td>
<td></td>
<td>2</td>
</tr>
<tr>
<td>Electives and courses to complete major</td>
<td>9</td>
<td>10</td>
<td>14</td>
</tr>
<tr>
<td></td>
<td>17</td>
<td>16</td>
<td>17</td>
</tr>
</tbody>
</table>

### Senior

<table>
<thead>
<tr>
<th>Course Description</th>
<th>F</th>
<th>W</th>
<th>S</th>
</tr>
</thead>
<tbody>
<tr>
<td>Minor Sports Theory and Practice (PE 441, 442, 443) (M)</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Senior Project (PE 461, 462)</td>
<td>2</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>Undergraduate Seminar (PE 463)</td>
<td></td>
<td></td>
<td>2</td>
</tr>
<tr>
<td>Electives and courses to complete major (M)</td>
<td>13</td>
<td>13</td>
<td>13</td>
</tr>
<tr>
<td>Electives and courses to complete major (W)</td>
<td>14</td>
<td>14</td>
<td>14</td>
</tr>
<tr>
<td></td>
<td>16</td>
<td>16</td>
<td>16</td>
</tr>
</tbody>
</table>

### PHYSICAL EDUCATION OPTION (ADD COURSES BELOW TO BASIC CURRICULUM)

#### Freshman

<table>
<thead>
<tr>
<th>Course Description</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Math 112 Basic Mathematics for General Education</td>
<td>(3)</td>
</tr>
<tr>
<td>PE 232 Intramural Sports</td>
<td>(3)</td>
</tr>
</tbody>
</table>

#### Sophomore

<table>
<thead>
<tr>
<th>Course Description</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>PE 303 Physiology of Exercise</td>
<td>(3)</td>
</tr>
<tr>
<td>Psy 306 Adolescent Psychology</td>
<td>(3)</td>
</tr>
<tr>
<td>**PE 321 Football Coaching Theory and Practice (M)</td>
<td>(2)</td>
</tr>
<tr>
<td>**PE 323 Baseball Coaching Theory and Practice (M)</td>
<td>(2)</td>
</tr>
<tr>
<td>PE 333 Track and Field Coaching Theory and Practice</td>
<td>(2)</td>
</tr>
</tbody>
</table>

### Junior

<table>
<thead>
<tr>
<th>Course Description</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>**PE 324-5-6 Teaching Progression in Girls' Sports (W)</td>
<td>(6)</td>
</tr>
<tr>
<td>PE 341-2-3 Directed Activity</td>
<td>(3)</td>
</tr>
<tr>
<td>**PE 406 Adaptive Physical Education</td>
<td>(3)</td>
</tr>
<tr>
<td>**PE 422 Basketball Coaching Theory and Practice (M)</td>
<td>(2)</td>
</tr>
<tr>
<td>PE 425 Tests and Measurements in Physical Education</td>
<td>(3)</td>
</tr>
<tr>
<td>PE 432 Athletic Training and Massage</td>
<td>(1)</td>
</tr>
<tr>
<td>**PE 446-7-8 Teaching Progression in Dance (W)</td>
<td>(6)</td>
</tr>
</tbody>
</table>

### RECREATION OPTION (ADD COURSES BELOW TO BASIC CURRICULUM)

#### Sophomore

<table>
<thead>
<tr>
<th>Course Description</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>PE 224 Administration of Recreation</td>
<td>(3)</td>
</tr>
<tr>
<td>PE 232 Intramural Sports</td>
<td>(3)</td>
</tr>
<tr>
<td>PE 222 Recreational Games</td>
<td>(2)</td>
</tr>
</tbody>
</table>

#### Junior

<table>
<thead>
<tr>
<th>Course Description</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>PE 300 Safety Education</td>
<td>(3)</td>
</tr>
<tr>
<td>PE 316 Social and Outdoor Recreation</td>
<td>(3)</td>
</tr>
<tr>
<td>Soc 201-2 Principles of Sociology</td>
<td>(6)</td>
</tr>
</tbody>
</table>

#### Senior

<table>
<thead>
<tr>
<th>Course Description</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>PE 301 Special Services in Recreation</td>
<td>(3)</td>
</tr>
<tr>
<td>PE 423 Field Work in Recreation</td>
<td>(4)</td>
</tr>
<tr>
<td>Art 235 Craft Materials and Skills</td>
<td></td>
</tr>
<tr>
<td>MU 101 Basic Music Skills</td>
<td>(3)</td>
</tr>
<tr>
<td>LA 224 Principles of Landscape Design</td>
<td>(4)</td>
</tr>
</tbody>
</table>

** Alternative Requirements for Men and Women Majors.
DESCRIPTI ONS OF COURSES IN PHYSICAL EDUCATION

PE 107 Health Education (2)
Personal hygiene and health education; investigation of the principles which promote attitudes and practices for optimum physical and mental health. Fire prevention and public safety; alcohol and other drugs. 2 lectures.

PE 121 Safety and First Aid (2)
A standard American Red Cross first aid course. Instruction and practice in the immediate and temporary care of injuries and sudden illness. 1 lecture, 1 two-hour laboratory.

PE 123 Swimming and Water Sports Theory and Practice (2)
Supervision of pool activities. Swimming instruction and safety. Teaching and coaching swimming and water polo. 1 lecture, 1 two-hour laboratory. Prerequisite: Demonstrated swimming ability.

PE 126 Introduction to Recreation (3)
Games and activities suitable for a community recreation program. 1 lecture, 2 two-hour laboratories.

PE 141 Physical Education (½)
Enrollment in activity classes limited as follows:
- Men only: Physical Fitness (prerequisite to all activities), apparatus and tumbling, basketball, physical fitness, flag football, handball, soccer, softball, track and field, volleyball, wrestling.
- Women only: fundamentals of movement (prerequisite to all activities), modern dance, field hockey, softball basketball.
- Coeducational: archery, badminton, dance, golf, swimming, tennis, fencing, volleyball. 2 activity periods. Total credit limited to 3 units.

PE 144 Beginning Swimming (½)
Beginning swimming for all who do not pass college swimming test. 2 activity periods. Total credit limited to 1 unit.

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. Course taken in lieu of PE 141 upon recommendation of college physician. 2 activity periods. Total credit limited to 3 units.

PE 151 Competitive Athletics (1)
May be substituted for required physical training by those qualified to compete in intercollegiate sports program. 10 hours activity. Total credit limited to 6 units.

PE 154 Dance Production (1)
Intermediate and advanced dance technique with an emphasis on composition and production in the area of dance, free exercise, gymnastics, etc. May be substituted for PE 141 by students talented in exhibition activities. 10 hours activity. Total credit limited to 6 units.

PE 157 Orientation to Physical Education Profession (2)
Orientation and guidance of major and minor students in physical education. Must be taken during the first quarter of enrollment as a physical education major or minor. 2 two-hour laboratories.

PE 201 Principles of Physical Education (3)
History and concept of physical education and recreation as a profession. Correlation between principles and methods. 3 lectures.

PE 221 Wrestling Theory and Practice (2)
Critical analysis of the methods and problems in coaching wrestling. 1 lecture, 1 two-hour laboratory.
PE 222 Recreational Games (2)
Development of a repertoire of group and individual quiet games for use by people confined to small areas. 1 lecture, 1 two-hour laboratory.

PE 224 Administration of Recreation (3)
Supervision and administration of recreation with consideration of facilities, budget, equipment maintenance, public relations, and special activities. 2 lectures, 1 two-hour laboratory.

PE 225 Apparatus and Gymnastics (2)
Critical analysis of methods and problems in coaching apparatus, gymnastics, and tumbling. 1 lecture, 1 two-hour laboratory. Prerequisite: PE 141, apparatus and tumbling.

PE 232 Intramural Sports (3)
Principles and policies underlying programs of intramural sports in schools and community centers. 2 lectures, 1 two-hour laboratory.

PE 245 Advanced Swimming and Lifesaving (2)
Lifesaving techniques. The Senior Red Cross Life Saving and the Water Safety Instructor's certificates will be issued to those students who qualify. 1 lecture, 1 two-hour laboratory.

PE 300 Safety Education (3)
Principles and practices of safety as applied to home, fire, industrial, school, community, and traffic situations. Accident prevention. 3 lectures.

PE 301 Introduction to Special Services in Recreation (3)
Orientation to field of hospital recreation, employee's recreation, commercial recreation, and industrial recreation. 3 lectures.

PE 302 Kinesiology (3)
Interrelationships of the body segments and the action of the joints and muscles involved in human movement; application of the principles of movements for the analysis and evaluation of selected physical education activities. 3 lectures. Prerequisite: Zoo 235

PE 303 Physiology of Exercise (3)
Effects of physical activity upon the circulatory, respiratory, and other physiological systems. Relationship of strength, co-ordination, flexibility, endurance, fatigue, conditioning, and related factors to human movement and athletic performance. 3 lectures. Prerequisite: PE 302

PE 316 Social and Outdoor Education (3)
Techniques in the development of leadership for recreational activities particularly as applied to outdoor camping. Social development and integration of individuals into group programs. 3 lectures.

PE 320 Driver Education and Driver Training (3)
Recommended procedures used in training drivers of high school ages. Attitudes and practices. 3 lectures.

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)
Methods and problems of teaching and coaching baseball. 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 and techniques of the following sports: basketball, softball, badminton, archery, tennis, soccer, speedball, speed-a-way, hockey, volleyball, golf. 1 lecture, 1 two-hour laboratory.

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

PE 337  Techniques of Officiating (2)
Problems, techniques, and practices of officiating major and minor sports in season. 1 lecture, 1 two-hour laboratory.

PE 341, 342, 343  Direction of Physical Education Activity (1) (1) (1)
Required of all majors in physical education. Experience in the supervision of physical education classes under the direction of regular faculty. 2 one-hour periods.

PE 344  Driver and Traffic Safety Education (3)
Methods, materials, and resources for effective teaching of driver instruction in secondary schools. Includes behind-the-wheel experience in teaching beginners to drive. 2 lectures, 1 laboratory.

PE 355  Driving Simulators (4)
Operation, preventive maintenance, and teaching techniques of simulators. Includes experience in teaching and coordinating classroom and simulator/dual-control car programs. 3 lectures, 1 laboratory.

PE 400  Special Problems for Advanced Undergraduates (1-2)
Individual or group investigation, research, studies, or surveys of selected problems. Total credit limited to 4 units, with a maximum of 2 units per quarter. Prerequisite: Senior standing or consent of instructor.

PE 406  Adaptive Physical Education (3)
Growth and development patterns; their relation to special and regular physical education programs; needs and methods for administering a recreation program for the handicapped. Analysis of postural divergencies and procedures for prevention and correction. 3 lectures. Prerequisite: PE 303

PE 411  Administration of Traffic Safety Programs (3)
Principles and practices of administering secondary school driver instruction programs. Includes legal aspects of driver education and driver training. 3 lectures.

PE 422  Baseketball Coaching Theory and Practice (2)
Fundamental individual basketball skills. Theories of offensive and defensive team play. 1 lecture, 1 two-hour laboratory.

PE 423  Field Work in Recreation (4)
Observation and participation in a community or industrial recreation program. 1 lecture, 3 two-hour laboratories. Prerequisite: Senior standing, PE 224 or departmental approval.

PE 425  Tests and Measurements in Physical Education (3)
Physical tests and measurements of skill, strength, speed, agility, and endurance as a basis for grading and evaluating the program and as a measure of progress in activities. 2 lectures, 1 two-hour laboratory.
PE 427 Advanced Sports Theory (2)
Theory and strategy of interscholastic and intercollegiate sports in season. Audiovisual, statistical, and scouting techniques as coaching aids. 1 lecture, 1 two-hour laboratory. Prerequisite: Completion of the appropriate Theory of Coaching course, one year of intercollegiate experience in the sport, or permission of the instructor.

PE 432 Athletic Training and Massage (1)
Prevention, examination, and care of athletic injuries, methods of taping, bandaging, and therapeutic exercises applied to athletic injuries, diets, training room equipment, protective devices, and supplies. 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: boxing, wrestling, tennis, golf, gymnastics, badminton, and six-man football. 1 two-hour laboratory.

PE 446, 447, 448 Teaching Progression in Dance (2) (2) (2)
Teaching progression in dance: folk, contemporary, and social. 2 two-hour laboratories. Prerequisite: PE 334

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

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

PE 521 Curriculum and Methods in Health and Physical Education (3)
Methods, curricular materials, and evaluation procedures in elementary and secondary school health and physical education. Directed observations, field experience; class organization, management of games and relays. 3 lectures. Prerequisite: Graduate standing and admission to teacher education program.

PE 590 Seminar in Physical and Health Education (1-3)
Special problems in selected areas of health education and physical education. Maximum of nine units credit may be earned. 1 to 3 lecture-discussions. Prerequisite: Graduate standing.
Three options are available for students desiring to major in the Physical Sciences. Courses may be selected to specialize in physics or in chemistry. As a third choice, courses may be selected which lead to a more general program embracing physics, chemistry and the earth sciences. These three options have different objectives and lead to different careers. All satisfy the requirements for subject matter majors leading to a secondary teaching credential. By choosing the proper electives in any of the three options, students planning to enter medicine, dentistry, or some other scientific field may meet the entrance requirements for such professions and also obtain the B.S. degree. These programs also provide prerequisites for entrance to graduate work at universities.

Students majoring in engineering, agriculture or life science will find courses designed to give them the necessary background for an understanding of the scientific principles which underly their practical work. The department also contributes to the general education of business and other arts and sciences majors by giving them a thorough foundation in the method and factual content of the physical sciences and the roles they play in modern society.

Department facilities include modern scientific equipment which allows the student to become acquainted with the latest techniques. It is recommended that the high school student planning to major in Physical Sciences include in his high school program three semesters of algebra, one of trigonometry, two of geometry, two of physics, and two of chemistry.

**CURRICULAR OPTIONS**

**Chemistry**

The chemistry option emphasizes chemistry and consists of beginning and advanced courses which lead to careers in chemistry in industry or government service.

**Physics**

The physics option emphasizes physics and mathematics. The career objective is employment in the field of physics with industry or in government service.

**Physical Sciences**

This option includes courses in physics, in chemistry, and in the earth sciences. The curriculum provides a foundation in these natural sciences for persons who plan careers calling for a depth of knowledge in a broad area of the physical sciences. The option is especially suitable for students with a number of transfer credits in the earth sciences. Students following this program may obtain jobs in industry as technicians or in business where some knowledge of chemistry, physics, astronomy, geology, or mineralogy is useful.
## CURRICULUM IN PHYSICAL SCIENCES

### Freshman

<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>General Chemistry (Chem 321, 322, 323)</td>
<td>4</td>
<td>4</td>
<td>4</td>
</tr>
<tr>
<td>General Physics (Phys 131, 132)</td>
<td>4</td>
<td>4</td>
<td>4</td>
</tr>
<tr>
<td>Physical Education (PE 141)</td>
<td>½</td>
<td>½</td>
<td>½</td>
</tr>
<tr>
<td>* Biological Sciences</td>
<td>3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>College Algebra and Trigonometry (Math 117)</td>
<td>5</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Analytic Geometry and Calculus (Math 118, 201)</td>
<td>5</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>Health Education (PE 107)</td>
<td>2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Electives and courses to complete major</td>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>16½</td>
<td>16½</td>
<td>16½</td>
</tr>
</tbody>
</table>

### Sophomore

<table>
<thead>
<tr>
<th>Course</th>
<th>F</th>
<th>W</th>
<th>S</th>
</tr>
</thead>
<tbody>
<tr>
<td>Physical Education (PE 141)</td>
<td>½</td>
<td>½</td>
<td>½</td>
</tr>
<tr>
<td>Principles of Economics (Ec 201, 202)</td>
<td>3</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>Analytic Geometry and Calculus (Math 202, 203)</td>
<td>3</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>General Psychology I (Psy 202)</td>
<td>3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>General Physics (Phys 133 or 204)</td>
<td>4</td>
<td></td>
<td></td>
</tr>
<tr>
<td>* Literature</td>
<td>3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Public Speaking (Sp 200)</td>
<td>3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Optics and Atomic Physics (Phys 211)</td>
<td>3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Introduction to Nuclear Physics (Phys 213)</td>
<td>3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Electives and courses to complete major</td>
<td>6</td>
<td>4</td>
<td>7</td>
</tr>
<tr>
<td></td>
<td>16½</td>
<td>16½</td>
<td>16½</td>
</tr>
</tbody>
</table>

### Junior

* Literature, Philosophy, Art or Music                                 | 3 | 4 | 3 |
| American Civilization (Am Civ 301, 302, 303)                         | 3 | 3 | 3 |
| Electives and courses to complete major                              | 11| 10| 14 |
|                                                                      | 17| 17| 17 |

### Senior

<table>
<thead>
<tr>
<th>Course</th>
<th>F</th>
<th>W</th>
<th>S</th>
</tr>
</thead>
<tbody>
<tr>
<td>Physical Chemistry (Chem 431, 432, 433)</td>
<td>4</td>
<td>4</td>
<td>4</td>
</tr>
<tr>
<td>Senior Project (Phys or Chem 461, 462)</td>
<td>2</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>Undergraduate Seminar (Phys or Chem 463)</td>
<td>10</td>
<td>10</td>
<td>10</td>
</tr>
<tr>
<td>Electives and courses to complete major</td>
<td>16</td>
<td>16</td>
<td>16</td>
</tr>
</tbody>
</table>

### CHEMISTRY OPTION (ADD COURSES BELOW TO BASIC CURRICULUM)

#### Freshman

<table>
<thead>
<tr>
<th>Course</th>
<th>F</th>
<th>W</th>
<th>S</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chem 171 Chemistry Laboratory Practices</td>
<td>1</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

#### Sophomore

<table>
<thead>
<tr>
<th>Course</th>
<th>F</th>
<th>W</th>
<th>S</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chem 340 Nutrition</td>
<td>3</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

#### Junior

<table>
<thead>
<tr>
<th>Course</th>
<th>F</th>
<th>W</th>
<th>S</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chem 326-7, 330 Organic Chemistry</td>
<td>12</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Chem 328-9 Biochemistry</td>
<td>8</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

* To be selected from General Education list.
Arts and Sciences Division

PHYSICS OPTION (ADD COURSES BELOW TO BASIC CURRICULUM)

Junior
Phys 301 Physics of Thermal Phenomena
Phys 303-4-5 Mathematical Methods in Applied Physics
Phys 313-4 Physics of Electrical and Magnetic Phenomena
Math 316-7 Differential Equations

Senior
Phys 401-2 Modern Physics
Phys 403 Advanced Nuclear Physics
Phys 406 Solid State Physics
Phys 407 Statistical Physics
Phys 408 Quantum Mechanics
Phys 430 Advanced Physics Laboratory

PHYSICAL SCIENCES OPTION (ADD COURSES BELOW TO BASIC CURRICULUM)

Sophomore
SS 121 Soils
PSc 216 Astronomy

Junior
PSc 320 Historical Geology
PSc 321 Mineralogy
PSc 322 Geomorphology
PSc 329 Physical Geology
Chem 326 Organic Chemistry
Chem 328 Biochemistry I

Senior
Chem 337 Soil Analysis
Chem 338 Plant Tissue Analysis
Phys 339 Soil Physics
Phys 401, 402 Modern Physics

DESCRIPTIONS OF COURSES IN CHEMISTRY

Chem 4 Preparatory Chemistry (3)
For students whose background is deficient in chemistry. Symbols, nomenclature, molecular theory, problems dealing with the metric system, density, formulas, percentage composition, and chemical equations. 3 lectures. Prerequisite: Math 112

Chem 171 Chemical Laboratory Practices (1)
The use, care, and handling of laboratory glassware and apparatus. Fundamental techniques of glass blowing. Safety procedures. 1 laboratory.

Chem 321 General Chemistry (4)
General principles emphasizing correlation of properties of elements with atomic structure. Fundamental reactions and elementary equilibria. For science, engineering, and math students. 3 lectures, 1 laboratory. Prerequisite: PSc 103 or Chem 4 or satisfactory score in the chemistry placement test.

Chem 322 General Chemistry (4)
The metals, electrochemistry, properties of solutions, nuclear chemistry. Introductory thermodynamics, and kinetics. Introduction to the chemistry of the carbon and silicon compounds, high polymers, fuels, etc. 3 lectures, 1 laboratory. Prerequisite: Chem 321

Chem 323 General Chemistry (4)
Applications and limitations of analytical chemistry. Predicting direction and extent of reactions. Selection of materials for science and engineering problems using theoretical principles of electrostatics. Qualitative analysis in the laboratory. 2 lectures, 2 laboratories. Prerequisite: Chem 322 or 325

Chem 324 General Inorganic Chemistry (4)
Fundamental principles including atomic structure, periodic classification of the elements, fundamental reactions, electrochemistry, and chemical calculations. For agricultural majors. 3 lectures, 1 laboratory. Prerequisite: PSc 103 or Chem 4 or the passing of a placement test.
Chem 325 General Inorganic Chemistry (4)
Basic principles of equilibrium, solution, and colloids. Properties of the common elements and their compounds with applications to agriculture. 3 lectures, 1 laboratory. Prerequisite: Chem 324

Chem 326 Organic Chemistry (4)
The fundamental concepts of organic chemistry with applications for science, engineering and agriculture students. 3 lectures, 1 laboratory. Prerequisite: Chem 321 or 324

Chem 327 Organic Chemistry (4)
Aliphatic compounds and reactions emphasizing modern physical-organic concepts. The laboratory work stresses organic synthesis and qualitative analysis of organic compounds. 3 lectures, 1 laboratory. Prerequisite: Chem 326

Chem 328 Biochemistry I (4)
Chemistry of carbohydrates, lipids, proteins and other classes of substances found in living tissues. Chemical nature of enzymes and their action including digestion and intermediary metabolism. Laboratory work includes test-tube reactions, enzymology and analytical procedures employing volumetric and colorimetric procedures. 3 lectures, 1 laboratory. Prerequisite: Chem 326

Chem 329 Biochemistry II (4)
Chemistry of metabolic processes in plants and animals including respiration, functions of blood, hormones, nitrogen, metabolism, energy metabolism and chemical aspects of nutrition. Laboratory work includes the study of live plants and animals as well as surviving tissues. 3 lectures, 1 laboratory. Prerequisite: Chem 328

Chem 330 Organic Chemistry (4)
Continuation of Chem 327 to include a survey of aromatic compounds and reactions. 3 lectures, 1 laboratory. Prerequisite: Chem 327

Chem 331 Quantitative Analysis I (4)
Principles and techniques involved in fundamental gravimetric and volumetric analysis. Laboratory work is the focal point, with class discussion supplying supporting theory. Emphasis on application of chemical equilibrium and methods of problem solving. 2 lectures, 2 laboratories. Prerequisite: Chem 322 or 325

Chem 332 Quantitative Analysis II (4)
A continuation of Chem 331 but with greater emphasis on theory, analytical problems in acidimetry and alkalimetry, oxidimetry, electrolytic deposition and colorimetric analysis. 2 lectures, 2 laboratories. Prerequisite: Chem 331

** Chem 333 Instrumental Methods of Analysis (3)
Spectrophotometry, electroanalysis, and other instrumental methods of analysis. 2 lectures, 1 laboratory. Prerequisite: Chem 331

Chem 334 Radiochemistry (4)

Chem 335 Biochemistry III (4)
Amino acid, purine and pyrimidine metabolism; metabolism of water and electrolytes; biochemistry of toxic materials; immunochemistry. 3 lectures, 1 laboratory. Prerequisite: Chem 329.

Chem 337 Soil Analysis (2)
Chemical analysis as a means of diagnosing problems related to western soils. 1 lecture, 1 laboratory. Prerequisite: Chem 322 or 325

** Offered in even-numbered years.
Chem 338  Plant Tissue Analysis  (2)
Chemical analysis of plant tissue as a guide to fertilization and crop production. 1 lecture, 1 laboratory. Prerequisite: Chem 322 or 325

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: Senior standing or consent of instructor.

Chem 430  Advanced Inorganic Chemistry  (4)
Detailed study of the inorganic elements based on periodic grouping and stressing electronic configuration, physical and chemical properties. 3 lectures, 1 laboratory. Prerequisite: Chem 323

Chem 431  Physical Chemistry I  (4)
Physical properties and molecular constitution of gases, solids, and liquids. Elements of crystallography. Thermochemistry. Chemical thermodynamics. 3 lectures, 1 laboratory. Prerequisite: Chem 323

Chem 432  Physical Chemistry II  (4)
Solutions of volatile and nonvolatile solutes. Homogeneous and heterogeneous equilibria. Theories of rate processes. Chemical kinetics. General and enzymatic catalysis. 3 lectures, 1 laboratory. Prerequisite: Chem 431 or ME 301

Chem 433  Physical Chemistry III  (4)
Electric conductance and emg measurements. Behavior of dispersed systems including colloids. Theory and analytical applications of adsorption. Photochemistry. 3 lectures, 1 laboratory. Prerequisite: Chem 432

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

Chem 463  Undergraduate Seminar  (2)
A study of current developments in chemistry and a discussion of periodical literature at an appropriate level. 2 lecture-discussions.

DESCRIPTIONS OF COURSES IN PHYSICS

Phys 121  College Physics  (4)
Principles of mechanics and heat. Statics, uniform motion, accelerated motion, Newton's second law, work and energy, impulse and momentum, rotational motion, fundamentals of heat, properties of gases, heat flow. 3 lectures, 1 laboratory. For non-engineering students. Prerequisite: Math 101

Phys 122  College Physics  (4)
Sound and light. Simple harmonic motion. Wave motion, Doppler effect, acoustical phenomena, geometrical and physical optics, elements of spectroscopy. 3 lectures, 1 laboratory. For non-engineering students. Prerequisite: Phys 121

Phys 123  College Physics  (4)
Electrostatics, magnetostatics, current electricity, potential, dielectrics, capacitance, Ohm's Law, electromagnetics. 3 lectures, 1 recitation. For non-engineering students. Prerequisite: Phys 122

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. Concurrent: Math 118 or higher.
Phys 132 General Physics (4)
Fundamental principles of hydraulics, heat, sound, and light. Fluids at rest and in motion, temperature, expansion, quantity of heat, heat transfer, thermodynamics, thermal properties of matter, wave motion, vibrating bodies, acoustical phenomena, nature and propagation of light, geometric optics. 3 lectures, 1 laboratory. Prerequisite: Phys 131

Phys 133 General Physics (4)
Fundamental principles of magnetostatics, electrostatics, and current electricity. Coulomb's law, electric field, potential, properties of dielectrics, capacitance, Ohm's law, magnetism and magnetic fields, measuring instruments, magnetic field of a moving charge, induced emg, ac circuits. 3 lectures, 1 laboratory. Prerequisite: Phys 131

Phys 204 Physics of Electricity and Magnetism (4)
Coulomb's law, the electrostatic field, potential, properties of dielectrics, capacitance and capacitors, the magnetostatic field, the magnetic field of a current, induced electromotive force, inductance, magnetic properties of matter. 4 lectures. Prerequisite: Phys 131 and Math 201

Phys 211 Elementary Physical Optics and Atomic Physics (3)
Basic physical optics and applications. Introduction to the fundamental particles, interpretation of spectra, radioactivity and atomic structure. 3 lectures. Prerequisite: Phys 133 or 204

** Phys 213 Introduction to Nuclear Physics (3)
Elementary theory of nuclear structure, including a study of nuclear reactions, particle accelerators, and nuclear instruments. Application in atomic energy and nuclear engineering. 3 lectures. Prerequisite: Phys 211

Phys 222 Sound (3)
Vibratory motion. Transverse waves, longitudinal waves, vibration of bars. Velocity of sound, vibrating air columns. Interference. Intensity and intensity level. Loudness and loudness level. 2 lectures, 1 laboratory. Prerequisite: Phys 133 or 204

Phys 223 Light (4)
The physical nature of light. Reflection, refraction, diffraction, interference, polarization, and absorption of light. 2 lectures, 2 laboratories. Prerequisite: Phys 133 or 204

Phys 301 Physics of Thermal Phenomena (3)
The physical nature of thermal processes. Fundamental concepts of thermodynamics and thermodynamic systems necessary for the treatment of practical problems dealing with phenomena associated with heat flow and the utilization of thermal energy. 3 lectures. Prerequisite: Phys 133 or 204 and Math 203

Phys 303, 304, 305 Mathematical Methods in Applied Physics (3) (3) (3)
Solution of practical problems in physics by mathematical methods. Analysis of phenomena involving motion of particles and rigid bodies using such techniques as vector calculus, differential equations, calculus of variation, and complex variables, Lagrange's and Hamilton's equations. 3 lectures. Prerequisite: Phys 133 or 204, and Math 316

Phys 313, 314 Physics of Electrical and Magnetic Phenomena (3) (3)
Principles of electrical and magnetic phenomena of fundamental importance in practical application. Static electric and magnetic fields, dielectric and magnetic materials, magnetic effects of currents, Maxwell's field equations. 3 lectures. Prerequisite: Phys 133 or 204, Phys 304, and Math 316

Phys 339 Soil Physics (2)
Fundamental aspects of soil physics and its application. 1 lecture, 1 laboratory. Prerequisite: SS 121

** Offered in even-numbered years.
Phys 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.

Phys 401  Modern Physics (3)

Atomic theory of matter, fundamental atomic particles. Thermal radiation and quantum theory, atomic and nuclear structure, electromagnetic radiation effects. 3 lectures. Prerequisite: Phys 133 or 204 and Math 203

Phys 402  Modern Physics (3)

Special theory of relativity, X-ray phenomena, wave-particle duality, quanta and atoms, wave mechanics, applications of quantum mechanics. 3 lectures. Prerequisite: Phys 401

* Phys 403  Advanced Nuclear Physics (3)

Natural and induced radioactivity, induced nuclear disintegration and nuclear reactions, interactions with matter of charged particles and gamma rays, Neutron physics, nuclear fusion, nuclear fission, nuclear reactions and related applications. 3 lectures. Prerequisite: Phys 402

Phys 406  Solid State Physics (3)

The crystalline structure of solids. Properties of metallic and ionic lattices. Electrical properties of insulators, metals and semiconductors. 3 lectures. Prerequisite: Phys 408

Phys 407  Statistical Physics (3)

Study of the statistical behavior of physical systems composed of large numbers of similar particles. Applications to thermal phenomena and the physics of gases. 3 lectures. Prerequisite: Math 316, Phys 301

Phys 408  Quantum Mechanics (3)

Experimental foundations of quantum theory. The Schroedinger wave equation and its interpretation. Solutions for one dimensional problems and the one electron atom. 3 lectures. Prerequisite: Math 316, Phys 401

Phys 430  Advanced Physics Laboratory (3)

Selected topics in advanced experimental physics. 3 laboratories. Prerequisite: Consent of department.

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

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

Phys 463  Undergraduate Seminar (2)

Study of current developments in physics and discussion of periodicals of an appropriate level. 2 lecture-discussions.

**DESCRIPTIONS OF COURSES IN PHYSICAL SCIENCE**

PSc 101  General Physical Science (4)

Geological features and processes. Astronomical phenomena and concepts. The development of a better understanding of man's physical environment. The scientific method of working and thinking. PSc 101 is not open to students who have credit for PSc 329 or 216. 3 lectures, 1 recitation.

* Offered in odd-numbered years.
PSc 102 General Physical Science (4)
Fundamental principles of physics. Various theories of matter and energy and the principles and laws that describe their behavior and applications. Some special knowledge of modern science that will function in a socially desirable manner in the lives of students. PSc 102 is not open to students who have credit for Phys 121 or 131. 3 lectures, 1 recitation. Prerequisite: A college math course.

PSc 103 General Physical Science (4)
Fundamental principles of chemistry. Chemical changes and their uses. A number of recent advances. Objective observation and experimentation in the solution of problems relating to natural phenomena. PSc 103 is not open to students who have credit for Chem 321 or 324. 3 lectures, 1 recitation.

PSc 216 Astronomy (3)
Astronomical properties of the earth, solar system, stars, and galaxies. Principles and methods of astronomical investigation, designed primarily for students majoring in a physical science or mathematics. 3 lectures. Prerequisite: Math 117 or permission of instructor.

PSc 320 Historical Geology (3)
A description of the evolution of landscapes beginning with the origin of the earth. Includes discussions of conditions and changes occurring during successive geologic ages. 2 lectures, 1 laboratory.

* PSc 321 Mineralogy (3)
Identification and occurrence of common rocks and minerals. Includes elementary crystallography, physical and chemical examinations of minerals and descriptive mineralogy. 2 lectures, 1 laboratory. Prerequisite: PSc 329

** PSc 322 Geomorphology (3)
Various landforms and interpretation of forces resulting in these landforms. 2 lectures, 1 laboratory. Prerequisite: PSc 329

PSc 325 Engineering Geology (4)
Fundamentals of geology applied to engineering problems. Emphasis on rock types, structure, erosion, sedimentation, and soil movements. 3 lectures, 1 laboratory.

PSc 329 Physical Geology (4)
Fundamental geologic processes. General surface features of the earth. Rocks and minerals. 3 lectures, 1 laboratory. Not open for credit to students who have completed PSc 101

PSc 430 Invertebrate Paleontology (3)
Morphology and evolution of fossil invertebrates. Includes discussions of ancient environments and changes in life forms with time. 2 lectures, 1 laboratory. Prerequisite: PSc 320 or Zoo 135

PSc 521 Curriculum and Methods in the Physical Sciences (3)
Techniques, aims and objectives in the teaching of physics, chemistry, physical science and general science at the secondary school level. Selection and organization of teaching material. Evaluation of results. 3 lectures. Prerequisite: Graduate standing and admission to teacher education program.

PSc 590 Seminar in the Physical Sciences (1-3)
Special problems in selected areas of physics and chemistry. Maximum of six units may be earned. 1 to 3 lectures. Prerequisite: Graduate standing.

* Offered in odd-numbered years.
** Offered in even-numbered years.
SOCIAL SCIENCES DEPARTMENT

Department Head, Frederick B. Heath

Kenneth L. Beauchamp  David L. Levering  Herman J. Ruether
Thomas C. Blackburn  Barbara H. Lingenfelter  Ralph E. Shaffer
Ben S. Gantz  Werner H. Marti  William A. Smith
Rodman F. Garrity  Robert L. Maurer  Dorothy M. Tucker
Kenneth A. Green  Joseph L. Philbrick  Bruce E. Wilson
Louis J. King  Donald H. Pflueger
Marcia E. Lasswell  Richard C. Richards

The Social Sciences Department serves Agriculture, Business, Engineering, and Arts and Sciences students by providing courses that give the necessary backgrounds in anthropology, economics, education, geography, history, philosophy, political science, psychology and sociology. In the area of general education, the department prepares the student to understand himself and others better, and to grasp the significance of the major social and philosophical problems of mankind.

The department offers a social sciences major planned to prepare students for entry jobs in civil service, business, industry, and social services, and also to prepare elementary and secondary school teachers of the social studies. The student will elect an option in Economics, Social Services or Social Sciences depending upon his occupational objective. He is further encouraged and advised to select elective courses that will more effectively prepare him for successful employment and worthwhile citizenship. The course offerings in this department also assist majors in other departments to prepare themselves for civil service positions by providing information of value on the job and in preparation for civil service examinations.

There are no special requirements for admission to the social sciences major. Since courses in the social sciences generally have heavy reading requirements, it is recommended that high school students interested in this major field seek to develop their reading skills before entering college.

CURRICULAR OPTIONS

Social Services
This option provides basic instruction and actual experience in social services and the case-study method, preparing the students for entry jobs in many types of social service agencies.

Social Sciences
The student receives a broad background leading to positions in business and government such as management trainee. By proper selection of electives, this option leads to preparation for elementary or secondary teaching upon completion of the fifth year.

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

CURRICULUM IN SOCIAL SCIENCES

<table>
<thead>
<tr>
<th>Freshman</th>
<th>F</th>
<th>W</th>
<th>S</th>
</tr>
</thead>
<tbody>
<tr>
<td>Principles of Sociology (Soc 201, 202, 203) or Principles of Anthropology (Ant 201, 202, 203)</td>
<td>3</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>History of Civilization (Hist 101, 102, 103)</td>
<td>5</td>
<td>5</td>
<td>5</td>
</tr>
<tr>
<td>Freshman Composition (Eng 104, 105, 106)</td>
<td>3</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>Physical Education (PE 141)</td>
<td>½</td>
<td>½</td>
<td>½</td>
</tr>
<tr>
<td>* Mathematics</td>
<td>3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Health Education (PE 107)</td>
<td>2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Electives and courses to complete major</td>
<td>3</td>
<td>2</td>
<td>5</td>
</tr>
</tbody>
</table>

* To be selected from the General Education list.

16½  16½  16½
### Sophomore

<table>
<thead>
<tr>
<th>Course</th>
<th>F</th>
<th>W</th>
<th>S</th>
</tr>
</thead>
<tbody>
<tr>
<td>General Psychology (Psy 202)</td>
<td>3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Principles of Economics (Ec 201, 202, 203)</td>
<td>3</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>Principles of Political Science (Pol Sc 201, 202)</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>Natural Sciences</td>
<td></td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>History of the United States (Hist 201, 202, 203)</td>
<td>3</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>Electives and courses to complete major</td>
<td></td>
<td>4</td>
<td>7</td>
</tr>
</tbody>
</table>

### Junior

<table>
<thead>
<tr>
<th>Course</th>
<th>F</th>
<th>W</th>
<th>S</th>
</tr>
</thead>
<tbody>
<tr>
<td>Natural Sciences</td>
<td></td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>Literature</td>
<td></td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>Introduction to Philosophy (Phil 201)</td>
<td></td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Electives and courses to complete major</td>
<td>8</td>
<td>11</td>
<td>11</td>
</tr>
</tbody>
</table>

### Senior

<table>
<thead>
<tr>
<th>Course</th>
<th>F</th>
<th>W</th>
<th>S</th>
</tr>
</thead>
<tbody>
<tr>
<td>Social Psychology (Psy 401) or Contemporary Social Problems (Soc 311)</td>
<td></td>
<td></td>
<td>3</td>
</tr>
<tr>
<td>Senior Project (Soc Sc 461, 462)</td>
<td>2</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>Undergraduate Seminar (Soc Sc 463)</td>
<td></td>
<td></td>
<td>2</td>
</tr>
<tr>
<td>Public Speaking (Sp 200)</td>
<td></td>
<td></td>
<td>3</td>
</tr>
<tr>
<td>Electives and courses to complete major</td>
<td>14</td>
<td>11</td>
<td>11</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Course</th>
<th>F</th>
<th>W</th>
<th>S</th>
</tr>
</thead>
<tbody>
<tr>
<td>Eng 216 Report Writing</td>
<td>(3)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ant 311 Culture and Personality</td>
<td>(3)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ant 312 Applied Anthropology</td>
<td>(3)</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Soc 401 Urban Sociology</strong></td>
<td>(3)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Soc 211–2–3 Introduction to Social Services</td>
<td>(3)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Soc 241–2–3 Social Service</td>
<td>(3)</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Psy 305 Child Growth and Development or</strong></td>
<td>(3)</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Psy 306 Adolescent Psychology</strong></td>
<td>(3)</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Soc 206 Family Relations</strong></td>
<td>(3)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### SOCIAL SERVICES OPTION (ADD COURSES BELOW TO BASIC CURRICULUM)

<table>
<thead>
<tr>
<th>Course</th>
<th>F</th>
<th>W</th>
<th>S</th>
</tr>
</thead>
<tbody>
<tr>
<td>Soc 311–2–3 Philosophy and Techniques of Social Services</td>
<td>(3)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Soc 341–2–3 Advanced Social Service Experience</td>
<td>(6)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Psy 314 Human Relations</td>
<td>(3)</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Psy 305 Child Growth and Development or</strong></td>
<td>(3)</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Psy 306 Adolescent Psychology</strong></td>
<td>(3)</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Soc 206 Family Relations</strong></td>
<td>(3)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### SOCIAL SCIENCES OPTION (ADD COURSES BELOW TO BASIC CURRICULUM)

<table>
<thead>
<tr>
<th>Course</th>
<th>F</th>
<th>W</th>
<th>S</th>
</tr>
</thead>
<tbody>
<tr>
<td>Psy 223 General Psychology III</td>
<td>(3)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Geog 201 Principles of Geography</td>
<td>(3)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hist 321 History of California</td>
<td>(3)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hist 415 Europe in the 20th Century</td>
<td>(3)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hist 313 History of Latin America</td>
<td>(3)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hist 417 History of Soviet Area or Soc 401 Urban Sociology</td>
<td>(3)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*To be selected from the General Education list.
**Physical Education Majors will substitute Principles of Sociology (Soc 201, 202, 203) in place of these courses.
ECONOMICS OPTION (ADD COURSES BELOW TO BASIC CURRICULUM)

Sophomore
Ec 231 Development of Economic Doctrine (3)
Math 211 Statistics (3)
Acc 121 Principles of Accounting (3)

Junior
Ec 251 Price and Income Analysis (5)
Ec 301 Public Finance (4)
Ec 302 Business and Government (3)
Ec 308 Money and Banking (3)

Senior
Geog 312 Economic Geography and World Resources (3)
Ec 401 International Trade and Finance (3)
Ec 402 Economic Development (3)
Ec 403 Comparative Economic Systems (3)
Ec 413 Managerial Economics or
Ec 414 Labor Economics (3)

DESCRIPTIONS OF COURSES IN AMERICAN CIVILIZATION

Am Civ 301, 302, 303 American Civilization (3) (3) (3)
An analysis of American Civilization with emphasis on the social, political, and economic ideas and practices which have moulded the unique American character; emphasis on American Government, American ideals, and the United States and the contemporary world. Courses to be taken in sequence. 3 lectures.

DESCRIPTIONS OF COURSES IN ANTHROPOLOGY

Ant 201, 202, 203 Principles of Anthropology (3) (3) (3)
Physical, cultural and social anthropology; human evolution and heredity; racial classification; the nature of culture; cultural phenomena; comparative social organization; religion and value systems of non-literate and folk peoples; culture and psychological processes in the development of personality. 3 lectures.
Ant 311 Culture and Personality (3)
Relations of variations in culture to personality development in different societies, both primitive and modern. Comparative study of the interrelationships of cultural milieu, child training and education. 3 lectures. Prerequisite: Ant 203 or Soc 201
Ant 312 Applied Anthropology (3)
The application of anthropological knowledge to the solution of practical problems in social work, education, race relations, public administration, international relations, and economic development. 3 lectures. Prerequisite: Ant 203

DESCRIPTIONS OF PROFESSIONAL COURSES FOR TEACHER PREPARATION

Ed 107 Introduction to Education (3)
Nature of the teaching profession. Qualifications of successful teachers. Analysis of duties and functions of elementary and secondary school teaching. School law and certification requirements. Opportunities for advancement. Observation of teaching situations in public schools. 3 lectures.
Ed 200 School Observation (½)
Supervised observation of children in the classroom and on the college campus. May be repeated for total of one unit of credit.
Ed 301 Principles of Education (3)
Purposes, organization, and development of the public school in America. Emphasis on the elementary and secondary school curriculum through intensive study and school visitations. 3 lectures.
Ed 420, 421, 422  Materials and Methods in Elementary Education (3) (3) (3)

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

Ed 430  Student Teaching (Secondary) (3-12)

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

Ed 431  Student Teaching (Elementary) (3-12)

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

Ed 503  Secondary School Teaching Plans and Techniques (3)

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

DESCRIPTIONS OF COURSES IN GEOGRAPHY

Geog 201, 202  Principles of Geography (3) (3)

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

Geog 301  Regional World Geography (3)

Major geographic regions of the world: their climates, landforms, soils, flora, fauna, agricultural systems, industries. Intensive study of selected regions. 3 lectures.

Geog 312  Economic Geography and World Resources (3)

Economic aspects of man’s environment. Economic implications of the distribution or location of natural resources throughout the world. Economic significance of physical and cultural landscapes throughout the world. 3 lecture-discussions. Prerequisite: Ec 201, 202

DESCRIPTIONS OF COURSES IN HISTORY

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

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

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.

Hist 301, 302, 303  History of Asia (3) (3) (3)

Historic background of the Far East, Southeast Asia, the Asian Sub-continent, and Southwest Asia. Political, social, and cultural developments. United States influence, interests, and responsibilities throughout Asia. 3 lectures. Prerequisite: Junior standing or permission of the instructor.

Hist 312  History of Africa (3)

Twentieth century developments in Africa. Modern imperialism and the recent rise of nationalistic forces in this area. Political and economic trends; social, religious, and cultural factors in this area. 3 lectures. Prerequisite: Junior standing or permission of instructor.
Hist 313 History of Latin America (3)
Survey of Latin America from the 15th century to the present. Emphasis on the economic, cultural, and historical development of the area. 3 lectures. Prerequisite: Junior standing or permission of instructor.

Hist 314 History of the American West (3)
Impact of frontier conditions upon the social, economic, political, and intellectual life of the United States. Place of the west in the arena of international politics. Prerequisite: Junior standing or permission of instructor.

Hist 316 Diplomatic History of the United States (3)
Development, policies, methods, traditions, and organizational structure involved in United States foreign relations from independence to the present era. Relationship of foreign policy to domestic American problems. Role of public opinion. Prerequisite: Junior standing or permission of instructor.

Hist 321 History of California (3)
Development of California; early explorations, colonizations; organization, government, and economy from beginnings to the present; development of culture, industry, agriculture, government, and population. 3 lectures.

Hist 410 American Colonial History (3)
Political, social and economic study of the Anglo-Colonial World. Qualities of Colonial life as contributory reasons for revolt. Colonial cultural debt to the Old World. 3 lectures.

Hist 414 Social and Agrarian Reform (3)
American social and agrarian reform movements. Penal reform, land reform, women's rights, and peace movements; economic reforms in the Twentieth Century. 3 lectures. Prerequisite: Junior standing or permission of instructor.

Hist 415 Europe in the 20th Century (3)
The political, economic, and social forces which have influenced the great powers of Europe in the 20th Century. The development of 20th Century ideologies. 3 lectures. Prerequisite: Junior standing or permission of instructor.

Hist 417 History of the Soviet Area (3)
A survey of modern Russian history with an emphasis on the post World War I period. The rise of Communism and its subsequent spread throughout Eastern Europe and Asia. 3 lectures. Prerequisite: Junior standing or permission of instructor.

DESCRIPTIONS OF COURSES IN LIBRARY
Lib 103 Library and Bibliographical Techniques (3)
Fundamentals of finding information in the library and of obtaining information from government and commercial sources. General and specialized bibliographical citations. 3 lectures.

Lib 331 Library Techniques for Teachers (3)
Current school library practices. The organization and the administration of school libraries; review of the sources of teacher's materials. 3 lectures.

DESCRIPTIONS OF COURSES IN PHILOSOPHY
Phil 201 Introduction of Philosophy (3)
A study of the purposes and meaning of philosophy for intelligent living. The study of philosophic methods and a study by philosophic method of issues traditional to philosophy and their relevance to contemporary living. A study of the methods, values and theories of philosophical systems, ancient to modern through a problem approach. 3 lectures.
Phil 202 Logic (3)
A study of inductive and deductive processes in reasoning. The uses of logic in science and in daily life. Analysis of fallacies; their detection in daily life. Study of logic and language, rules of deductive inference, symbolic processes in logical calculation, the rules of argumentation, formation and validation of scientific hypotheses, analysis of proposition, the syllogism. 3 lectures.

Phil 204 Ethics (3)
The implications of ethics and ethical systems. The meaning of right and wrong, Sanctions and sources of morality. Inquiry into the principles of the morality of human actions. The ethical foundations of personal and social relations. 3 lectures.

Phil 205 Symbolic Logic and Set Theory (3)
Logic of propositions and sets including sentential calculus, set operations, metamathematics, quantifications, structure of an axiomatic system, functions and relations. 3 lectures. Prerequisite: Math 101, 117, or 207

Phil 501 Philosophy of Education (3)
The function of philosophy; the meaning of education; significance of present philosophical points of view; educational aims and values; democracy and education; the relationship of various philosophical outlooks to educational methods and subject matter. 3 lectures. Prerequisite: Graduate standing and permission of instructor.

DESCRIPTIONS OF COURSES IN POLITICAL SCIENCE

Pol Sc 201, 202, 203 Principles of Political Science (3) (3) (3)
Introduction to the principal methods and concepts used to analyze, explain and justify governmental institutions and political behavior. Emphasis on national government and federal system, distribution of powers and intergovernmental relations. Comparisons will be made showing the effect of historical, cultural, ideological, institutional, and personal factors in political problem-solving. 3 lectures. Pol Sc 201 meets the state requirement in U.S. Constitution and state and local government.

Pol Sc 310 Recent and Contemporary Ideologies (3)
Analysis of the historical, cultural, and institutional roots of the various democratic, marxist, socialist, communist, liberal, conservative, and pluralist orientations toward social organization, human behavior, and governmental authority, in order better to understand the nature and function of constitutional, democratic, and republican government. 3 lectures. Prerequisite: Junior standing or permission of instructor.

Pol Sc 314, 315, 316 Public Administration (3) (3) (3)
Principles of organization, management, authority, and administrative action from the point of view of government and public service. Executive functions of government, responsibility, community welfare, and concrete problem solving. Public law affecting municipal and county government. 3 lectures. Prerequisite: Junior standing or permission of instructor.

Pol Sc 401 State and Local Government (3)
The structure, function and problems of state, county, municipal, and district governments. 3 lectures. Prerequisite: Junior standing or permission of instructor.

Pol Sc 411 Inter-American Relations (3)
Inter-American affairs. Political, economic, and social problems; forces motivating cultural behavior, industrial development, trade techniques, agricultural methods. Opportunities for employment in agriculture, engineering, and business. Finding and evaluating authoritative source materials on Latin American affairs. 3 lectures. Prerequisite: Junior standing or permission of instructor.
Arts and Sciences Division

Pol Sc 412 International Relations (3)
Analysis of international organizations, including political and economic types. Problems of security, the League of Nations, the United Nations and its special agencies. 3 lectures. Prerequisite: Junior standing or permission of instructor.

Pol Sc 413 Comparative Government (3)
Contemporary political situation in Britain, France, Soviet Union, Germany, Italy, and Japan. Policies and problems; forces making for conflict and adjustment. Constitutional, economic, communal, and sovereignty bases. 3 lectures. Prerequisite: Junior standing or permission of instructor.

Pol Sc 414 Political Parties and Pressure Groups (3)
Dynamics of contemporary political parties and pressure groups in the United States. Analysis of the aspirations, organization, and techniques employed by agriculture, business, and labor as well as other special interest groups. 3 lectures. Prerequisite: Junior standing or permission of instructor.

Pol Sc 415 American Political and Social Thought (3)
American political and social thought and the philosophies of those individuals who have influenced it. 3 lectures. Prerequisite: Junior standing or permission of instructor.

DESCRIPTIONS OF COURSES IN PSYCHOLOGY

Psy 202 General Psychology I (3)
Basic concepts, methods, and vocabulary of psychology with emphasis upon human behavior as an object of scientific study. 3 lectures.

Psy 203 General Psychology II (3)
Critical consideration of the many methods used to analyze and guide behavior. Emphasis on the application of the basic principles to individual differences in social learning and thinking. 3 lectures.

Psy 205 Personal Adjustment (3)
The development of insight into human behavior; understanding self and others; principles of mental health and their application to personal adjustment. 3 lectures.

Psy 223 General Psychology III (3)
The general problems, methodology, and principles of psychology, with emphasis upon sensory functions, perception, motivation, and social interaction; elements of physiological psychology and statistical methods in psychological experimentation. 2 lectures, 1 two-hour laboratory. Prerequisite: Psy 202

Psy 305 Child Growth and Development (3)
Developmental aspects of the physical, social, emotional, and intellectual growth of the child from birth to adolescence. Focus on child as a person and emphasis on the awareness of self, at various ages, in relation to the world and environment. 3 lectures. Prerequisite: Psy 202

Psy 306 Adolescent Psychology (3)
Physical, social, emotional, and intellectual growth of the adolescent. Emphasis upon personality formation, social adjustment, and the problem of self-identity. 3 lectures. Prerequisite: Psy 202

Psy 312 Educational Psychology (3)
Psychological principles of the learning process and mental hygiene at the elementary and secondary levels. Emphasis upon learning and the motivation of the learner. 3 lectures. Prerequisite: Psy 203

Psy 314 Human Relations (3)
The problems of human relations, specifically in group situations as observed on the job. Development of skills in dealing with others especially as a committee member and chairman of groups. Development of skills through class lecture and
discussion plus small-group involvement with actual business-personnel problems. 2 lectures, 1 laboratory. Prerequisite: Psy 202

**Psy 401 Social Psychology (3)**

Human behavior as a product of interaction and social process; nature of group life in relation to social groupings; social conflict, public opinion, group morale, social controls, leadership. 3 lectures. Prerequisite: Psy 202 or permission of instructor.

**Psy 503 Counseling and Guidance (3)**

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

**Psy 504 Evaluation in Education (3)**

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

**DESCRIPTIONS OF COURSES IN SOCIAL SCIENCE**

**Soc Sc 251, 252, 253 Laboratory in Group Activities (1) (1) (1)**

Skills and techniques of solving problems in large and small groups; conducting and reporting meetings; analyses of leadership dynamics in campus organizations. 1 two-hour laboratory.

**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: Senior standing or consent of instructor.

**Soc Sc 461, 462 Senior Project (2) (2)**

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

**Soc Sc 463 Undergraduate Seminar (2)**

Intensive study of selected social problems with application of various techniques for analysis. 2 meetings. Prerequisite: Completion of senior project.

**Soc Sc 521 Curriculum and Methods in Secondary Social Studies (3)**

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

**Soc Sc 590 Seminar in the Social Sciences (1-3)**

Special problems in selected areas of the social sciences. Each seminar will have a subtitle, describing its nature and content. 1-3 lectures. Prerequisite: Graduate standing. May be repeated for maximum of 9 units.

**DESCRIPTIONS OF COURSES IN SOCIOLOGY**

**Soc 201, 202, 203 Principles of Sociology (3) (3) (3)**

Sources of materials and methods of sociological study; concepts and principles; structure and process of group life; social institutions. Applications of techniques in field study. 3 lectures.
Arts and Sciences Division

Soc 206 Family Relations (3)
Analysis of dating, courtship, engagement, religion and social, marital and legal factors relating to marriage and early adjustment. Preparation for marriage. 3 lectures.

Soc 211, 212, 213 Introduction to Social Services (1) (1) (1)
Modern social service agency and worker purposes, objectives, obligations, responsibilities, and relationships. Social service as a career. Soc 241, 242, 243 taken concurrently, 1 lecture. Prerequisite: Approval of interdepartmental committee.

Soc 241, 242, 243 Social Service Experience (2) (2) (2)
Agency placement, experience in agency procedures, casework, case history recording, social evaluations. Requires a minimum of 10 hours each week devoted to agency participation. Concurrent registration in Soc 211, 212, 213

Soc 301 Contemporary Social Problems (3)
Analysis of leading social problems facing American society today. Observations of selected social welfare institutions. 3 lectures. Prerequisite: Junior standing or permission of instructor.

Soc 311, 312, 313 Philosophy and Techniques of Social Service (1) (1) (1)
Socio-cultural and psychological backgrounds of social and personal disorganization. Counseling techniques and philosophy, case recording techniques; elements of self analysis, group therapy experience. Soc 341, 342, 343 taken concurrently. 1 lecture. Prerequisite: Soc 213, 243 and approval of interdepartmental committee.

Soc 341, 342, 343 Advanced Social Service Experience (2) (2) (2)
Agency placement, case work experiences, case recording, worker-client relationships. Requires a minimum of 10 hours each week devoted to agency participation. Concurrent registration in Soc 311, 312, 313

Soc 401 Urban Sociology (3)
A comparison of the organization of the modern city with special emphasis on the social problems of the modern industrialized urban center; analysis of trends in urban communities; and ecological patterns and change. 3 lectures. Prerequisite: Junior standing or permission of instructor.

Soc 508 Educational Sociology (3)
Sociological backgrounds of school children; effects of social, economic, and political trends and issues on education; problems of leisure, recreation, and occupations; modern interpretations of democratic ideology. Sociological problems are utilized to define the social objectives of the school. 3 lectures. Prerequisite: Graduate standing and permission of instructor.
DIRECTORIES
DEPARTMENT HEADS AND CHAIRMEN
BY DIVISIONS
SAN LUIS OBISPO

AGRICULTURE DIVISION

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

ENGINEERING DIVISION

Aeronautical Engineering ......................................................... Charles P. Davis
Air Conditioning and Refrigeration Engineering .................... James McGrath
Architecture and Architectural Engineering ......................... George J. Hasslein
Electrical Engineering ............................................................. Fred W. Bowden
Electronic Engineering ............................................................. Fred H. Steuck
Industrial Engineering ............................................................. Millard J. Fetter
Manufacturing Processes ....................................................... Francis F. Whiting
Mechanical Engineering ........................................................... Leon F. Osteyee
Welding and Metallurgical Engineering ................................ Richard C. Wiley

APPLIED ARTS DIVISION

Business Administration ............................................................. Owen L. Servatius
Education .............................................................................. Walter P. Schroeder
English and Speech ................................................................. Willard M. Pederson
Home Economics ....................................................................... Marie S. Pfeiffer
Music ........................................................................................ Harold P. Davidson
Physical Education ................................................................. Robert A. Mott
Printing Engineering and Management ................................ A. M. Fellows
Technical Arts ......................................................................... J. M. McRobbie
Technical Journalism ............................................................... None

APPLIED SCIENCES DIVISION

Biological Sciences ................................................................. Glenn A. Noble
Mathematics ............................................................................ Milo E. Whitson
Military Science ................................................................. Col. Elmer H. Bauer
Physical Sciences ................................................................. Woodford E. Bowls
Social Sciences ......................................................................... M. Eugene Smith
KELLOGG CAMPUS

AGRICULTURE DIVISION

Agricultural Engineering
Agricultural Business Management
Agricultural Services and Inspection
Agronomy
Animal Science
Foods and Nutrition
Fruit Industries
Landscape Architecture
Ornamental Horticulture

AGRICULTURE DIVISION

Agricultural Engineering: Haven Q. Conard
Agricultural Business Management: William P. Rowley
Agricultural Services and Inspection: Edward C. Appel, Jr.
Agronomy: Robert L. Procsal
Animal Science: Harry B. McLachlin
Foods and Nutrition: Ramiro C. Dutra
Fruit Industries: Albert E. Canham
Landscape Architecture: Howard O. Boltz
Ornamental Horticulture: Oliver A. Batcheller

ENGINEERING DIVISION

Aerospace Engineering
Chemical Engineering
Civil Engineering
Electronic Engineering
Industrial Engineering
Metal Processes Engineering
Mechanical Engineering
Welding Engineering

ENGINEERING DIVISION

Aerospace Engineering: Rodney D. Sutherland
Chemical Engineering: Max B. Epps
Civil Engineering: John W. Comer
Electronic Engineering: Richard T. Black
Industrial Engineering: Joseph P. Wymer
Metal Processes Engineering: Russell A. Parish
Mechanical Engineering: Walter E. Holtz
Welding Engineering: William M. Harris

ARTS AND SCIENCES DIVISION

Accountancy
Biological Sciences
Business Management
Economics
Language Arts
Marketing
Mathematics
Music
Physical Education
Physical Sciences
Social Sciences

ARTS AND SCIENCES DIVISION

Accountancy: George E. Carlberg
Biological Sciences: Jerome E. Dimitman
Business Management: Richard H. Schoning
Economics: George T. Galbreath
Language Arts: John F. Fulbeck, Acting
Marketing: None
Mathematics: Harold F. Simmons
Music: Lowell K. Weeks
Physical Education: Frank D. Lansford
Physical Sciences: Elmer H. Rice
Social Sciences: Frederick B. Heath
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
K. B. Cutler, Regional Supervisor
809-C California State Bldg., 217 W. First St., Los Angeles 90012
S. L. Barrett, Regional Supervisor
Room 413, State Education Bldg., 721 Capitol Mall, Sacramento 95814
Emile J. LaSalle, Regional Supervisor
California State Polytechnic College, San Luis Obispo 93401
W. J. Maynard, Regional Supervisor
809-C California State Bldg., 217 W. First St., Los Angeles 90012
R. H. Pedersen, Regional Supervisor
Room 4064, 1111 Jackson St., Oakland 94607
G. A. Hutchings, Regional Supervisor
Room 5044, State Bldg., 2550 Mariposa St., Fresno 93721
J. E. Walker, Regional Supervisor
47 Warner Street, Chico 95928
H. H. Burlingham, Teacher Trainer
California State Polytechnic College, San Luis Obispo 93401
E. M. Juergenson, Teacher Trainer
University of California, College of Agriculture, Davis 95616
Leland H. Ruth, Special Supervisor
Room 413, State Education Bldg., 721 Capitol Mall, Sacramento 95814
McPHEE, JULIAN A. (1933) ... Oregon State University; Fulbright professor of political science, India.

* Kellogg-Voorhis staff.
ALLEN, JOHN K. (1952) Veterinary Science
D.V.M., Iowa State College, 1934.
Experience: Bureau of Animal Industry, State of Iowa; Federal Bureau of Animal
Industry; divisional superintendent in charge of feeding operations, Swift & Co.,
Omaha, Nebraska; U.S. Army Veterinary Corps; general practice of veterinary
medicine.

ALLEN, RAY (1955) Air Conditioning and Refrigeration Engineering
B.A., Santa Barbara State College, 1942; graduate study, Santa Barbara State
College.
Experience: Instructor, U.S. Naval Air Technical Training Center; technician,
U.S. Air Force; instrument technician, welder, and machinist, self-employed; welder,
Ventura Coastal Lemon Co.; engineer, Carpinteria Fire District.

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.

AMES, RALPH W. (1961) Biological Sciences
B.S., University of Wyoming, 1941; M.S., 1942; Ph.D., University of Illinois, 1950.
Experience: Assistance plant pathologist, Waltham Field Station; associate pro-
fessor of botany and plant pathology, Utah State Agricultural College; professor
and head department of botany and plant pathology, Utah State University; plant
pathologist, Los Angeles State and County Arboretum, J. Harold Mitchell Com-
pany.

ANDERSEN, OLIVE M. (1958) Mathematics
B.A., University of Madras, India, 1928; L.T., 1929; M.A., California State Poly-
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.
Experience: Reporter and feature writer, Athens Messenger, Athens, Ohio;
copywriter, Cleveland Press, Cleveland, Ohio; advertising department, General
Electric Company, Bridgeport, Connecticut; free-lance writing.

ANDERSON, KENNETH H. (1963) Physical Sciences
B.S., Brigham Young University, 1953; M.S., 1955; Ph.D., University of Southern
California, 1963.
Experience: U.S. Army; instructor, South Dakota School of Mines and Technol-
gy; guest professor, Brigham Young University; instructor, Bakersfield College;
teaching assistant, University of Southern California; assistant professor, Los An-
geles State College; research associate, University of Southern California.

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 Clare-
mont College.
Experience: Instructor, Massachusetts State College; professor, Parsons College,
Tusculum College; professor, director of debate, academic dean, Otterbein College;
professor, academic dean, National College.

* Kellogg-Voorhis staff.
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) ....................................... 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, California State Polytechnic College; senior Danforth associate.

*ANOOSHIAN, V. BARNEY (1958) ................................... Physical Education
  A.B., San Jose State College, 1947; M.A., Claremont Graduate School, 1961; additional graduate study, San Jose State College, Stanford University; University of Nevada.
  Experience: Instructor, Summerville High School, Tuolumne County; coach and instructor, Modesto High School.

*APPEL, EDWARD CARL, JR. (1946) ............................ Head, Agricultural Services and Inspection Department
  B.S., Oregon State College, 1940.
  Experience: Agricultural inspector and deputy county agricultural commissioner, Department of Agriculture, San Bernardino County; officer, U.S. Navy.

* Kellogg-Voorhis staff.
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 clasifica-
tion officer and personnel consultant, U.S. Air Force; associate registrar, Stanford
University; test officer and instructor in education, California State Polytechnic
College.

* ARMSTRONG, WILLIAM W., JR. (1960) ........................ Audio Visual Coordinator
B.S., California State Polytechnic College, 1958; M.S., University of California,
Riverside, 1964.
Experience: Horticulturist, USDA, Indio; citrus orchard manager, Indio; vine-
yardist, Indio.

* ASCHENBRENNER, ALBERT J. (1947) ......................... Dean, Arts and Sciences Division
A.B., Whitman College, 1940; M.S., University of Southern California, 1947;
Experience: Custer County High School, Miles City, Montana; Infantry School,
Fort Benning, Georgia. Instructor, English and social sciences; registrar and admis-
sions officer, Kellogg Campus, California State Polytechnic College; associate dean,
counseling and testing, California State Polytechnic College.

BABB, JAMES H. (1959) ........................................ Printing Engineering and Management
Experience: Fifteen years experience in printing, 6 1/2 of which was as owner of
Visalia Printing Service.

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, Coro-
nado High School and La Mesa Junior High School; art supervisor, Escondido
Union School District; instructor in art education, University of California Extensi-
on; Palomar Junior College and Pacific Lutheran University, Washington.

* BANKS, DORVAL D. (1965) ...................................... Ornamental Horticulture
Experience: Skelly Oil Company, Texas; laboratory instructor, Texas Technical
College, Lubbock; supervisor, Indiana Division of State Parks, Indianapolis.

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 Col-
lege; instructor, Wisconsin State College.

* BARRETT, MARTIN K. (1965) .................................. Accountancy
B.S., University of Pittsburgh, 1937; M.A., Ohio State University, 1939; additional
graduate study, University of Redlands, University of California, Los Angeles.
Experience: Staffman, Arthur Andersen & Company, New York; assistant instruc-
tor, Ohio State University; U.S. Army; Certified Public Accountant; assistant pro-
fessor, University of Redlands; instructor, San Bernardino Valley College, Wood-
bury College.

* Kellogg-Voorhis staff.
* BATCHELLER, OLIVER A. (1946)  Head, Ornamental Horticulture
Department
B.S., Oregon State College, 1936; graduate study, Oregon State College.
Experience: Assistant farm adviser, Oregon; branch manager, California Nursery
Company; officer, U.S. Army.

BAUER, CLEO (1965)  Activities Advisor

BAUER, ELMER H., COL., U.S.A. (1965)  Head, Military Science
A.B., University of Nebraska, 1940; graduate, Infantry School, 1944; Command
and General Staff College, 1949; Army Language School, 1956; U.S.A. Infantry
School, 1959.
Experience: Overseas advisor, Ecuadorian Army; training officer, infantry di-
vision, Ft. Ord, California; senior advisor, Vietnam Army Training Center; chief,
ROTC division of headquarters 4th Army, Ft. Sam Houston, Texas.

BAUER, GEORGE C. (1958)  Mechanical Engineering
M.E., Cornell University, 1925.
Experience: Mechanical engineer, U. C. Radiation Laboratory; mechanical design
engineer, Aerojet General Corporation and Westinghouse Electric Corporation;
administration and instruction, Engineering School, Curtiss Wright Technical Insti-
tute; design engineer at various aircraft companies; registered professional engineer,
California.

BAUM, JOHN M. (1963)  Music
B.S., University of New Mexico, 1950.
Experience: Music instructor, Atascadero Union High School; Torrance Unified
School District; Grants Unified School District, New Mexico.

* BEARDMORE, ROBERT L. (1958)  Mechanical Engineering
B.S.M.E., 1951; M.S.M.E., 1952, University of Illinois.
Experience: Industrial engineer and mechanical engineer, Hood Sponge-Rubber
Company, Chicago, Illinois; industrial engineer, U.S. Rubber Company, Chicago,
Illinois; design engineer, Cannon Electric Company, Los Angeles, California.

BEATIE, GEORGE C. (1959)  Coordinator of Special Services
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, California State
Polytechnic College, San Luis Obispo.

* BEAUCHAMP, KENNETH L. (1965)  Social Sciences
A.B., Whitman College, Washington, 1962; M.A., Claremont Graduate School,
1965.
Experience: Research assistant, teaching assistant, Claremont Graduate School;
research scientist, Aeronutronic; instructor, Peninsula College, Washington.

* BELCHER, MELVIN B. (1958)  Electronic Engineering
B.S.E.E., 1951, University of California, Berkeley.
Experience: Test engineer, analytical engineer, manager Southern Nevada Area,
General Electric, Schenectady, and Las Vegas, Nevada; service engineer, Western
Audiograph, Los Angeles.

* BELLMAN, SAMUEL I. (1957)  Language Arts
B.A., University of Texas, 1947; M.A., Wayne University, 1951; Ph.D., Ohio
State University, 1955
Experience: Assistant instructor and university fellow, Ohio State University;
columnist, the Fresno Guide. Instructor: Fresno State College; California State
Polytechnic College, San Luis Obispo; San Luis Obispo Adult School; University
of California Extension, Los Angeles.

* Kellogg-Voorhis staff.
BENHARDT, HAROLD M. (1965) Activities Adviser
M.A., Western New Mexico University, 1961.
Experience: Chairman, Business Education Department, and counselor, Westwood
High School, Mesa, Arizona; instructor, Mesa High School.

BENNION, LYMAN L. (1938) Head, Animal Husbandry Department
B.S., Utah State College, 1929.
Experience: Sales Department, Purina Mills; American Packing Company, Union
Stockyards, Ogden, Utah; agriculture instructor, Salinas Union High School, agri-
cultural extension service, University of California.

BENTLEY, ROBERT A. (1965) Mathematics
B.A., Wooster College, 1929; M.A., University of Chicago, 1933; B.D., 1933;
Ph.D., 1951; additional graduate study, University of Michigan, Michigan Techni-
cal University, San Diego State College.
Experience: Pastorates, various churches; instructor, Mesa College, San Diego
Adult High School; counseling, dean, Institute Clin. Past.; associate professor,
California Western University.

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.

* BERNE, JOHN R. (1960) Housing Coordinator
B.S., University of Southern California, 1958; graduate study, University of
Southern California.
Experience: Counselor of men’s organizations, University of Southern California.

BETZ, ELLARD W. (1947) Manufacturing Processes
B.A., Santa Barbara State College, 1942.
Experience: U.S. Navy; teacher, Victorville, California.

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
Experience: Professor, Arkansas Tech; Hind Junior College, Raymond, Missis-
ippi; instructor, San Angelo College, Texas; Copiah-Lincoln Junior College, Wess-
on, Mississippi; Texas A&M. Radar School; engineer and manager, B & M Machine
Co., Grenada, Mississippi.

* BLACK, RICHARD T. (1960) Head, Electronic Engineering Department
B.S.E.E., U.S. Naval Academy, 1933; certificates, Harvard Graduate School of
Engineering and Massachusetts Institute of Technology.
Experience: Communications—electronics engineer officer, USAF; command of
Air Force Proving Ground Electronics Unit, Elgin Air Force Base.

* BLACKBURN, THOMAS C. (1965) Social Sciences
B.A., University of Hawaii, 1959; graduate study, University of California, Los
Angeles.
Experience: Teaching assistant, Santa Monica City College, University of Cali-
ifornia, Los Angeles.

* Kellogg-Voorhis staff.
* BLAKELY, LAWRENCE M. (1963)  
Biological Sciences  
B.A., Montana State University, 1956; M.A., 1958; Ph.D., Cornell University, 1963.  
Experience: Graduate assistant, Montana State University; teaching and research assistant, research associate and instructor, Cornell University.

* BLEIWEISS, GAIL (1964)  
Physical Education  
B.S., Purdue University, 1961; M.A., University of California, Berkeley, 1964.  
Experience: Instructor, Penn High School, Indiana; junior supervisor, University of California, Berkeley.

* BLINKHERN, LOUISE (1955)  
Library  
B.A., University of California, Los Angeles, 1929; Certificate in Librarianship, University of California, 1931.  
Experience: Librarian, San Marino Public Library, San Marino; cataloger and audio-visual assistant, Arcadia Unified School District, Arcadia.

BLOOM, EMMETT A. (1946)  
Animal Husbandry  
B.S., University of California, Davis, 1934.  
Experience: Agricultural instructor at Ripon, Laton, and Corning High Schools.

* BOBB, SYDNEY RALPH (1958)  
English  
A.B., 1939, University of Chicago, M.A., 1948; Ph.D., Stanford University, 1954.  
Experience: U.S. Army; instructor, Washington State College; acting instructor, Stanford University; instructor, California State Polytechnic College, San Luis Obispo.

BONGIO, ENRICO P.  
Welding and Metallurgical Engineering  
Experience: Welder, Chicago Bridge and Iron Co., Churchill Frozen Foods Co., Eureka, and Eureka Boiler Works and Steel Products; U.S. Army Signal Corps; general metal shop work, Woodsman Power Saw Co., Eureka; instructor, Sonoma Valley Union High School; metals inspector and welding instructor, Hunters Point Naval Shipyard; nondestructive testing technician, Ferro-Spec Laboratory, Los Angeles.

* 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.

* Kellogg-Voorhis staff.
BOSTROM, ROBERT M. (1956) ........................................... Housing Coordinator
B.S., California State Polytechnic College, 1956.
Experience: Graduate manager, California State Polytechnic College.

* BOVEE, GEORGE R. (1965) ........................................... Accountancy
B.S., Los Angeles State College, 1957; graduate study, University of California, Los Angeles.
Experience: Teacher, Riverside City College; senior revenue agent, Internal Revenue Service, Riverside; U.S. Army; staff accountant, Sheppard & Reynolds.

BOWDEN, FREDERICK W. (1949) .............. Head, Electrical Engineering Department
B.S., California Institute of Technology, 1932; M.S., 1933; additional graduate study, California Institute of Technology.
Experience: Geophysics, Shell Oil Company; electrical engineer, Oilfields Service Co.; mechanical and electrical consultant, Walt Disney Enterprises; head electrical research department, Lockheed Aircraft Corp.; associate professor, University of Southern California College of Aeronautics. Registered professional engineer, California.

BOWLS, WOODFORD E. (1937) .............. Head, Physical Sciences Department
A.B., University of California, 1932; M.A., 1935; Ph.D., 1937.
Experience: Teaching assistant and teaching fellow in physics, University of California.

BOWMAN, ERNA (1962) ......................... Education
M.F.A., Otis Art Institute, Los Angeles, 1961.
Experience: Instructing designer, Foremost Studio, New York City; Headon Designers, London and Manchester, England; owner and operator of commercial design studio, Montreal, Canada; freelance designer, Los Angeles; fine arts instructor, private schools, art associations, Los Angeles.

BOYCE, WILLIAM M. ........................................... Director of Developmental Affairs
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, California State Polytechnic College.

BOYCE, WILLIAM M. ........................................... Director of Developmental Affairs
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, California State Polytechnic College.

BRANNUM, THOMAS P. (1952) ..................... Animal Husbandry
B.S., California State Polytechnic College, 1948.
Experience: Dos Pueblos Ranch, Goleta; U.S. Army Air Force; agriculture instructor, Santa Ynez High School.

* BRAY, ROBERT T. (1965) ......................................... Economics
Experience: Teaching assistant, Pennsylvania State University, University of California, Los Angeles; research assistant, University of California, Los Angeles.

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.

* Kellogg-Voorhis staff.
BRENDELIN, 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.

* BRIGHT, BRATCHER L. (1964) Metal Processes
B.S., Buffalo State University, 1960; M.A., Colorado State University, 1961.

BROMLEY, J. PHILIP (1947) Instructional Materials Program
B.S., University of Southern California, 1934; M.S., 1936; additional graduate study, Columbia, Texas A & M, and University of California.

* BROWN, DONALD E. (1958) Metal Processes
Experience: Foreman, Milling Department, Glenn-Jones Machinists, Ontario, California; job planning and cost estimating, Hi-Q Manufacturing Company, Pomona, California; general machinist, Hanson Manufacturing Co., Pomona; production and experimental machinist, H. W. Loud Machine Works, Pomona.

* BROWN, HARRY M. (1963) Language Arts
Experience: Instructor, Baldwin-Wallace College; teaching fellow, Western Reserve University; assistant professor, Shepherd College; associate professor, Louisiana Polytechnic Institute.

BROWN, HOWARD C. (1946) Head, Ornamental Horticulture Department
B.S., California State Polytechnic College, 1943; M.S., Ohio State University, 1954; Ph.D., 1963.
Experience: U.S. Army Air Force; instructor, Ohio State University.

* BROWN, HOWARD S. (1948) Biological Sciences
B.A., University of California at Los Angeles, 1943; M.A., 1949; Ph.D., Claremont Graduate School, 1960.
Experience: Visiting professor, Chung Chi College, Hong Kong; officer, U.S. Marine Corps.

BROWN, WILLIAM H. (1957) Architecture and Architectural Engineering
B. Arch., University of Florida, 1954; graduate study, University of Florida.

* BROWNE, PHILIP (1963) Music
Experience: Music teacher, elementary, junior high and high schools; musician, Phoenix Symphony, Eastman Wind Ensemble; arranger, King Arranging Association, Chicago, Crawley Film Corporation, Ottawa; composer, performances in Europe (International Music Educators' Convention) and United States including Eastman-Rochester Symphony Orchestra, Howard Hanson.

* Kellogg-Voorhis staff.
BRUNK, ATHOL J. D. (1957) Physical Sciences
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.

* BRUNS, ROBERT A. (1965) Electronic Engineering
B.S., M.S., Oregon State College, 1942.
Experience: Instructor, Oregon State College; assistant professor, University of California; lecturer, University of Southern California; engineering specialist, Jet Propulsion Laboratory; manager, Kinetic Corp.

BUCCOLA, VICTOR A. (1962) Physical Education
B.S., California State Polytechnic College, 1956; M.A., 1957.
Experience: Officer, U.S. Army; physical education instructor and athletic coach, The College of Idaho; science and math instructor and athletic coach, Mark Keppel High School.

BUCICH, RICHARD A. (1963) Electronic Engineering
Experience: Sub-station operator, electrical engineer, U.S. Steel Corporation; graduate assistant, Illinois Institute of Technology; assistant professor, Purdue University Center.

BUCY, L. LAVERNE (1955) Animal Husbandry
B.S., University of Kentucky, 1943; M.S., 1950; Ph.D., University of Illinois, 1954.
Experience: Graduate assistant in animal science, University of Illinois; teacher of vocational agriculture, Kentucky high schools; farming; U.S. Navy.

* BURDIC, THOMAS A. (1962) Public Relations Coordinator
B.A., M.A., Long Beach State College; additional graduate study, University of California at Los Angeles, Los Angeles State College.
Experience: Editorial departments Pasadena Star-News, Alhambra Post-Advocate, Long Beach Independent Press-Telegram newspapers; teacher, English and journalism, Garden Grove High School District; administrative assistant, public relations, Orange Coast College; public relations coordinator, Long Beach State College; supervisor of publications, Alhambra Elementary and High School Districts.

BURGESS, THOMAS G. (1963) Mathematics
Experience: Engineer, Radio KDSH; chief engineer and announcer, Radio KCID, Caldwell, Idaho; student assistant, assistant instructor, instructor, Idaho State College; instructor, Colorado State University.

BURLINGHAM, HERBERT H. (1948) Chairman, Agricultural Education
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.

BUSCHMAN, WILLIAM O. (1956) Mathematics
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.

* Kellogg-Voorhis staff.
* BUTTERWORTH, JOHN R. (1961) English
B.A., Syracuse University, 1933; M.A., University of Southern California, 1938; Ph.D., University of California at Los Angeles, 1959.
Experience: Instructor in English, University of Nevada; assistant professor of science (USAF), University of Southern California; staff officer, U.S. Air Force.

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, EBSCO, Inc., Santa Cruz; instructor, Loyola University.

* CANHAM, ALBERT E. (1948) Head, Fruit Industries Department
B.S., University of California at Los Angeles, 1941.
Experience: Officer, U.S. Navy; manager of avocado and citrus orchards; owner and operator of commercial weed and pest control company; instructor in I-on-F program, Palomar College, Vista, California.

* CARLBERG, GEORGE E. (1949) Head, Accountancy Department
B.S., University of California, 1947; graduate study, University of California at Los Angeles and Claremont Graduate School.

* CARLSTEDT, GEORGE C. (1959) Mathematics
B.S., U.S. Coast Guard Academy, 1924; M.S., Purdue University, 1958.
Experience: Instructor, Bradley University; Line Officer, U.S. Coast Guard; District Commander; Commanding Officer, Curtis Bay Training Station.

CARNegie, E. J. (1963) (1965) Agricultural Engineering
Experience: Research assistant, University of California, Davis; junior agricultural engineer, University of California; officer, U.S. Naval Reserve.

CARR, LAURENCE H. (1963) Physical Sciences
B.S., University of Chicago, 1932; M.S., 1934.
Experience: Director of research and engineering, Edward Valves, Inc.; lecturer and assistant professor, Purdue University.

CARRINGTON, JAMES H. (1943) Agricultural Engineering
Special Vocational Arts Credential, University of California, Los Angeles, 1940; University of California, Berkeley, 1941 and 1942.
Experience: Auto mechanic, Los Molinos Garage, Los Molinos; auto shop instructor, Los Molinos High School, Los Molinos.

* Kellogg-Voorhis staff.
CARSON, GEORGE W. (1961) Mathematics
A.B., Hanover College, 1927; M.A., University of Illinois, 1935; additional graduate study, University of Pittsburgh; Stanford University.
Experience: Public schools; Pikeville College; professor of mathematics, Grove City College; associate professor of mathematics, University of Redlands.

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.

CASS, MARJORIE (1957) Education
B.S., University of Nebraska, 1932; M.A., Columbia University, 1945; additional graduate study, University of Missouri, 1947.
Experience: Teacher, Nebraska and Iowa; instructor, Stephens College; assistant professor, Grinnell College.

CATALINA, FRANCIS V. (1962) Mathematics
A.B., San Jose State College, 1950; M.A., University of Southern California, 1952; Ph.D., American Academy of Asian Studies, Affiliate of the College of the Pacific, 1959; additional graduate study, University of California, San Francisco State College, College of the Holy Names.
Experience: Laboratory assistant, Garan Chemical Company; instructor, San Jose Adult Education School; instructor, Soledad State Prison. Teacher: Granda Junior High School, George Washington High School, McClymonds High School, Oakland City College.

CHANDLER, EVERETT M. (1951) Dean of Students
A.B., University of California, 1939; graduate study, University of California. Experience: Administrative officer, U.S. Air Force; personnel technician, State Personnel Board; management analyst, State Department of Finance; extension teacher, Sacramento State College; U.S. Air Force.

CHANG, YU (1963) Mathematics
B.A., Sacramento State College, 1961; M.A., University of California at Davis, 1963; additional graduate study, University of California at Davis.
Experience: Teaching assistant, University of California, Davis; programmer, Computer Center, University of California, Davis.

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.

CHORNEY, ALEXANDER H. (1962) Language Arts
A.B., University of California at Los Angeles, 1948; M.A., 1951; Ph.D., 1963.
Experience: Teaching assistant, University of California at Los Angeles; instructor and assistant professor, University of Southern California; William Andrews Clark Memorial Library fellow; radio, music experience.

* Kellogg-Voorhis staff.
CHOU, TEH-LOH (1961) Electronic Engineering
B.6., 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, ALLEN C. (1964) Animal Science
B.S., Brigham Young University, 1957; M.S., University of California, 1960; additional graduate study, University of Nevada.
Experience: Teaching assistant, University of California; instructor, White Pine County Schools, Nevada.

* CHURCH, DAVID A. (1962) Language Arts
B.A., Los Angeles State College, 1959; M.A., 1961; additional graduate study, University of Southern California.
Experience: Graduate assistant, Los Angeles State College, University of Southern California; teacher, Los Angeles City Schools; lecturer, Loyola University; instructor, Los Angeles State College.

* CHYLINSKI, RICHARD J. (1964) Landscape Architecture
Experience: Industrial engineer; architectural draftsman; assistant planner; consultant.

* CLAIBORNE, GAYLON R. (1965) Civil Engineering
Experience: City engineer, City of Vernon, California; steel designer, Dudley Steel Corp.; assistant traffic engineer, City of Norwalk, California; registered professional civil engineer, California.

* CLANTON, HENRY M. (1964) Electronic Engineering
B.S., Louisiana Polytechnic Institute, 1934; M.S., Ph.D., University of Pennsylvania, 1950.
Experience: Manager, trainers and simulators, Marquardt Corp., Pomona; United States Army; project manager, phase of project Defender; chief, analysis and integration branch, ballistic missile defense office; executive, Army Rocket and Guided Missile Agency; liaison officer, Army Air Defense Board; battalion commander, group commander of antiaircraft artillery units; member, Antiaircraft Artillery Board; instructor, radar school, Antiaircraft Artillery School.

CLINNICK, MANSFIELD L. (1960) Mathematics
Experience: Artillery officer, U.S. Marine Corps; Instructor, California State Polytechnic College; Computer, University of California Radiation Laboratory, Berkeley; Senior Programmer, Lawrence Radiation Laboratory, Livermore; Computer Project Manager, Broadview Research Corporation, Burlingame, 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
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.

* Kellogg-Voorhis staff.
COATS, DONALD M. (1964) Admissions Officer
B.S., California State Polytechnic College, 1964.

COBB, ALAN W. (1964) Physical Sciences
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.

COCHRANE, KENNETH H. (1963) Physical Education
B.A., San Diego State College, 1959; graduate study, San Diego State College.
Experience: U.S. Navy; graduate assistant, San Diego State College; teacher and coach, Lincoln High School and Helix High School, San Diego.

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.

* COLE, DAVID E. (1962) Agricultural Business Management
B.S., California State Polytechnic College, 1952.
Experience: Produce Broker, Patterson; General Manager, Santa Lucia Tomato Growers Co-op; General Manager, Nutting and Hogue; District Manager, American National Foods, Inc.; Nurseryman, Monterey Park Nursery; Salesman, Standard Stations, Inc.

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.

COLLINS, SPELMAN B. (1939) Animal Husbandry
B.S., University of California, 1925.
Experience: Agriculture instructor, Middletown, Calistoga, and Livermore high schools.

* COMER, JOHN W. (1962) Head, Civil Engineering
B.S., Oklahoma State University, 1935; M.S., 1950.
Experience: Associate Professor, Oklahoma State University; Inspector, Bureau of Reclamation; Field Engineer, Atlantic Refining Company; Officer, U.S. Army Transportation Corps; Registered Professional Engineer, Oklahoma.

* COMPTON, MEL D. (1958) Welding Engineering
B.V.E., California State Polytechnic College, 1964.
Experience: Welder and teacher in apprentice program, Standard Oil Company; instructor in welding, Compton College, El Camino College, and California State Polytechnic College, San Luis Obispo; quality assurance engineer, Mare Island Naval Shipyard.

* CONARD, HAVEN Q. (1946) Chairman, Agricultural Engineering
B.S., Iowa State College, 1943.
Experience: Teaching, Engineering Drafting Department, Iowa State College; officer, U.S. Air Force.

* Kellogg-Voorhis staff.
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) Curriculum Evaluator
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.

* COULTER, CHARLES A. (1961) Music
B.S., Indiana State Teachers College, 1947; M.A., Columbia Teachers College, 1948; additional graduate study, Arizona State University, Tempe.
Experience: Music teacher, elementary, junior high, and high schools; faculty member, National Music Camp; first trombonist, Phoenix Symphony.

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.

* CROISSANT, GERALD L. (1964) Agronomy
B.S., Colorado State University, 1959; M.S., University of Idaho, 1961; Ph.D., University of Wisconsin, 1965.
Experience: Research fellow, University of Idaho; teaching assistant, University of Wisconsin.

CRUIKSHANKS, ANDREW N. (1947) Social Sciences
A.B., University of California, 1931; M.A., Stanford University, 1933; Ed.D., 1957.
Experience: Instructor, social studies and speech, Sacramento High School; educational supervisor, U.S. Department of Interior, CCC; instructor, social studies and speech Fort Bragg High School; director of adult education and community forums, Fort Bragg; tour director, Europe and Middle East; professional lecturer.

CULBERTSON, JAMES T. (1953) Mathematics
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.

CUMMINS, CARL C. (1958) Dean, Applied Arts Division
A.B., University of California, Santa Barbara, 1948; M.S., University of Southern California, 1952; Ed.D., University of California, 1957.

* Kellogg-Voorhis staff.
CURTIS, WILLIAM D. (1961) Education
B.A., University of Redlands, 1948; M.A., University of California, Los Angeles, 1951; Ph.D., University of Denver, 1960.
Experience: Probation officer, Riverside County, California; school psychometrist, San Bernardino City Schools; teacher, San Bernardino High School; instructor, San Bernardino Valley College; part-time instructor, University of Redlands, University of Denver, International Business Machines Corporation.

DALE, WILLIAM R. (1964) Landscape Architecture
Experience: Draftsman, W. T. Dale, Arch. Town Planner; site planner, E. Elliott Gross; associate planner, T. W. Patterson; designer, Norman N. Robson; planning consultant, Planning/Development Association; director/planning, City of West Palm Beach.

DAUGHERTY, RAYMOND C. (1960) Physical Education
B.S., State University of New York, 1951; M.S., 1956; additional graduate study Springfield School of Physical Education, University of Buffalo, Los Angeles State College, Cortland State Teachers' College.
Experience: Physical Education director, coach, Azusa High School; teacher, recreation director, coach, Alexander and Lowville, New York; instructor, Citrus College; chairman, Red Cross Water Safety Program, Pomona.

DAVIDSON, HAROLD P. (1936) Chairman, 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.

B.S., University of Pittsburgh, 1939; Command and General Staff College, 1960.
Experience: Assistant professor of military science, Valley Forge Military Academy, 1955-57; training officer 1st Guided Missile Group, Fort Bliss; executive officer and battalion commander, Fifth Howitzer Battalion, Korea.

DAVIS, ANNEMARIE J. (1965) Physical Education
Experience: Teaching assistant, University of California, Los Angeles; program director, club director, Special Services, U.S. Air Force; lecturer, San Jose State College; assistant professor, Fresno State College.

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.

DEGEN, JAMES L. (1959) Ornamental Horticulture
B.S., California State Polytechnic College, 1954.
Experience: Nursery, landscape contracting business, Costa Mesa, California; U.S. Army.

DENDURENT, MYRON S. (1957) Physical Sciences
B.S., Kansas State College, 1939; M.S., 1939.

* Kellogg-Voorhis staff.
* DEV, VASU (1965) .............................................. Physical Sciences
B.S., Punjab University, 1951; M.S., 1954; Ph.D., University of California, 1959.
Experience: Chemist, Drug Research Laboratory, India; instructor, Department
of Pharmacology, Medical College, Patiala, India; teaching assistant, University of
California, Davis; research associate, University of Chicago; assistant professor,
University of Tennessee, Memphis.

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.

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 assist-
ant, 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: Technician, U.S. Army; electronic engineer, International Business
Machines, San Jose.

DILLS, CHARLES E. (1963) .............................................. Physical Sciences
B.S., North Dakota State University, 1949; M.S., George Washington University,
1951; Ph.D., Harvard University, 1956; additional graduate study, Columbia Uni-
versity.
Experience: Professor, Deep Springs College; assistant editor, American Chemical Society;
chemist, National Research Corporation; assistant professor, North-
west 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.

* DIMITMAN, JEROME E. (1949) ................................ Head, Biological Sciences Department
B.S., University of California at Berkeley, 1943; M.S., University of California,
Citrus Experiment Station, Riverside, 1949; Ph.D., University of California, 1958.
Experience: Citrus production, University of California at Los Angeles; assistant
plant pathologist, California State Department of Agriculture; officer, U.S. Navy.

* DIVELBESS, DIANE (1963) .............................................. Art
B.A., Scripps College, 1957; M.F.A., Claremont Graduate School, 1959; additional
graduate study, Claremont Graduate School, Fresno State College, Los Angeles
State College.
Experience: Teacher, Chaffey Union High School District, Riverside Art Cen-
ter, Children's Creative Workshops; professional painter.

* DONNELLY, CLAIRE KATHERINE (1961) ................................ Registered Nurse
R.N., St. John's Hospital School of Nursing, St. Louis, Mo., 1946.
Experience: Inter-Community Hospital, Covina; Marr-Jacobs Medical Group,
Pomona.

* Kellogg-Voorhis staff.
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, NORMAN K. (1960) Animal Science
B.S., Colorado State University, 1951; M.S., Kansas State University, 1960.
Experience: County agricultural agent, Gunnison, Colorado; herdsman, Painter Hereford Company, Denver, Colorado; graduate research assistant Kansas State University.

DUNN, WESLEY T. (1959) Printing Engineering and Management
Experience: Instructor, Compton High School; rotary press operator, Moore Business Forms; 11 years experience as composition-press operator for various printing firms.

DUSEK, BERNARD W. (1965) Education
A.B., University of California, 1951; M.A., University of Southern California, 1955.

* DUSTMAN, JACK R. (1962) Business Management
B.S., Arizona State University, 1958; M.S., 1959; additional graduate study, University of Southern California.
Experience: Lecturer, University of Southern California; instructor, Arizona State University; research interviewer, SBA Motel Study, University of Arizona; collateral-discount teller, Midland National Bank, Minneapolis; salesman, Dale's Department Store, Phoenix, Arizona; assistant to president, Holmberg Organ Company, Rockford, Illinois; personnel interviewer and counselor, U.S. Army.

* DUTRA, RAMIRO C. (1959) Head, Foods and Nutrition Department
B.S., University of California, 1954; M.S., 1956; Ph.D., 1958.
Experience: Teaching assistant and research assistant, University of California; junior specialist to assistant specialist, Department of Food Science and Technology, California Agricultural Experiment Station; lecturer in dairy chemistry, University of California.

* EBERSOLE, WALTER (1958) Mechanical Engineering
B.A., Santa Barbara State College, 1941; graduate study, University of Southern California, Los Angeles.
Experience: Project engineer, Shaffer Oil Tool Works, Brea; designer, University of Southern California Engineering Center; process engineer, B. H. Hadley Company, Pomona; instructor, engineering, drafting, etc., Mount San Antonio College.

ECKROTE, LAWRENCE H. (1955) Printing Engineering 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 of experience in the printing industry.

* Kellogg-Voorhis staff.
EILERS, PATRICIA (1956)  Graduate Nurse

R.N., San Diego County Hospital, 1936.
Experience: San Luis Obispo County General Hospital.

ELLIOTT, WALTER E. (1965)  Physical Sciences

B.S., McNeese State College of Louisiana, 1954; M.Ed., Northwestern State
College of Louisiana, 1957; M.S., 1963.
Experience: Instructor, Beauregard Parish Schools; teaching fellow, Northwestern
State College of Louisiana; assistant professor, Springfield College; U.S. Navy.

ELSTON, CHARLES A. (1947)  Mathematics

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.

ENGELKE, GEORGE P. (1965)  Mechanical Engineering

B.S., California Institute of Technology, 1958; M.S., 1959.
Experience: Associate preliminary design engineer, AiResearch Manufacturing
Company; research engineer, Astro; design engineer, Astropower, Inc.; senior
engineer, Ray D. Bowerman Consulting engineers; consulting engineer; registered
professional engineer.

ENGLUND, CARL R. (1948)  Dean, Agriculture Division

B.S., University of California, Berkeley, 1939.
Experience: Director of vocational agriculture, Reedley Union High School and
Junior College, Reedley; head, crops department, California State Polytechnic Col-
lege, Voorhis Unit.

EPPS, MAX (1960)  Head, Chemical Engineering Department

B.S., University of Southern California, 1934; M.S., 1935.
Experience: General Petroleum Corporation, Los Angeles; chief automotive
engineer, Socony Vacuum, Paulsboro, New Jersey; assistant supervisor of engine
laboratories, Fairchild Aircraft, Ranger Engine Division, Farmingdale, New York;
assistant to chief engineer. Registered professional chemical engineer, California.

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 Califor-
nia, Santa Barbara College; district superintendent, West Park School District,
Fresno, California.

ERSPAMER, JACK L. (1956)  Biological Sciences

B.S., University of Washington, 1941; Ph.D., University of California, 1953.
Experience: Teaching assistant, University of Washington, University of Cali-
ifornia; research assistant, University of California, Citrus Experiment Station,
Riverside.

EVANS, HAROLD D. (1965)  English and Speech

B.A., Duke University, 1949; M.A., Columbia University, 1956; additional grad-
uate 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.

* Kellogg-Voorhis staff.
EYLER, MARY F. (1960) Placement Supervisor
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 and placement interviewer, California State Polytechnic College; business teacher, San Luis Obispo Adult Evening School.

FALKENSTERN, OSWALD J. (1953) Mathematics
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.

FAUSCH, HOMER D. (1956) Animal Science
B.S., University of Minnesota, 1947; M.S., 1950; Ph.D., 1953.
Experience: U.S. Air Force; associate professor and head, animal husbandry department, Northwest Experiment Station, University of Minnesota, Crookston, Minnesota; secretary-treasurer, Red River Valley Aerial Sprayers, Inc., Crookston, Minnesota.

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.

FEENEY, ROBERT G. (1965) Chemical Engineering
B.S., University of Pennsylvania, 1939.
Experience: Junior engineer, Scott Paper Co.; shift chemist and development engineer, Brunswick Pulp and Paper Co.; chemical engineer, U.S. Bureau of Mines; metallurgical engineer, Frankford Arsenal; chemical and building engineer, Tennessee Eastman Corp.; group leader, Colgate Palmolive Co.; development associate, Celanese Corp.; instructor, Newark College of Engineering.

FELLOWS, ALBERT MELVIN (1946) Head, Printing Engineering and Management Department
Experience: Special training courses in journalism, advertising, mechanical art and print shop management; U.S. Army, World War I; journeyman printer and supervisor of apprentice training programs; superintendent of printing plants in Kansas City, Missouri, and Birmingham, Alabama.

FERRIS, HORACE GARFIELD (1958) Physical Sciences
B.A., Pomona College, 1936; M.A., University of California, Los Angeles, 1939; Ph.D., 1949.
Experience: Physicist, U.S. Naval Ordnance Test Station, California Institute of Technology, Scripps Institute of Oceanography, Robert Shaw-Fulton Company, Anaheim; Hughes Aircraft Company, Fullerton; lecturer, Pomona College, University of Southern California; instructor, San Diego State College; associate professor, Chapman College.

FIGGINS, ROSS (1965) Language Arts
B.A., San Fernando Valley State College, 1960; M.A., 1962; M.A., University of Illinois, 1964; additional graduate study, University of Southern California.
Experience: Graduate assistant, San Fernando Valley State College, University of Illinois; instructor, University of Illinois.

FILLHART, DANIEL (1961) Metal Processes
Pasadena City College.

* Kellogg-Voorhis staff.
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.

* FIRSTMAN, BRUCE L. (1962) Biological Sciences
Experience: Graduate laboratory assistant, Stanford University; associate in biol-
yogy, San Jose State College; teaching fellow, University of California, Santa Bar-
bara College; instructor, City College of San Francisco.

FISHER, CLYDE P. (1947) Dean, Applied Sciences Division
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; assist-
ant 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.

FLANAGAN, JAMES ROBERT (1959) Animal Husbandry
B.S., California State Polytechnic College, 1959.
Experience: Rancher.

* FLYNN, THOMAS J. (1959) Mathematics
B.S., United States Naval Academy, 1927; M.S., Purdue University, 1959; addi-
tional graduate study, United States Naval Postgraduate School, Ordnance Engi-

FOLSOM, VOLMAR A. (1946) Mathematics
B.S., Iowa State College, 1934; M.E., Colorado University, 1937; additional gradu-
ate study, Southern Methodist University.
Experience: High school and junior college teaching; officer, U.S. Navy; assistant
professor, mathematics, Southern Methodist University; coordinator; relations
with schools, California State Polytechnic College.

* FORCE, DONALD C. (1965) Biological Sciences
A.B., Fresno State College, 1954; M.S., University of California, Davis, 1958;
Ph.D., University of California, Berkeley, 1963.
Experience: Research assistant, University of California, Davis; entomologist,
Stauffer Chemical Company and U.S. Department of Agriculture, California and
Missouri; lab technician, University of California, Berkeley.

* FORD-LIVENE, CARLOS (1964) Mathematics
A.B., Fisk University, 1958; M.A., University of Southern California, 1964.
Experience: Instructor, Stillman College; teaching assistant and lecturer, Univer-
sity of Southern California; participant in Summer Institute in Analysis, University
of British Columbia, Canada, 1962.

FOTTER, MILLARD J. (1954) Head, Industrial Engineering Department
B.S., Armour Institute of Technology, 1935; M.S., University of Southern Cali-
fornia, 1956.
Experience: Officer, U.S. Air Force; sales engineer, Stanley E. Morris Co.,
Los Angeles; production engineer, Southland Paper Co., Los Angeles; industrial
engineer, Southwestern Engineering Co., Los Angeles; industrial engineer, Inter-
national Harvester Co., Chicago and Memphis. Registered professional engineer,
California.

* Kellogg-Voorhis staff.
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.

*FOX, WILLIAM E. (1961) Marketing
B.S., Ohio State University, 1951; M.B.A., University of Miami, 1959; additional graduate study, University of Southern California.
Experience: Instructor, Marketing Department, Arizona State University; research associate, Bureau of Business Services, Arizona State University; instructor, summer session, Arizona State College; agent, Prudential Insurance Company; instructor, Naval Electronics School, U.S. Navy.

*FOXEN, MILDRED E. (1955) Supervising Nurse
R.N., Women's Christian Association, 1943.
Experience: Resident nurse, College of Wooster, Wooster, Ohio; Intercommunity Hospital and office nurse, Medical Center, Covina.

*FRANCIS, JOHN W. (1960) Assistant Foundation Manager
Experience: Teacher, Los Angeles City Schools; California bar, 1961.

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.

FRANKLIN, ROBERT J. (1965) Social Sciences
B.A., Greenville College, 1950; M.A., University of Michigan, 1952; additional graduate study, California State College at Los Angeles, University of Southern California.

*FRENCH, JERE STUART (1957) Landscape Architecture
A.B., Washington University, 1951; B.S., Michigan State University, 1956.
Experience: Paving construction, St. Louis, Missouri; landscape architect, National Park Service, San Francisco; landscape architect, F. B. Stressau, Miami, Florida; instructor, U.S. Navy.

*FRENCH, MILTON L. (1961) Language Arts
B.S., New York University, 1932; M.A., Columbia University, 1936; Ph.D., New York University, 1938. Graduate study, University of Paris, Ruprecht-Karls-Universität, Heidelberg, Deutsche Akademie.
Experience: Instructor, Monmouth Junior College; director of beginning English, American College; assistant professor, Baylor University; director of publications, Northern State Teachers College, Minot State Teachers College; assistant field director, American Red Cross; display advertising salesman, Fresno Bee; instructor, Selma Union High School; product service engineer, American Radiator and Standard Sanitary Corporation; technical editor, Models of Industry.

* Kellogg-Voorhis staff.
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) Physical Sciences
A.B., University of California, 1939; M.A., 1945; Ph.D., 1947.
Experience: Teaching assistant, University of California; assistant professor, University of Missouri.

FRYBERGER, E. L. (1957) Electrical Engineering
B.S., U. S. Naval Academy, 1923; M.S., Harvard University, 1930; additional graduate study, U. S. Naval Post Graduate School, George Washington University.
Experience: Officer, U. S. Navy (Retired); instructor, George Washington University; associate professor, Valparaiso University.

* FULBECK, JOHN F. (1958) Acting Head, Language Arts
A.B., University of Southern California, 1951; Ph.D., 1960.
Experience: New Jersey state representative, Scholastic Magazine; advertising manager, Independent Press, Bloomfield, New Jersey; reporter, The Newark Ledger, New Jersey; U.S. Navy; editor, Southwest News Press, The South End Bee, Los Angeles; instructor and lecturer, University of Southern California, Chouinard Art Institute, Los Angeles; coordinator, business management program, University of Southern California; editor, Conservation Topics, The Writer's Mailbag.

FULLER, KENNETH G. (1960) Mathematics
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, Autonetics.

*GAITSKELL, JUNE (1962) Activities Adviser
B.A., Scripps College, 1940; M.A., Claremont University College, 1962.

* GALBRAITH, EDWARD D. (1962) Mechanical Engineering
B.S.M.E., University of Toledo, 1952; M.I.E., 1960.
Experience: Assistant professor, University of Toledo; engineer, Owens-Illinois Glass Company, Toledo Edison Company; officer, U. S. Army.

* Kellogg-Voorhis staff.
**GALBREATH, GEORGE T.** (1953) Head, Economics Department
A.B., Stanford University, 1948; M.A., 1949; additional graduate study, University of California.
Experience: Instructor, California State Polytechnic College, San Luis Obispo Campus; assistant professor of economics, Armstrong College; manager, Galbreath Orchards.

**GANTZ, BEN S.** (1963) Social Sciences
B.A., University of Southern California, 1942; M.A., University of Chicago, 1956; additional graduate study, University of Puerto Rico, Loyola University of Chicago, Claremont Graduate School.
Experience: Officer, U.S. Navy; administrative staff, U.S. Naval Post Graduate School; instructor, University of Alaska; psychologist, Alaska Crippled Children’s Treatment Center; Desert Area Counseling Service, China Lake; research psychologist, Naval, Ordnance Test Station; research assistant, Claremont Graduate School.

**GARRITY, RODMAN F.** (1962) Social Sciences; Coordinator of Teacher Credential Programs
Experience: Teacher, principal and psychologist, Palmdale and Redondo Beach City Schools; junior college instructor, Los Angeles, Palo Verde, San Bernardino and Citrus Junior Colleges; consulting psychologist to Big Bear Lake and Palo Verde Unified Schools; assistant director of educational placement, assistant coordinator of Congolese program, lecturer in educational administration, University of Southern California; California certified psychologist.

**GATES, DOROTHY L.** (1961) Library
B.A., University of California, 1927; Certificate of Librarianship, University of California Library School, 1928.
Experience: University of California Library; San Luis Obispo County Library; Atascadero State Hospital Library.

**GATES, VINCENT J.** (1958) Technical 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.

**GELLER, IRWIN** (1962) Physical Sciences
B.A., Emory and Henry College, 1943; M.S., University of Puget Sound, 1953; Ph.D., Pennsylvania State University, 1959.
Experience: Manager, Bulk Oil Storage Depot, Leyte, Philippine Islands; part-owner, automobile agency, Roslyn, New York; research assistant in fuel technology, Pennsylvania State University; research chemist, solid rocket fuels, Aerojet-General Corporation, Azusa; evening instructor, Citrus College.

**GENDELMAN, SAMUEL** (1964) Mathematics
B.A., University of Wisconsin, 1938; M.A., University of Southern California, 1961; additional graduate study, University of California, Los Angeles.
Experience: Teaching assistant, University of Wisconsin; lecturer, University of Southern California; assistant professor, Los Angeles State College.

**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) ................................................................. Mathematics
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 pro-
fessor, University of Washington; associate director of research, El Paso Natural
Gas Products Co.

GERARD, E. DOUGLAS (1951) ................................................................. Building Program Coordinator
B.S., University of British Columbia, 1950; M.S., University of Saskatchewan,
1951.
Experience: Instructor, University of British Columbia; instructor, University of
Saskatchewan; shop superintendent, British Columbia Forest Products, Pitt Lake,
British Columbia; service manager, Tractor and Allied Equipment, Limited, Mel-
fort, Saskatchewan.

GESLER, JACK T. (1957) ................................................................. Animal Science
B.S., California State Polytechnic College, 1952; M.S., Kansas State College, 1956;
additional graduate study, State College of Washington.
Experience: Instructor in meats, State College of Washington; assistant meats
instructor, Kansas State College.

GIBBONS, BILLIE D. (1963) ................................................................. Education
A.B., University of California, 1950; M.A., Long Beach State College, 1957;
additional graduate study, University of Southern California.
Experience: Graduate manager, Long Beach State College; research engineer,
North American Aviation; associate research scientist, American Institute for Re-
search; human factors specialist, Nortronics Corp.; engineering psychologist, Aero-
jet-General Corporation.

GIBBS, GORDON L. (1962) ................................................................. Animal Husbandry
B.S., California State Polytechnic College, 1962.
Experience: Livestock and Ranch work, Mackay, Idaho; Manager, Gibbs Drive-
In Dairy, Twin Falls, Idaho; U.S. Air Force.

GIBFORD, WILLIAM R. (1955) ................................................................. Animal Husbandry
B.S., California State Polytechnic College, 1947.
Experience: Horse trainer, Ed Wright Stables and 1001 Ranch, Riverside; horse
trainer and horseshoer, San Luis Obispo; employee, Humphrey Meat Packing Com-
pany, San Miguel; Pacific Valley Cattle Company, King City; U.S. Marine Corps.

GIBSON, DOUGLAS A. (1965) ................................................................. Assistant Graduate Manager
B.S., University of Wyoming, 1965.
Experience: Sports editor and reporter, Laramie Daily Boomerang.

GIBSON, J. CORDNER (1949) ................................................................. Assistant Dean 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, Kellogg-Voorhis.

GLIDDEN, WALLACE F. (1961) ................................................................. Veterinary Science
B.S., California State Polytechnic College, 1962; B.S., University of California,
Experience: U.S. Army Veterinary Corps; poultry research, U.C.D.; large and
small animal practice, southern California.

* Kellogg-Voorhis staff.
GOLD, MARCUS (1947) (1954) --- 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.

GONAN, LILLIAN I. (1963) --- English and Speech
B.S., Danbury State Teachers College, 1950; M.A., University of California, 1958; additional graduate study, University of Southern California.
Experience: Teacher in public schools of Visalia, Santa Barbara, Hermosa Beach; teaching assistant, University of Southern California; teacher, Cambria School.

GOODE, JESSE B. (1956) --- Mathematics
B.S., U.S. Naval Academy, 1919; M.S., Columbia University, 1926; U.S. Naval Academy Post Graduate School.
Experience: United States Navy; instructor, Clinch Valley College, University of Virginia.

*GOODIN, JAMES D. (1962) --- Mechanical Engineering
B.S.M.E., University of Southern California, 1957.
Experience: Production supervisor, Union Carbide Chemicals Co.; junior mechanical engineer, Southern California Edison Company.

* GORMAN, LEO P. (1957) --- Agricultural Engineering
Adult Teacher Certificate, University of California, Los Angeles, 1941.

GOULD, NORMAN S. (1950) --- Education
A.B., Pomona College, 1948; M.S., University of Southern California, 1949; Ph.D., Florida State University, 1961.
Experience: Instructor, Basic Medical Sciences, U.S. Army; Assistant to Dean of Students, University of Southern California; Lecturer, University of California Extension Division; Instructor, Florida State University.

GOW, IMOGENE V. (1947) --- Supervising Nurse
R.N., Union Labor Hospital, Eureka, 1921.
Experience: In charge floor nurses, Union Labor Hospital; nurse, Stanford Lane, San Francisco; private duty, Eureka and Yreka.

GRAN, RUTH (1957) --- Graduate Nurse
R.N., Mary's Help Hospital, San Francisco, 1936.
Experience: San Mateo Clinic; Army Nurse Corps; San Luis Obispo General Hospital.

GRANT, DAVID M. (1950) --- English 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, GEORGE (1958) --- Aerospace Engineering
B.S., Marquette University, 1955.

* Kellogg-Voorhis staff.
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) *
Air Conditioning and Refrigeration 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, KENNETH A. (1965) Social Sciences
A.B., University of California, Berkeley, 1948; M.S.W., 1950.
Experience: Counselor, Conciliation Court, Los Angeles County, Family Counseling Service, Los Angeles; director of social service, Sierra Madre Lodge for Alcoholism; mental health counselor, Santa Rita Rehabilitation Center.

* GREEN, SIMON (1964) Mathematics
Actuary Diploma, University of Vienna, 1933; M.S., 1934; Ph.D., University of Pittsburgh, 1952.
Experience: Assistant professor, Lincoln University; professor, Philander Smith College; associate professor, Tulsa University; professor, Arizona State University; research associate: Meteorological Institute, University of Uppsala; Royal Telephone Company, Sweden; Boeing Airplane Company, Kansas and Washington; consultant, Navy Electronics Laboratory, San Diego.

GREGORY, C. HEROLD (1950) Printing Engineering and Management
B.S., California State Polytechnic College, 1952.
Experience: Superintendent and manager of printing plants, Los Angeles; instructor, U. S. Navy.

* GREGORY, VERNON L. (1953) Biological Sciences
B.S., University of Miami, 1941; M.A., DePauw University, 1947; additional graduate study, University of Southern California, 1949-1953.
Experience: Undergraduate assistant in zoology, University of Miami; graduate assistant, DePauw University; naval aviator, United States Navy; flight instructor, United States Navy; instructor in zoology, University of Miami; graduate associate, University of Southern California; curriculum specialist, California State Polytechnic College.

* GRIFFIN, JAMES M. (1949) Ornamental Horticulture
B.S., California State Polytechnic College, 1949; M.A., 1952.

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.

* Kellogg-Voorhis staff.
HADJIMICHAEL, EVANGELOS (1965) .............................................. Physical Sciences
B.S., City College of New York, 1960; Ph.D., University of California, Berkeley, 1965.
Experience: Research assistant, Columbia University; teaching assistant and research assistant, University of California, Berkeley; lecturer, University of California, Santa Barbara.

* HALDERMAN, DONALD L. (1959) .............................................. Physical Education
B.S., University of Southern California, 1951; M.S., 1959.
Experience: Teacher-coach, Whittier High School and California High School, Whittier; naval aviator, United States Naval Reserve.

* HALL, CLARENCE L. (1965) .............................................. Civil Engineering
Experience: Commissioned officer, United States Navy; civil engineering designer-draftsman, contract basis; civil engineering assistant, City of Los Angeles; structural engineering, Ralph McLean; engineering calculator; civil engineering associate, City of Torrance; civil engineer, Staples Engineering Co.; real estate loan man, W. R. DuBois Co.; civil engineer, self-employed.

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.

HAMMITT, LEWIS E. (1946) .............................................. Physical Sciences
B.S., Whitman College, 1926; M.A., University of Washington, 1940; additional graduate study, University of Washington. U.S. Navy Air Navigation School, 1943.

HANCOCK, KATHARINE A. (1964) .............................................. Library
Experience: Reference librarian, Library Branch, Special Services Section, United States Army, Korea.

* HAND, ROBERT F. (1964) .............................................. Physical Education
B.S., Louisiana Polytechnic Institute, 1941; M.S., University of Arkansas, 1948; additional graduate study, University of Houston.
Experience: Athletic trainer, Louisiana Polytechnic Institute; assistant chemist, Holly Sugar Corporation; athletic trainer, United States Naval Training Center, San Diego.

* HANEY, SUE M. (1964) .............................................. Library
Experience: Student assistant, Catalog Department, California State College at Long Beach; catalog assistant, Washington State Law Library.

HANKS, CHARLES J. (1954) .............................................. Mathematics
Experience: Assistant professor, Drexel Institute of Technology; assistant football coach, University of Arkansas; officer, U.S. Coast Guard.

HANNULA, REINO (1962) .............................................. Mathematics
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.

* Kellogg-Voorhis staff.
HANSEN, PHYLLIS JEAN (1963) Library
Experience: Student assistant, University of Illinois Library; librarian, Queens Borough Public Library; reference librarian, Community Library, San Leandro, California.

* HANSON, CHARLES L. (1961) Assistant Director, Voorhis Educational Center
B.A., University of Redlands, 1957; graduate study at San Diego State College and California Western University.
Experience: YMCA Boys' Secretary; U.S. Army—Personnel Department and Finance Department; Crown Enterprises, Comptroller and General Manager.

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.

* HARDING, FENTON (1965) Civil Engineering
B.S., Texas Technological College, 1933.
Experience: Instructor, Texas Technological College; associate engineer, Armour Research Foundation; assistant professor, Southern Methodist University; associate professor, Texas Technological College; professor, University of Southwestern Louisiana.

* HARMER, RUTH M. (1960) English
B.A., Barnard College, 1941; M.A., Columbia University, 1942; additional graduate study, University of Southern California.
Experience: Instructor, University of Southern California and Mexico City College; lecturer, University of Hartford Courant, Washington Times-Herald; editorial assistant, American Speech; writer, Mutual Broadcasting Company.

HARRIS, ROY M. (1954) Animal Husbandry
B.S., Utah State Agricultural College, 1952; M.S., 1954.

* HARRIS, WILLIAM M. (1960) Chairman, Welding Department
B.S.Met.E., 1950; B.S.M.E., 1952, Missouri School of Mines and Metallurgy; graduate study, Washington University, St. Louis, Missouri.

HASKELL, CHARLES THOMSON (1963) Mathematics
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.

* Kellogg-Voorhis staff.
HASSLEIN, GEO. JOHANN (1949) ....... Head, Architecture and Architectural Engineering Department

B. of Arch., University of Southern California, 1945, 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 Wurdenman 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.

HAYES, HAROLD P. (1952) ....................................... Dean, Engineering Division
B.M.E., University of Santa Clara, 1941; graduate study, Stanford University.
Experience: Test and commercial engineer, General Electric Company; officer, U.S. Navy; head of Mechanical Engineering Department, University of Santa Clara, 1946-1951; sales engineer, Dudley Machinery Corporation. Registered professional engineer, California.

HEALEY, JOHN R. (1947) ........................................ Technical Journalism
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.

HEALEY, ROBERT J. (1958) ..................................... Business Management
B.S., State Teachers' College, Salem, Massachusetts, 1950; M.S., Oklahoma State University, 1952; additional graduate study, San Francisco State College.
Experience: U.S. Navy; teaching fellow and instructor, Oklahoma State University; office manager, Groendyke Transportation, Inc., Wichita, Kansas; instructor, Modesto High School, Modesto; coordinator of athletics, California State Polytechnic College.

HEATH, FREDERICK B. (1962) ................................ Head, Social Sciences
A.B., Syracuse University, 1949; M.A., 1950; Ph.D., University of Southern California, 1958.
Experience: United States Army; graduate fellow, lecturer, University of Southern California; instructor, Chouinard Art Institute; lecturer, Long Beach State College, Los Angeles State College.

HEIFETZ, EMANUEL R. (1962) .................................. Music
B.A., University of Redlands, 1950; M.M., 1958; additional graduate study, Claremont Graduate School. Extensive private music study with Luboviski, Pollak, Zaslavsky, and Meremblum.
Experience: Instrumental music instructor, San Bernardino Valley College; string and orchestra director, Summer Music Workshops; instructor-director, Community Orchestra, San Bernardino Adult Education; master teacher, University of Redlands; instrumental music teacher, Redlands City Schools and Inglewood Unified School District; composer of published violin method and other works.

HEINZ, JOHN A. (1953) ........................................... Chairman, Audio Visual Department
Experience: Technical and research assistant, University of Washington; production assistant, Korry Film Productions; free lance photographer, Seattle; production co-ordinator, Criterion Films, Inc., Seattle; film editor, KRON-TV, San Francisco.

* Kellogg-Voorhis staff.
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 Expanoles Asociados, Madrid, Spain; Warsaw Municipality; instructor, University of Nebraska; University of Oklahoma; Navy Orientation School.

* HENDERSON, LAUREN J. (1962) Medical Officer
M.D., State University of Iowa, Iowa City, 1932; internship, Jersey City Medical Center, 1932-33; residency, Hudson County Hospital, Secaucus, New Jersey, 1933-36.
Experience: General and surgical practice, Cedar Falls, Iowa; major, Medical Corps, U.S. Army; command of field hospital, surgical platoon, North African and Italian theaters.

HENDRIKS, HAROLD J. (1952) Electronic Engineering
B.S., Iowa State University, 1940; M.S., 1941; additional graduate study, University of Colorado, 1949.

HENNIG, LLOYD R. (1963) Medical Officer
B.S., University of California, 1927; M.D., 1932.
Experience: Internship, San Francisco General Hospital; residency, Franklin Hospital, San Francisco; U.S. Army; private practice, Willows.

HENSEL, DONALD W. (1960) Social Sciences
B.S., University of North Dakota, 1949; M.A., University of Colorado, 1953; Ph.D., 1957.
Experience: Instructor, public schools in Colorado, New Mexico, Arizona; graduate assistant, University of Colorado, Boulder; instructor in history and coordinator of Arts and Sciences instruction, University of Colorado, Denver; acting head, Social Sciences Department, California State Polytechnic College.

HERALD, CHARLES A. (1958) Electronic Engineering
B.Sc., M.Sc., Dalhousie University, Halifax, Nova Scotia, 1935.
Experience: Assistant professor, University of Massachusetts; instructor, Pennsylvania State University; instructor, Communication School, Canadian Department of National Defense; lecturer, McGill University; lecturer, University of British Columbia; special gauge examiner, assistant and junior physicist, National Research Council, Ottawa.

HESCH, EARL R. (1956) Mechanical Engineering
B.S., University of New Mexico, 1955; M.S., Oklahoma A. & M. College, 1956.

* HESSE, WALTER H. (1956) Physical Sciences
B.S., California State Polytechnic College, 1952; M.S., Cornell University, 1953; Ph.D., 1955.
Experience: Research assistant, Cornell University; teaching and research, University of Nevada; research, California Institute of Technology; engineering officer USNR and Merchant Marine.

HETTINGA, DAVID H. (1965) Food Processing
B.S., California State Polytechnic College, 1962; M.S., Purdue University, 1964.
Experience: Graduate assistant in food technology, Purdue University; sales manager, Eastgate Dairy Farms, Garden Grove, California.

* Kellogg-Voorhis staff.
Hickey, William A. (1963) — Physical Sciences
B.S., U.S. Naval Academy, 1924; M.S., University of California, 1932.
Experience: Statistician, State of Michigan; dean of engineering, Detroit College of
Applied Science; staff engineer, Chrysler Corporation Missile Division; dean of
college of engineering, Detroit Institute of Technology; captain, U.S. Navy.

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.

Hiemenz, Paul C. (1965) — Physical Sciences
B.S., Loyola University, 1958; Ph.D., University of Southern California, 1964.
Experience: Teaching assistant and research fellow, University of Southern Cali-
ifornia; instructor, Pierce College; research chemist, Dow Chemical Company,
Michigan.

Hirt, John B. (1965) — Business Administration
Experience: Industrial engineering analyst; industrial engineer, supervising engi-
neer, U.S. Steel Corporation; Engineering Officer, U.S. Marine Corps; instructor,
University of Pittsburgh.

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 Depart-
ment, Hayward.

Ho, Franklin Y. H. (1961) — Economics
B.A., National Southwestern Associated University, 1942; M.A., University of
Southern California, 1951; Ph.D., 1957; post-doctoral study at University of Wash-
ington and University of California.
Experience: Editor, National Construct; industrial engineer, Utility Appliance
Corp.; U.S. Government service; instructor, National Sun Yat-sen University; in-
spector, Santa Rosa Junior College; associate professor of business administration
and research project director, University of Portland.

Hobbs, Kenneth R. (1950) — Agricultural Services and Inspection
Experience: Technician and curator, Department of Entomology, Oregon State
College; agricultural inspector, Los Angeles County Department of Agriculture;
inspector, Bureau of Nursery Service, State Department of Agriculture; field repre-
sentative, structural pest control.

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.
Experience: Assistant manager, J. J. Newberry Co.; cost estimator, Douglas Aircraft
Co.; engineer, Robertshaw Fulton Controls; Kennecott Copper Corp., Ray,
Arizona.

Hogan, Wilbur C. (1959) — Mathematics
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.

* Kellogg-Voorhis staff.
HOLMQUIST, ROBERT E. (1946) Physical Sciences
B.A., University of Oregon, 1932; M.A., Oregon State College, 1936; additional graduate study, Purdue University and University of Washington.
Experience: Teaching assistant, University of Oregon and Oregon State College; instructor, University of Oregon; teaching fellow, Purdue University and University of Washington; inspection supervisor, Boeing Aircraft Company.

HOLT, RAY J. (1955) Physical Sciences
A.B., University of California, 1939; M.A., 1949.
Experience: Physicist, University of California Radiation Laboratory; aircraft inspector, Consolidated Vultee Aircraft Corporation; high school and junior college teacher.

HOLTZ, WALTER E. (1954) Head, Mechanical Engineering Department
B.S., Illinois Institute of Technology, 1949; M.S.M.E., California Institute of Technology, 1951.
Experience: Project engineer, Aerojet Corporation, Azusa; project engineer, Baker Engineering Corporation, Los Angeles; engineer, Carrier Corporation, Chicago; U.S. Naval Air Missile Test Center, Point Mugu; instructor, mechanical engineering, California State Polytechnic College, San Luis Obispo; officer, U.S. Air Force; registered professional engineer, California.

HOMFELD, GILBERT L. (1960) Mathematics
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.

Experience: Instructor in horseshoeing and blacksmithing, U.S. Army; horseshoer, Porterville.

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.

HORWITZ, DAVID A. (1965) Mathematics
B.A., University of Southern California, 1955; M.S.Ed., 1959; M.A., California State College, Los Angeles, 1963; additional graduate study, Claremont Graduate School.
Experience: Teacher, John Muir High School, Pasadena; instructor, Los Angeles Trade Technical College; lecturer, assistant professor, California State College, Los Angeles.

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.

* Kellogg-Voorhis staff.
HOUK, A. L. (1946) .................................................Physical Sciences
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; analyst, Michigan Agricultural Experiment Station; instructor in chemistry, Michigan State College; research chemist and group leader, Rohm and Haas Company, Philadelphia, Pennsylvania.

HOUKIS, JEROME F. (1959) .............................................Physical Sciences
B.S., California State Polytechnic College, 1958; graduate study, California State Polytechnic College.

* HOUSE, HENRY (1947) ....................................................Dean of Students
B.S., California State Polytechnic College, 1943; graduate study, University of California, California State Polytechnic College.
Experience: Associate dean (activities), California State Polytechnic College; director of vocational agriculture, Brawley Union High School; officer, U.S. Marine Corps.

HOUSTON, ERNEST R. (1957) ............................................Ornamental Horticulture
B.S., Oklahoma State University, 1943; M.S., Ohio State University, 1947; additional graduate study, Oklahoma State University.
Experience: Assistant professor, Oklahoma State University; manager of plant shipments, Furrow and Co., Guthrie, Oklahoma; grower and consultant, Higdon Flower Shop and Nursery, Oklahoma City, Oklahoma; U.S. Army.

HOWARD, LORRAINE H. (1964) ..................................Associate Dean, Women
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 Engineering 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.

* HUFFMAN, ALICE A. (1965) ..................................Mathematics
Experience: Math associate, University of California, Riverside; teacher, Notre Dame Preparatory School; extension teacher, teaching assistant, University of California, Riverside.

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.

* HUTCHINSON, RALPH B. (1960) ................................Economics
A.B., University of California, 1953; M.A., 1960; additional graduate study, University of California at Los Angeles.
Experience: Instructor, Long Beach State College; officer, U.S. Army.

* Kellogg-Voorhis staff.
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.

* IRVINE, ROBERT G. (1959) Electronic Engineering
B.S.E.E., Utah State University, 1956.
Experience: Electronic engineer, Convair, Pomona.

* IRWIN, LARRY D. (1965) Mathematics
B.A., Hardin-Simmons University, Texas, 1961; M.S., New Mexico State University, 1963.
Experience: Radarman, U.S. Army, Western Tablet and Stationery Corporation; project engineer, Sperry Utah Company; research engineer, General Dynamics, Pomona.

* IVES, QUAY D. (1960) Metal Processes
B.S., M.S., Texas College, 1951; additional graduate study, University of California at Los Angeles.
Experience: Instructor, Claremont Unified Schools, Claremont; Starr Commonwealth School, Albion, Michigan; factory superintendent and assistant engineer, Dico Corporation, Des Moines, Iowa; instructor, Del Mar College, Corpus Christi, Texas; tool and die maker, Ryan Aircraft, San Diego.

* JACKMAN, CLARENCE H. (1960) Business Management, Coordinator of Business Internships
Experience: Instructor, Spencerian College, Monmouth (Illinois) High School, University of Illinois; associate professor and assistant director of Evening Division, Bradley University; general manager, Schafer Feed and Grain Company; auditor, Arthur Young & Company; officer, U. S. Air Force Auditor General; auditor, Bowman Bros. Shoe stores; certified public accountant.

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.

*JACKSON, LEON S. (1961) Physical Education
Experience: U.S. Army Special Services; recreation adviser, Boys Republic.

JAMES, AERNAT S. (1965) Physical Sciences
Experience: Instructor, Orient Technical College, Frostburg State College; research assistant, Southern Illinois University; assistant, U.S. Embassy, Kabul, Afghanistan.

* Kellogg-Voorhis staff.
JAMES, ARTHUR F. (1956) Medical Officer
M.D., University of Chicago, 1953; B.A., University of California at Los Angeles.
Experience: Internship, U.S.P.H.S. Hospital, Staten Island, New York; U.S.
Public Health Service, San Pedro; private practice, Wilmington.

JENKINS, JOHN L. (1956) Home Economics
University of Wisconsin, 1923; University of California, 1956.
Experience: Own decorating business; instructor, adult education, various Cali-
ifornia schools.

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.

*JENSEN, JoANN S. (1963) Biological Sciences
B.A., Pacific Lutheran University, 1954; M.A., University of Southern California,
1957; Ph.D., Iowa State University, 1961.
Experience: Graduate teaching assistant, University of Southern California and
Iowa State University; graduate research assistant on Public Health Service Grant,
Iowa State University; instructor, Iowa State University; assistant professor, Cali-
fornia Lutheran College.

JENSEN, ROBERT P. (1954) Mechanical Engineering
B.S., The Stout Institute, 1932; M.S., 1938.
Experience: Instructor, Orange Coast College, College of the Sequoias; assistant
professor, Kansas State Teachers College; instructor, Maryland high schools;
operation sheet writer in production engineering, Pratt Whitney Corporation,
Kansas City, Missouri.

JOHNSON, CORWIN M. (1961) Head, Crops Department
B.S., State College of Washington, 1950; M.S., 1951; Ph.D., Cornell University,
1953.
Experience: Field and laboratory technician, research assistant, Department of
Agronomy, State College of Washington; research assistant, Department of
Agronomy, Cornell University; research agronomist, Northwestern Washington
Experiment Station; assistant professor and agronomist, Mississippi State University.

JOHNSON, MEAD R. (1956) English 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.

* Kellogg-Voorhis staff.
JOHNSON, RICHARD F. (1950) Animal Husbandry
B.S., Iowa State College, 1942; M.S., State College of Washington, 1947.
Experience: U.S. Army; instructor, College of Agriculture and assistant animal husbandman, Experiment Station, State College of Washington, Pullman, Washington.

JOHNSTON, ROBERT M. (1946-54) (1956) Mechanical Engineering
B.A., Santa Barbara State College, 1937; graduate study, Boeing School of Aeronautics.
Experience: Meteorologist, Pan American Airways and Pennsylvania Central Airlines; meteorology instructor, Randolph Field and Pan American Airways; junior civil engineer, Division of Highways, California.

*JONES, CECIL W. (1939) Business Manager
Riverside College, 1934; Riverside Business College, 1936; Certificate International Accountancy Society, 1942.

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.

*JOSEPH, ROBERT F. (1961) Medical Officer
Experience: General practice, Ross-Loos Medical Group, Pasadena; school physician, Los Angeles City School District.

JUDD, W. BOYD (1956) Mathematics
B.S., St. Mary's College, 1939; M.A., University of California, 1951; additional graduate study, University of California, Pennsylvania State College.
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) Physical Science
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.

*KACHUN, JOSEPH (1959) Mathematics
B.A., University of Pittsburgh, 1940; graduate study, University of Pittsburgh.
Experience: Assistant professor of mathematics, University of Pittsburgh; lieutenant, U. S. Navy, instructing navigation; instructor, Duquesne University, Pittsburgh, Penn State University; National Science Program, summer.

* Kellogg-Voorhis staff.
KAUFMAN, LOUIS (1961) Business Management
B.S., University of California, Los Angeles, 1940; M.B.A., University of Southern California, 1961; D.B.A., 1963.
Experience: Instructor, University of Southern California; general manager, retail department, store chain; warehouse manager, plastics manufacturer; assistant plant manager, aluminum manufacturer and converter.

KAY, THOMAS D. (1958) Welding and Metallurgical Engineering
B.S., Wayne State University, 1957.
Experience: Assistant training director, Ex-C elo-O Corporation; apprentice instructor, Chrysler Corporation; radio team chief and refrigeration mechanic, U.S. Army; machinist, Detroit-T imken Axle Company; apprentice, Goodyear Tire and Rubber Company.

KEATING, EUGENE K. (1964) Animal Science
B.S., Kansas State College, 1953; M.S., 1954; Ph.D., University of Arizona, 1964.
Experience: Rancher; farm manager and instructor, Midwestern University.

KEIF, RODNEY G. (1960) Air Conditioning and Refrigeration 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) Mathematics
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.

KELLY, EDWARD M. (1957) Physical Sciences
B.S., Pennsylvania State College, 1943; M.S., 1945; Ph.D., Brown University, 1950.
Experience: Assistant professor, University of Maine; physicist, North American Aviation; physicist, Rheem Manufacturing Co.

KENNEDY, ROBERT E. (1940) Administrative Vice President
Experience: Editorial staff of San Diego Sun, San Diego Daily Journal, San Luis Obispo Telegram-Tribune, Palo Alto Times; executive secretary and manager, Civic Affairs Conference, San Diego; advertising manager, Hamilton's Ltd., San Diego; at California State Polytechnic College: instructor, English and journalism; acting college librarian; instructor, communications and English, U.S. Naval Flight Preparatory School; chairman, journalism department; public relations director and publications adviser; assistant to the president; dean, Arts and Sciences.

KENNELLY, BRUCE (1947) Physical Sciences
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.

KENNINGTON, MACK H. (1958) Animal Science
B.S., University of Idaho, 1946; M.S., Purdue University, 1956; Ph.D., 1958.
Experience: U.S. Air Force; assistant agricultural extension agent, Bannock Company, Pocatello, Idaho; research assistant, Purdue University.

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.

* Kellogg-Voorhis staff.
* KESSLER, CHARLES J. (1960) __________________________ Mechanical Engineering  
B.S.M.E., University of Michigan, 1941.  
Experience: Works manager, Angle Products Company; consultant, McDonnell Aircraft; design engineer, Convair; instructor, Case Institute of Technology; assistant professor, Kent State University and University of Florida; associate professor, University of Missouri; registered professional engineer, Ohio.

* KIBBE, DONALD E. (1958) __________________________ Agricultural Engineering  
B.S., California State Polytechnic College, 1956.  
Experience: Manager, Surge of So. Oregon; salesman, Hawthorne Machinery, San Diego; sales engineer, Service Equipment Supply Company, Rocklin.

* KIEFER, DOROTHY L. (1962) _________________ Physical Education  
B.S., University of California, Los Angeles, 1943; graduate study, University of California, Los Angeles; University of California, Riverside; Claremont Graduate School.  
Experience: Teacher, Huntington Beach High School, Riverside Polytechnic High School, Claremont High School.

* KING, LOUIS J. (1958) ________________ Psychology  
B.A., University of California, Los Angeles, 1943; M.S.W., University of Southern California, 1954; Ed.D., 1958.  
Experience: Marriage counselor, American Institute of Family Relations, Los Angeles; personnel counselor, Los Angeles; vocational and personal counselor, University of Southern California, Veterans Administration; instructor, Los Angeles City Schools, Torrance City Schools, Santa Ana Junior College; assistant superintendent, attendance and welfare, Los Angeles City Schools.

KIRKPATRICK, WILLIAM M. (1949-51) (1953) __________ Agricultural Engineering  
B.S., California State Polytechnic College, 1949.  

* KITCH, KENNETH H. (1950) _____________ Director, Voorhis Educational Center  
A.B., Southwestern College, 1930; A.M., Kansas University, 1937.  
Experience: Reporting, editing, advertising staffs, various Kansas daily newspapers; instructor, community high schools, Arlington and Altamont, Kansas; correspondent for Kansas City Star; editorial columnist for chain of southeast Kansas weeklies; instructor, Dallas, Texas, Technical High School; wire editor and writer, Associated Press; assistant director, Dallas Adult Education Program; public relations and advertising counsel, Dallas and San Antonio; news editor, WFFA, Dallas; editor and managing editor, Southern Seedsman and Sun-Up magazines; freelance magazine writer.

KLAUSTERMEYER, JAMES A. (1964) _________________ Crops  
B.S., California State Polytechnic College, 1960; graduate study, 1961.  
Experience: Sales and service, Southern Ammonia Service; Vocational Agriculture instructor, Santa Paula, Camarillo; U. S. Army.

* KLEBSCH, HOWARD K. (1965) _________________ Electronic Engineering  
B.S., California State Polytechnic College, 1952.  
Experience: Engineer, Douglas Aircraft Co., General Telephone Co.; senior engineer, General Dynamics Corp.

* Kellogg-Voorhis staff.
* KNIGHT, BARRY A. (1964) .................................................. Accountancy
B.S., University of California, Los Angeles, 1960.
Experience: Senior accountant, Lybrand, Ross Bros. and Montgomery; certified public accountant.

* KNILL, LAMAR M. (1960) .................................................. Biological Sciences
B.S., Colorado State University, 1951; M.S., 1955.
Experience: Graduate assistant, Colorado State University; fellow, Squibb Institute for Medical Research; research physiologist, Veterans Administration Hospital, Albuquerque; training officer, Armed Forces Special Weapons Project, Sandia Base, New Mexico; technical representative, Braun Chemical Company, Los Angeles; officer, U.S. Army.

* KNUDSEN, A. RUSSELL (1960) .............................................. Electronic Engineering
A.B., Brigham Young University, 1941; graduate study, North Carolina State College.
Experience: Instructor in electronics and mathematics, Valparaiso Technical Institute, Valparaiso, Indiana; assistant dean of education, Valparaiso Technical Institute; special instructor in electronics, Valparaiso University; instructor, National Science Foundation, Oklahoma State University; engineer, General Electric Co., Utica, N.Y.; staff member, Sandia Corporation, Albuquerque, New Mexico.

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.

KOEHNEN, HARVEY E. (1963) ................................................. Architecture and Architectural Engineering
B.S., University of Illinois, 1951; M.S., 1952.

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.

* KONIGSBERG, ALBERT (1961) ............................................ Mathematics
B.S., U.S. Naval Academy, 1930; M.S., Purdue University, 1960.
Experience: Officer, U.S. Navy (retired); director of material, Pennsylvania Optical Company; instructor, Claremont Men’s College.

* KORDUS, HENRY (1964) ..................................................... Landscape Architecture
M.S., University of Agriculture, Warsaw, Poland, 1951; M.A., University of Warsaw, 1957.
Experience: Landscape designer, “Flora” Forestry Office; professor, Lyceum of Landscape Architecture; assistant professor, University of Agriculture, Warsaw, Poland; landscape architect, Andrews and Clark Construction Engineers and Friedberg.
KORSMEYER, RUSSELL (1958) Electrical Engineering  
B.S.E.E., University of Missouri, 1950; M.S.E.E., University of Southern California, 1958.  

* KRAMER, LLOYD A. (1963) Library  
B.A., University of California, 1948; B.L.S., 1950; graduate study, U.S. Navy Language School.  
Experience: Slavic librarian, Hoover Institute and Library; social sciences librarian, Washington State University; head, technical services division, Humboldt State College Library; director, technical services division, Pomona Public Library.  

* KRAMER, ROBERT C. (1965) Vice President  
B.S., Purdue University, 1947; M.S., Michigan State University, 1948; Ph.D., 1952; post-doctoral graduate study, Harvard University.  
Experience: Professor, Michigan State University; program leader for marketing and assistant director—marketing, Michigan Cooperative Extension Service; director, Agricultural Marketing and Utilization Center, Michigan State University; visiting professor, Harvard Graduate School of Business Administration, Cornell University, University of Arkansas, Colorado State University, University of Wisconsin, and University of California, Berkeley; consultant, United States Department of Agriculture, O.E.C.D., Paris, France, Bank of America, and business corporations and trade and commodity associations; officer, USNR.  

* KRIEGE, KENNETH B. (1957) Mathematics  
B.S., California State Polytechnic College, 1951; M.A., 1951; additional graduate study, University of Southern California, University of California at Los Angeles.  
Experience: Teacher, San Luis Obispo Junior High School, Pomona High School.  

* KRUEPER, HARRY J. (1964) Civil Engineering  
B.S., University of California, Los Angeles, 1959, M.S., 1963.  
Experience: Traffic section, City of Berkeley, California; instructor, U.S. Navy Civil Engineer Corps; assistant district traffic engineer, California Division of Highways; consulting engineer, Neste, Brudin and Stone; registered professional civil engineer, California.  

KUMM, KARL W. G. (1965) English and Speech  

* LA BOUNTY, HUGH O. (1953) Executive Dean and Director of Staff Services  
Experience: Teacher-administrator, Citrus High School and Junior College; chairman, English department and building coordinator; head, social science department, California State Polytechnic College.  

* LACY, MILO G. (1959) Agricultural Business Management  
B.S., University of Oregon, 1938; graduate study, University of California, Los Angeles.  
Experience: Instructor, Long Beach City College; Pasadena City College; retail marketing specialist, USDA, Washington, D.C.; general manager, Richards Market, Newport Beach.  

LAMOURIA, LLOYD H. (1965) Head, Agricultural Engineering  
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.  

* Kellogg-Voorhis staff.
LANDRETH, James R. (1956) ........................................... Personnel Relations and
Business Management Analyst
B.A., Mexico City College, 1954; M.B.A., Stanford graduate school of Business, 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.

LANDYSHEV, ALEXANDER (1956) ..................................... Electrical Engineering
E.E., University of Vladivostok, Russia, 1927.
Experience: Electrical engineer, Donetz Basin Power System, Russia; Energiebauanst 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.

LANE, BERNARD O. (1963) ............................................. Physical Sciences
B.S., University of North Carolina, 1950; M.S., Brown University, 1955; Ph.D., University of Southern California, 1962.
Experience: Graduate assistant, University of Southern California; geologist, Union Oil Company; lecturer, University of Nevada; curator of paleontology, Mackay Museum; curator of geology, Santa Barbara Museum of Natural History.

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.

* LANSFORD, FRANK D. (1964) .................................... Head, Physical Education
B.S., Tennessee Polytechnic Institute, 1953; M.A., George Peabody College, 1954; additional graduate study, Claremont School of Theology, Whittier College.
Experience: Physical education instructor, Young Men's Christian Association, Florida; director and coach, Young Men's Christian Association, Pomona.

LANSMAN, PAUL S. (1964) ............................................. Mathematics
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.

* LAPP, RUSSELL V. (1962) ........................................... Language Arts
Experience: Staff photographer, Los Angeles Examiner; staff photographer, Garden Grove News; free lance photographer.

* LASSWELL, MARCIA E. (1961) .................................... Social Sciences
B.A., University of California, 1949; M.A., University of Southern California, 1952.
Experience: Instructor, George Pepperdine College; consultant, Affiliated Psychological Consultants; marriage counselor and psychometric consultant, Institute Therapeutic Psychology.

LAU, HOLLY HANG (1964) ............................................. Library
B.A., National Taiwan University, 1962; M.S.L.S., George Peabody College for Teachers, 1964.
Experience: Assistant Secretary, Filmo Depot, Ltd., Hong Kong; assistant bookkeeper, University Students' Cooperative, Berkeley, California.

* Kellogg-Voorhis staff.
LAUMANN, GEORGE C. (1957) Mathematics
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.

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.

* LEE, KEI A. (1965) Mathematics
B.S., University of Michigan, 1960; B.S., 1961; M.S., 1962.
Experience: Assistant in research, University of Michigan; assistant professor, Piedmont College.

LEE, THOMAS J. (1952) Physical Education and Athletics
Experience: Player-coach, All-American Professional Basketball Team; instructor, private gymnasium, Oakland; playground director, Hayward Recreation District; U.S. Army.

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.

* LEVERING, DAVID L. (1963) Social Science
B.A., University of Redlands, 1950; M.A., Claremont Graduate School, 1959; additional graduate study, Claremont Graduate School.
Experience: Regional executive, World University Service; associate in humanities, University of California, Riverside.

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 Brosl; officer, U.S. Navy; counselor, San Francisco Unified School District; associate dean (counseling and testing), California State Polytechnic College, San Luis Obispo.

LEWIS, VANCE D. (1946) Physical Sciences
A.B., University of California, 1933; M.A., 1940; Ph.D., University of Southern California, 1954; additional graduate study, University of New Mexico, University of Washington, Rensselaer Polytechnic Institute.
Experience: Laboratory technician, Shell Development Company; science and mathematics instructor and administrator, California secondary schools; staff member, 1955 summer physics institute, University of New Mexico; U.S. Naval Aviation officer.

* Kellogg-Voorhis staff.
* LIEB, THEODORE L. (1964) —— Agronomy and Agricultural Engineering
   B.S., California State Polytechnic College, 1947.
   Experience: Teacher, Federal Government; dairy farmer, Corona; head farmer, California State Polytechnic College.

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.

* LINGENFELTER, BARBARA H. (1964) —— Social Sciences
   B.A., Santa Barbara State College, 1934; M.E., University of California, Los Angeles, 1955.
   Experience: Teacher, Pasadena City Schools; Little Lake School District; elementary consultant, Imperial, Alameda and Los Angeles Counties; primary consultant, San Carlos City Schools; instructor, University of California Extension, Los Angeles.

* LINT, HAROLD L. (1947) —— Biological Sciences
   B.A., University of California at Los Angeles, 1940; M.A., 1942.
   Experience: Inspector, United States Food and Drug Administration.

LINTON, ARTHUR C. (1964) —— Animal Husbandry
   Experience: Dudley-Parker Ranch Company, Gazelle, Calif.; Sinton Brown Company, Santa Maria, Calif.

* LISOWSKI, MARTIE L. (1959) —— Library
   B.A., University of California, Los Angeles, 1933; M.S. in Library Science, University of Southern California, 1959.
   Experience: Counseling, testing, and special placement, California Department of Employment; evening school instructor, Los Angeles City Schools; library aide, Los Angeles County Library.

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) —— Mathematics
   B.S., United States Military Academy, West Point, 1947; M.A., California State Polytechnic College, 1963; additional graduate study, University of Illinois.
   Experience: Officer and navigation instructor, U.S. Air Force; engineer, Boeing Company.

* Kellogg-Voorhis staff.
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.

LUM, PUEY-CHONG (1963) Mathematics
A.B., University of California, Berkeley, 1958; M.A., 1959; additional graduate study, University of California, Berkeley.
Experience: Translator, California State Board of Examiners; teaching and research assistant in mathematics, University of California.

LYNCH, EDMUND C., JR. (1963) Language Arts
B.A., University of Denver, 1955; M.A., 1956; additional graduate study, University of Denver.
Experience: Instructor, Trinity University; assistant professor and technical director of theater, Iowa State University; designer and technical director, Omaha Community Playhouse; operations supervisor, KOA, TV; instructor, University of Denver; film editor—operations director, WRC TV; lighting designer, Barter Theater of Virginia.

McALLISTER, JAMES A. (1964) Electronic Engineering
B.S., U.S. Naval Academy, Annapolis, 1939; M.S., University of California, 1948.
Experience: Assistant professor, Physics, California Western University, San Diego; United States Navy; division director, Research and Development Division for Undersea Warfare and Ocean Surveillance; assistant director, Electronics Division, Bureau of Ships; assistant director, U.S. Navy Electronics Laboratory, San Diego; electronics and radiological safety officer, San Francisco Naval Shipyard; assistant director, Ship Electronics Division, Bureau of Ships.

McCaleb, Donald L. (1962) Public Relations Coordinator
B.S., Los Angeles State College, 1958; graduate study, Los Angeles State College.

B.S., Clemson University, 1950; B.S.E.E., 1957; M.S.E.E., 1961; additional graduate study, Worcester Polytechnic Institute, Arizona State College.

McCorkle, C. O. (1932) Dean of the College
B.S., University of California, 1927; M.S., 1937.
Experience: Director of agriculture and critic teacher, Red Bluff Union High School; executive secretary, California Association Future Farmers of America; teacher trainer, Agricultural Education, Bureau of Agricultural Education; head, agricultural division, California Polytechnic; research assistant, Giannini Foundation of Agricultural Economics, University of California; instructor, agricultural economics; subject matter specialist, Bureau of Agricultural Education, State Department of Education (California); assistant to the president, dean of instruction, administrative dean, instruction, California State Polytechnic College.

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.

* Kellogg-Voorhis staff.
*McCORMIC, RALPH C. (1959) Language Arts
B.A., Oklahoma State University, 1947; M.A., Stanford University, 1950; additional graduate study, Stanford University.
Experience: Temporary instructor, Oklahoma State University; instructor, San Francisco State College; assistant professor, University of Texas; Command Entertainment Director, United States Army in Europe; technical director, Actor’s Workshop of San Francisco.

McGRATH, JAMES M. (1946)
Head, Air Conditioning and Refrigeration Engineering Department
B.A., Santa Barbara College, 1941; M.A., California State Polytechnic College, 1953.

* McINTOSH, WILLIAM C. (1951)
Coordinator, Scheduling and Institutional Studies
A.B., University of California, Berkeley, 1948; M.A., 1950; additional graduate study, University of Southern California.
Experience: Teacher, Richmond Union High School; mathematics and physics instructor, California State Polytechnic College, San Luis Obispo Campus; instructor, mathematics, California State Polytechnic College, Kellogg Campus.

* McLACHLIN, HARRY B. (1954) Head, Animal Sciences Department
B.S., North Dakota State College, 1930.
Experience: Extension service, extension animal husbandman, North Dakota; U.S. Navy; ranch management, Sacramento Valley.

McMEEN, GEORGE H. (1960) Mathematics
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.

Experience: Communications electronics staff officer, U.S. Air Force; senior electronics engineer and group leader, General Dynamics; chief engineer, Edcliff Instruments.

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, Technical Arts 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.

* Kellogg-Voorhis staff.
MACDONALD, KENNETH A. (1962) Mathematics
B.A., University of Arizona, 1956; M.A., University of Vermont, 1958.
Experience: Instructor, Idaho State College; Instructor, San Diego State College.

MACDONALD, LACHLAN P. (1963) Language Arts
M.A., University of Chicago, 1957.
Experience: Reporter, Daily Mining Gazette, Michigan; news editor, Radio Station KBYR, Alaska; feature reporter, Anchorage Daily Times; Alaska correspondent, Associated Press Seattle Bureau; public information specialist, U. S. Army, Alaska; public relations counsel, Alaska National Guard; editor, Chicago Review; lecturer and editor, University College, University of Chicago; reporter and copy editor, City News Service, Los Angeles; teacher, Webb School of California; free lance magazine and television writer and photographer.

MACH, GEORGE R. (1954) Mathematics
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; officer, U.S. Navy.

MACROPOL, JOHN (1960) Physical Sciences
B.A., University of California, 1954; M.S., Michigan State University, 1955.
Experience: Dynamics engineer, Convair, San Diego; head, physics department, Lawrence Institute of Technology, Detroit, Michigan.

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) Physical Sciences
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.

MAKOW, YORAM (1965) Audio-Visual
Experience: Free lance designer, California; teacher and supervisor, University Synagogue; designer, Northwestern; research assistant, University of California.

MAKSOUDIAN, Y. LEON (1963) Mathematics
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.

MANASSEUO, JAMES R. (1963) Agricultural Business Management
B.S., California State Polytechnic College, 1961; M.S., Cornell University, 1963.
Experience: Research assistant, Department of Agricultural Economics, Cornell University.

MANNING, JOHN H. (1956) Mathematics
A.B., Oakland City College, 1937; M.A., University of Cincinnati, 1939; D.Ed., Pennsylvania State University, 1954.

* Kellogg-Voorhis staff.
MARQUEZ, HENRY B. (1955) Administrative Assistant to Business Manager
B.S., University of California, Los Angeles, 1952.
Experience: Manager, Thrifty Drug Stores, Inc.; assistant to secretary-treasurer, Cannell and Chaffin; medical section, Los Angeles Terminal Annex Post Office; U. S. Coast Guard; purchasing division, Los Angeles County Purchasing and Stores; Bureau of Engineering, City of Los Angeles; Business Service Officer, California State Polytechnic College.

*MARSHALL, ROBERT D. (1957) Library
A.B., University of Washington, 1940; B.L.S., University of California, 1953.
Experience: Social science librarian, University of Oregon.

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.

*MARTI, WERNER H. (1956) Social Sciences
A.B., University of California, Los Angeles, 1943; M.A., Claremont Graduate School, 1951; Ph.D., University of California, Los Angeles, 1953.

MARTIN, LAURI R. (1965) Assistant to the Dean of Students and Financial Aid Counselor
B.S., California State Polytechnic College, 1962.
Experience: U.S. Coast Guard; claims adjuster, Travelers Insurance Companies; placement interviewer, University of California, Santa Barbara.

MATHENY, ROBERT (1952) Agricultural Engineering
Technical Certificate, California State Polytechnic College, 1951.
Experience: International Harvester Company, Des Moines, Iowa; diesel and heavy duty machinery mechanic, Army Air Corps; dealer and sales, Allis Chalmers, Point Arena.

* MAURER, ROBERT L. (1948) Social Sciences
B.A., Western Reserve University, 1935; M.A., 1936; Ph.D., Ohio State University, 1951.
Experience: Teaching assistant and research fellow, Ohio State University; instructor, Oregon State University, California State Polytechnic College, San Luis Obispo Campus; dean of arts and sciences, California State Polytechnic College; officer, U. S. Air Force; California certified psychologist.

*MATTERN, DAVID C. (1964) Library
B.A., Wesleyan University, 1961; M.S., University of Southern California, 1962.
Experience: Reference librarian, Anaheim Public Library; catalog librarian, professional Library Service, Santa Ana.

*MAURY, JAMES B., JR. (1963) Accountancy
B.S., University of Utah, 1959; graduate study, Loyola Law School.
Experience: Teacher, Twin Falls, Idaho, Junior High School; staff accountant, Alexander Grant and Company; staff accountant, Darling Wold and Agee. Certified public accountant.

*MELLARD, GEORGE A. (1957) Electronic Engineering
B.S., Kansas State College, 1947; M.S., 1952.
Experience: Instructor, Kansas State College; senior resident engineer, Convair, Pomona; engineer, Sylvania, Mountain View; officer, U. S. Naval Reserve.

MERRIAM, JOHN L. (1958) Agricultural Engineering
B.S., California Institute of Technology, 1938; graduate study, California Institute of Technology.
Experience: Instructor, California Institute of Technology; junior civil engineer, U. S. Army Engineers and private consulting engineers; civil area engineer, Soil Conservation Service, USDA; senior irrigation engineer, Ministry of Agriculture, Kingdom of Saudi Arabia; registered civil engineer, California.

* Kellogg-Voorhis staff.
MESLER, FLORENCE (1962) - Graduate Nurse
R.N., Patterson General Hospital, New Jersey, 1939.
Experience: Industrial nurse, Wright Aero Corporation, Patterson, New Jersey; general duty nurse, Santa Monica Hospital, and French Hospital, San Luis Obispo; private duty, San Luis Obispo.

MEYER, THOMAS O. (1955) - Food Processing
B.S., State College of Washington, 1949; M.S., 1953.
Experience: Instructor and meats specialist, State College of Washington; assistant animal husbandman, Experiment Station, State College of Washington, Pullman, Washington.

MILES, HERBERT L. (1963) - Electronic Engineering
B.S.E.E., Wayne State University, 1950; M.S.E.E., 1963.
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, ALFRED I. (1963) - Physical Education
B.S., California State Polytechnic College, 1963; graduate study, California State Polytechnic College.
Experience: Athletic coach, Webb School of California, Claremont.

MILLER, ALLEN D. (1960) - Mathematics
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, DOUGLASS W. (1953) - Publications Manager
B.A., DePauw University, 1916; M.A., University of Wisconsin, 1927; Litt.D., DePauw University, 1941.
Experience: Copywriter, Sidner-Van Riper Advertising Agency; editorial staff: Greencastle, Ind., Daily Banner; European Edition, Stars and Stripes; community newspaper publisher, Syracuse, N.Y., Los Angeles; director of public relations, Ohio Wesleyan University, Syracuse University, Case Institute of Technology; professor of journalism, Ohio Wesleyan University, Stanford University, Syracuse University.

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.

MONSEES, LYLE R. (1964) - Electronic Engineering
B.S., South Dakota School of Mines and Technology, 1959; M.S., University of Southern California, 1963.
Experience: Engineer, Beckman Instrument Company, KELO Radio and Television Station, KSDN Radio Station; member of technical staff, Hughes Aircraft Company; instructor, U. S. Air Force.

* Kellogg-Voorhis staff.
MONTGOMERY, DAVID H. (1956) Biological Sciences
B.S., California State Polytechnic College, 1954; M.A., College of the Pacific, 1956; additional graduate study, Friday Harbor Laboratories, University of Washington and University of California.

Experience: Laboratory assistant and teaching assistant, California State Polytechnic College; teaching fellow, College of the Pacific; staff Pacific Marine Biological Station, Dillon Beach, California; National Science Foundation fellow, Friday Harbor Laboratories; National Science Foundation fellow, University of California.

* MOORE, DOUGLAS H. (1958) Mathematics
A.B., 1942; University of California, M.A., 1948; Ph.D., 1962.

Experience: U.S. Air Force, instructor, University of California, West Coast University, Los Angeles; research engineer, North American Aviation, Hughes Aircraft Company, Los Angeles.

MOORE, JERRY M. (1964) Agricultural Business Management
B.S., Texas Technological College, 1962; M.S., Colorado State University, 1964.

Experience: Field supervisor, Agricultural Stabilization and Conservation Service; graduate research assistant and instructor, Colorado State University.

* MOORE, LYDIA P. (1964) Mathematics

Experience: Lecturer, California State College, Los Angeles.

* MORALES, RAY (1961) Civil Engineering
B.S., Loyola University, 1960; M.S., Stanford University, 1961.

Experience: Assistant civil engineer, Department of Water and Power, Los Angeles; field engineering aide, Department of Water and Power, Los Angeles; design draftsman, Electro-cord Corp.; design draftsman, Williams Metal Products; assembly, Lockheed Aircraft Corp.

* MORAN, GABRIEL T. (1948) Physical Sciences
B.A., Whittier College, 1942; graduate study, Whittier College.

Experience: Chemist, American Potash and Chemical Company, Trona; Thompson Products, Bell; Paul Dickerson, Chemistry Laboratory; District Agricultural Laboratory, Whittier.

* MORGAN, HORATIO O. (1963) Aerospace Engineering
B.A., Pomona College, 1928; graduate study, Claremont College, George Washington University.

Experience: United States Air Force as group commander, executive officer, commander air base group, air inspector, personnel officer; director personnel, Boston Air Defense Sector; colonel (retired) U.S. Air Force.

* MORRELL, WARREN E. (1965) Language Arts
B.S., South Dakota State University, 1939.


MORRISON, IAN W. (1965) Social Sciences
A.B., Knox College, 1958; A.M., University of Chicago, 1961; additional graduate study, Loyola University, University of Toronto, University of California, Los Angeles.

Experience: Management-trainee, Prudential Insurance Co.

MOTT, ROBERT A. (1946) Head, Physical Education
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.

* Kellogg-Voorhis staff.

17-62024
MOUNTS, BILLY W. (1956) ........................................ College Physician
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 (1960) .......................... Associate Dean (Counseling)
B.A., Long Beach State College, 1956; M.A., 1957; additional graduate study, University of Southern California.
Experience: Counselor, California State Polytechnic College; teacher, Excelsior Union High School District; counselor-instructor, Cerritos College; electronic technician, U.S. Army Ordnance; drafting, tool design, and technical illustration, Goodyear Tire and Rubber and Shaffer Tool Company.

* MYERS, LEONHARD M. (1964) ..................... Industrial Engineering
B.A., University of Missouri, 1952; B.S., 1960.
Experience: Industrial engineer, General Dynamics; human factors engineer, Boeing Airplane Co.; instructor, University of Missouri.

* MYLANDER, HARVEY (1958) ....................... Mechanical Engineering
B.S.M.E., University of Arizona, 1931; graduate study, University of Arizona, 1932.
Experience: Junior engineer, U.S. Geological Survey; foreign representative, General Electric Company; Pacific Coast manager, American Hoist and Derrick Company; district manager, DeLaval Steam Turbine Co.; consulting hydraulic engineer, private practice; registered professional engineer, California.

NEEL, PAUL R. (1962) ................................. Architecture and Architectural Engineering
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, Applied 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) ............................. Business Manager
A.B., Stanford University, 1930.
Experience: California State Department of Finance, Budgets and Accounts; comptroller, Fresno State College.

* NELSON, EDWARD A. (1958) ..................... Animal Science
B.S., Utah State Agricultural College, 1952; M.S., 1953; Ph.D., Kansas State College, 1958.
Experience: Manager, B.A.C. Valley Farm, Cedar City, Utah; co-owner and operator of livestock ranch, Cedar City, Utah; graduate research assistant, Kansas State College; U.S. Navy.

NELSON, RICHARD 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.
Experience: Operations control analyst, Aerojet-General Corporation; management and traffic consultant; assistant traffic manager, Treesweet Products Company; proprietor of retail grocery.

NEWBERRY, CONRAD F. (1964) Aerospace Engineering
B.E.M.E., University of Southern California, 1957.

NEWELL, LLOYD A. (1956) Fruit Industries
B.S., South Dakota State College, 1941.
Experience: Agricultural inspector, Department of Agriculture, San Diego County; instructor I-on-F program, Escondido and El Cajon; instructor adult education, Escondido; deciduous orchard manager, Escondido; livestock superintendent, San Diego, Riverside, and Orange County Fairs; U.S. Marine Corps.

NEWMAN, PAUL M. (1965) Language Arts
Experience: Assistant business manager, State University of Iowa Theatre; instructor, University of Iowa; assistant professor, University of California.

NICHOLSON, LOREN L. (1956) Technical 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-Searchnight.

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.

NISE, NORMAN S. (1963) Electronic Engineering
B.S.E.E., Drexel Institute of Technology, 1960; M.S.E.E., Lehigh University, 1962; additional graduate study, Purdue University.
Experience: Part-time instructor, Purdue University; Remington Rand Univac; electronics engineer, Hughes Aircraft Company.

NOBLE, GLENN A. (1947) Head, Biological Sciences Department
A.B., University of California, 1931; M.A., 1933; Ph.D., Stanford University, 1940.
Experience: Assistant in zoology, College of the Pacific; instructor, San Francisco City College; consultant in biology, American Military Government in Korea; professor of parasitology, Seoul National University, Korea; Fulbright professor of parasitology, Philippines and Taiwan.

NOLAN, THOMAS F. (1949) Social Sciences
B.S., University of Wisconsin, 1935; M.A., University of Southern California, 1940; additional graduate study at the University of Zurich, Switzerland.
Experience: Instructor senior high school, Stockbridge, Wisconsin; instructor senior high school, Kaukauna, Wisconsin; instructor, American School, Quito, Ecuador; Economic Analyst, Department of State, Washington, D.C., Montevideo, Uruguay; Officer, U.S. Naval Reserve; Vice-Consul, Department of State, Washington, D.C. at Valparaiso, Chile.

* Kellogg-Voorhis staff.
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.

NYCE, BENJAMIN, M. (1964) Language Arts
B.A., Princeton University, 1954; M.A., Claremont Graduate School; additional graduate study, Claremont Graduate School.
Experience: Lecturer, Scripps College; instructor, University of California, Riverside.

O’CONNOR, EUGENE L. (1964) Business Administration
B.S., St. Louis University, 1957; M.S., 1963.
Experience: Assistant manager, Knights of Columbus, Inc.; sales representative, Burroughs Corporation; executive director, Madison County Association for the Crippled, Inc.; instructor in business, Belleville Junior College.

O’DANIELS, HOWARD R. (1933) Business Administration
Bachelor of Commercial Science, University of Santa Clara, 1931; additional graduate study, University of Southern California.
Experience: Coach, California Polytechnic; officer, U.S. Navy.

OGAWA, ROY H. (1964) Mathematics
Experience: Data analyst and graduate teaching assistant, University of Hawaii; teacher, McKinley High School, Honolulu, Hawaii.

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.

OSBORN, NEAL J. (1965) Language Arts
Experience: Assistant professor and associate professor, Westminster College; associate professor, La Verne College.

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) Physical Sciences
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.I.S., Louisiana State University, 1963.
Experience: U.S. Air Force; Louisiana State University Library.

* Kellogg-Voorhis staff.
PARISH, A. RUSSELL (1958) ............................................ Chairman, Metal Processes Engineering Department

B.S., Oshkosh State Teacher's College, 1932; graduate study, University of Michigan.

Experience: Instructor, General Motors Institute, Public Schools, Michigan; writing and conducting management training conferences and tool and die maker, General Motors Corp.; training director, General Railway Signal Co.

PARK, DAVID J. (1965) .................................................. Economics

B.A., Claremont Men's College, 1957; M.A., University of Southern California, 1959; Ph.D., 1962.

Experience: Mathematics teacher, Los Angeles City Schools; assistant professor; La Verne College, University of Maryland; head, Overseas Marketing Department, Janseng Corporation.

PAUGSTAT, WILLIAM C. (1956) ........................................ Mathematics

A.B., Miami University, 1952; M.Sc., Cornell University, 1954.

Experience: Assistant professor of chemistry, Upland College; associated with the Exchange Orange Products Company, Ontario, as hesperidin analysis and control chemist.

PAUL, FRANK (1960) .................................................... Accounting

B.B.A., City College of New York, 1942; M.A., University of San Francisco, 1958; additional graduate study, City College of New York, University of Washington.


PAUTZ, ROLAND K. (1959) ............................................... Poultry Industry

B.S., Oregon State College, 1957; graduate study, Oregon State College.


PEDERSON, 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.

PEPPER, JAMES E. (1964) ............................................. Landscape Architecture


Experience: Draftsman, Gordon & Gordon; designer-draftsman, Smith and Williams, and Hershberger and Pepper.

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) ......................... Physical Sciences

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.

* Kellogg-Voorhis staff.
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.

* PFLUEGER, DONALD HOWARD (1952) (1958)  Social Sciences Department
B.A., Pomona College, 1949; M.A., Stanford University, 1951.
Experience: U.S. Navy; teacher, Covina High School; instructor, California State
Polytechnic College; cultural attaché, American Embassy, Amman, Jordan.

PHAKLIDES, WILLIAM J. (1963)  Air Conditioning and Refrigeration Engineering
B.S., California State Polytechnic College, 1956.
Inc., Modesto; design engineer, Barium Products, Ltd., Modesto; design engineer,
Conditioned Air, Fresno.

PHILBIN, LEO F. (1948)  Aeronautical Engineering
B.S., California State Polytechnic College, 1944.
Experience: Aircraft instructor, Naval Flight Preparatory School; aircraft in-
tructor, Fourth Air Force Headquarters, San Francisco; civilian training admin-
istrator, Salinas Army Air Base; training officer, Veterans Administration Office,
San Luis Obispo; registrar, California State Polytechnic, San Luis Obispo.

* PHILBRICK, JOSEPH L. (1960)  Social Sciences
B.A., Baylor University, 1949; M.A., 1950; Ph.D., 1955; additional graduate
study, University of Southern California, Long Beach State College.
Experience: Elementary school; registrar and chairman of department of psy-
chology and philosophy, California Baptist Theological Seminary; dean of student
personnel services, chairman of department of psychology and philosophy, Howard
Payne College; instructor in psychology and sociology, Fullerton Junior College;
instructor in philosophy, Cerritos College; instructor in education, University of
California Extension.

PHILLIPS, WILLIAM R. (1957)  Architecture and Architectural Engineering
B.Arch., University of Southern California, 1952.
Experience: Draftsman, W. H. Harrison, Architect; Sponseller & Sons; U.S
Engineer Department; engineer, North American Aviation, Inc.; U.S. Army,
registered architect, California.

PIMENTEL, RICHARD A. (1952)  Biological Sciences
A.B., San Jose State College, 1947; M.S., Oregon State College, 1950; Ph.D., 1952.
Experience: Officer, U.S. Army; teaching assistant, Oregon State College; ranger-
naturalist, Crater Lake National Park; associate professor, University of California
Extension Nature Study Institute at Santa Barbara; lecturer, National Science
Foundation Summer Science Program.

PIPER, CURTIS DEAN (1964)  Soil Science
B.A., W. T. Bryan University, 1953; M.S., Michigan State University, 1959; Ph.D.,
1964.
Experience: Farm operator; food service director, Kings College; instructor in
research and teaching, Michigan State University.

* POLLOCK, FRANCES (1963)  Language Arts
A.B., University of California, 1943; M.A., University of California at Los
Angeles, 1959; additional graduate study, University of Southern California, Neighbor-
hood Playhouse School of the Theater, New York.
Experience: Instructor, Hartnell College, Salinas; managing-director, Community
Players, Berkeley; partner-producer, Gallery Stage, Hollywood; summer stock,
New York, New Hampshire.

* Kellogg-Voorhis staff.
POMERENING, JAMES A. (1965) Agronomy
B.S., University of Wisconsin, 1951; M.S., Cornell University, 1956; Ph.D., Oregon State University, 1960.
Experience: Soil surveyor, Wisconsin Geological and Natural History Survey; teaching assistant, Cornell University; air photo interpreter, U.S. Army; research fellow, Oregon State University; assistant professor, University of Maryland.

POMEROY, JACK L. (1964) Civil Engineering
Experience: Engineering consultant; director of technical services, Product Techniques, Inc., Los Angeles; mechanical designer, Magnavox Research Laboratories, Torrance; mechanical engineering and designer, Hughes Aircraft Co., Culver City; mechanical engineer, Celon Co., Madison, Wisconsin; mechanical engineer, George Gorton Machine Co., Racine, Wisconsin; instructor, Racine Vocational School, Racine, Wisconsin.

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.

PROCSAL, ROBERT L. (1949) Head, Agronomy Department
B.S., California State Polytechnic College, 1946.
Experience: Borden's Dairy Delivery Service, Oakland; vocational agricultural instructor, El Centro; diversified farming, Imperial County; officer, U.S. Army Air Force.

PURCELL, RICHARD J. (1965) Physical Education
Experience: Instructor, Atascadero High School; lecturer, California State Polytechnic College, San Luis Obispo.

PURCIEL, DAVID W. (1965) Landscape Architecture

PYE, EARL L. (1961) Physical Sciences
A.B., Chico State College, 1958; M.S., University of California, Davis, 1961.
Experience: Teaching assistant and laboratory technician, University of California; laboratory technician, Standard Oil Company of California; insurance investigator, Retail Credit Company, and self-employed, dba Statistical Research.

* Kellogg-Voorhis staff.
* QUANEY, ROBERT (1959) ............................................................... Industrial Engineering
Experience: Manufacturing engineer, R.C.A., Los Angeles; manufacturing planner,
Lockheed Missile, Van Nuys; coordinator of engineering planning, manufacturing
research engineer and production planning supervisor, Lockheed Missile, Sunnyvale;
senior manufacturing engineer, Autonetics; officer, U.S. Navy.

RALL, FREDERICK A., Captain U.S. Army (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.

* RANKIN, DAVID B. (1963) .............................................................. Language Arts
A.B., University of Southern California, 1953; M.A., 1960; Ph.D., University of
London (Birkbeck College), 1965.
Experience: Teaching assistant, lecturer, and assistant baseball coach, University
of Southern California; instructor and baseball coach, Alhambra High School, Coa-
linga College; instructor and chairman of the English department, Foothill College.

RAPP, JOHN B. (1959) ............................................................... Electronic Engineering
B.S., University of California, 1940.
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.

* RAUCH, RAYMOND C. (1963) .................................................. Business Management
B.S., University of Oregon, 1951; M.B.A., 1959; additional graduate study, Ohio
State University.
Experience: Teaching assistant, Ohio State University; assistant professor, San
Fernando Valley State College; underwriter, Fireman’s Fund Insurance Company;
general agent and partner, Powell & Rauch Insurance Agency; instructor, American
College of Life Underwriters, Insurance Institute of America; consultant to the
insurance industry.

RAYNER, CLARE G. (1963) .............................................................. Music
B.M., University of Toronto, 1954; A.R.C.T., Royal Conservatory, 1954; M.M.,
Indiana University, 1962; Ph.D., 1963.
Experience: U.S. Army Band; 7th Army Symphony; assistant, Indiana University;
piano teacher, Palo Alto.

REAGAN, EVELYN D. (1946) (1954) ........................................... Library
B.S., College of St. Catherine, 1943.
Experience: Librarian, College of the Holy Cross, Worcester, Massachusetts;
librarian, Charity Hospital School of Nursing, New Orleans; cataloger, California
State Polytechnic College.

REECE, OSCAR E. (1956) ............................................................. Crops
B.S., Kansas State College, 1931; M.S., University of Minnesota, 1945; Ph.D., 1949.
Experience: Grade school principal, Hopewell and Smith Center, Kansas; agricul-
tural 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.

* Kellogg-Voorhis staff.
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.

B.S., University of Colorado, 1949; M.Ed., 1951; additional graduate study, Stanford University.
Experience: Research specialist, Lockheed Space and Missile; project engineer, Philco WDL; engineer, North American Aviation; registered professional engineer, California.

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, ELMER H. (1959) Head, Physical Sciences Department
B.A., Whittier College, 1947; Ph.D., University of Southern California, 1958.
Experience: Analytical chemist, Truesdail Laboratories; junior research biochemist, University of California Medical Center.

RICE, JAMES E. (1963) Technical Arts
B.S., Kansas State College, 1956; graduate study, Fresno State College.

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) Agricultural Engineering
Experience: Journeyman carpenter, U.S. Coast Guard.

RICHARDS, CARLOS C. (1946) Manufacturing Processes
B.A., Santa Barbara State College, 1942.

* RICHARDS, RICHARD C. (1964) Social Sciences
B.A., University of California, Santa Barbara, 1957; M.A., University of California, Los Angeles, 1964; additional graduate study, University of California, Los Angeles.
Experience: Teaching assistant, University of California; instructor, San Fernando Valley State College, California State College at Los Angeles.

* Kellogg-Voorhis staff.
RICHARDSON, JOY O. (1948) Mechanical Engineering
B.S., University of Nebraska, 1940; M. of Engr., Yale University, 1942.
Experience: Instructor, Yale University, New Haven Junior College, New Haven, Connecticut; instructor, Orland High School, Orland, California; machine designer, Rockbestos Products Corporation; engineer, Marlin Firearms Company; Bristol Aeronautical Corporation, New Haven, Connecticut; engineer, Johns Manville Corporation, Tilton, New Hampshire; vice president and treasurer, Richardson Industries, Incorporated, East Haven, Connecticut. Registered professional engineer, California.

RICKANrud, Torleif M. (1943) Physical Sciences
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.

RICKARD, HERMAN E. (1959) Dairy
B.S., Ohio State University, 1950; M.S., 1954; Ph.D., 1958.
Experience: Assistant Herdsman, research assistant, in charge of federal dairy breeding program, Ohio State University.

* RIDDLE, JEWEL M. (1959) Accountancy
B.A., San Jose State College, 1951; graduate study, Golden Gate College, University of California at Los Angeles, University of Southern California.
Experience: Instructor, Golden Gate College, Los Angeles Metropolitan College, University of California Extension; tax department, Perkins and Trousdale, CPA's; staff accountant, Arthur Young and Company, CPA's; certified public accountant.

RIDER, ROL W., JR. (1960) Business Administration
B.A., University of California, 1941.

RIEBEL, JOHN P. (1947) English and Speech
B.S., University of Kentucky, 1924; A.B., University of Southern California, 1927; M.A., 1928; additional graduate study, University of Illinois.
Experience: Teaching, Georgia School of Technology; University of Illinois; Austin Peay Normal, Clarksville, Tennessee; General Motors Institute, Flint, Michigan; University of Detroit. Editor and author, L. W. Singer Company; Cadillac Motor Car Division; Gladding, McBean and Company; professional writing.

* RITCHIE, MARGARET (1965) Foods and Nutrition
B.S., Columbia University, 1918; M.A., University of Chicago, 1923.
Experience: Instructor and professor, Battle Creek College, Michigan; professor and head of home economics department, University of Idaho.

* Kellogg-Voorhis staff.
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.

ROBERTS, ALICE E. (1963) ________________________________ Education
B.S., Milwaukee State Teachers College, 1940; M.S., University of Wisconsin, 1962.
Experience: Elementary school teacher, West Bend, Wisconsin; participant in Wisconsin Education Improvement Program; leader in team teaching and intern program.

* ROBERTS, JOHN M. (1965) ________________________________ Landscape Architecture
B.S., California State Polytechnic College, 1959.
Experience: Designer, City Schools and Wimmer & Iamada, San Diego; teacher, University of California Extension, San Diego; landscape architect, Dreyton, Inc., Covina and Linesch & Reynolds, Costa Mesa.

* ROCHE, EDWARD TOWNE (1959) __________________________ Biological Sciences
B.A., San Diego State College, 1948; M.S., University of Southern California, 1952; Ph.D., University of Southern California, 1957.
Experience: Teaching assistant and field-laboratory research assistant on Navy and Air Force research projects in Alaska; instructor, Compton College, 1957-59.

ROBIN, 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.
Experience: U.S. Air Force; graduate assistant, Cornell University; material control analyst, Ryan Aeronautical Company.

ROGERS, LEO E. (1954) __________________________________________ Manufacturing Processes
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.

* Kellogg-Voorhis staff.
ROSEN, ARTHUR Z. (1953) .................................................. Physical Sciences
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.

* ROWLEY, WILLIAM P. (1958) ................. Head, Agricultural Business Management
Department
A.B., University of California at Los Angeles, 1933; graduate study, University
of Southern California, Los Angeles State College.
Experience: Case supervisor, California State Relief and Welfare, Los Angeles;
field man, U.S.D.A., Agricultural Marketing Administration, Los Angeles and
Boise, Idaho; public relations director, Associated Produce Dealers and Brokers of
Los Angeles.

* RUETHER, HERMAN J. (1961) ......................... Social Sciences
B.S., Xavier University, 1952; M.A., 1961; additional graduate study, Claremont
Graduate School.
Experience: Teacher, Cincinnati Public Schools; instructor in military police
duties and procedures, Army; social worker, San Bernardino County Welfare
Department.

* RUPPERT, ALVIN C. (1965) ................................ Business Management
Experience: Instructor, Mt. San Jacinto College; operations control analyst,
Aerojet-General; procedures designer, Kaiser Steel Corporation; assistant examiner,
Standard Oil Company.

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
ingineer, 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.

* SANFORD, ALBERT D. (1964) ................... Aerospace Engineering
B.S., University of Colorado, 1956; graduate study, University of California.
Experience: Engineer, Marquardt Corp., Van Nuys; engineer, Boeing Co., Seattle;
research engineer, Rocketdyne Co., Canoga Park; teaching assistant, University of
California, Berkeley.

SANKOFF, LEO (1946) ........................................ Poultry Industry
B.S., California State Polytechnic College, 1942; M.A., 1956.
Experience: Agricultural instructor, Fillmore High School.

SCALES, HARRY H. (1958) ....................... Education
Experience: Teacher and counselor, Santa Barbara Junior College; associate
professor and consultant to industry and schools, Michigan State University; aerial
navigation training, U.S. Navy; teacher and guidance director, Redlands High
School; director of research, Arizona State Department of Education; teacher,
Superior and Safford, Arizona, public schools.

SCHEFFER, PAUL E. (1964) ................... Industrial Engineering
B.M.E., University of Minnesota, 1947; M.S., University of Southern California,
1959.
Experience: Engineer, Crane Company, U. S. Rubber Company, Appraisal Service
Company; instructor, University of Minnesota.

* Kellogg-Voorhis staff.
SCHENCK, W. DONALD (1956) Language Arts
B.A., University of Redlands, 1949; M.A., University of Southern California, 1955; additional graduate study, University of Southern California, San Francisco State College, Claremont Graduate School.
Experience: Teacher, San Bernardino City Schools; instructor, Mt. San Antonio College, American Institute of Banking; editor for personnel department, Convair-Pomona.

B.S., University of Arizona, 1948; M.S., 1950; Ph.D., Ohio State University, 1952. Experience: Agronomist, Zonolite Corporation; assistant professor and assistant soil scientist, Oregon State College and Oregon Agricultural Experiment Station; agronomist, California Spray Chemical Corporation; assistant professor plant science, Fresno State College.

SCHNEIDER, CATHERINE A. (1959) (1963) Library

SCHNEIDER, KENNETH J. (1961) Mechanical Engineering
B.S.M.E., University of Southern California, 1958; M.S.M.E., 1961. Experience: Research engineer, Convair, Physics Group; research and design engineer, Aerojet, Ordnance Division; design engineer, C. F. Braun, Alhambra; registered engineer, California.

SCHOENWETTER, EARL E. (1960) Electronic Engineering

SCHONING, RICHARD H. (1963) Head, Business Management Department

SCHROEDER, WALTER P. (1957) Chairman, 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

SCOLINOS, JOHN H. (1960) Physical Education
B.S., Pepperdine College, 1950; M.A., University of Southern California, 1952; additional graduate study, University of Southern California. Experience: Instructor and head coach, Pepperdine College; professional baseball player; U.S. Army.

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.


Experience: Farming; instructor, Ferndale Union High School.


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.


Experience: Teacher, high schools, New Mexico and California; associate professor, Chaffey College; certified professional secretary; instructor, University of Alabama, Extension Division; contract instructor, Maxwell AFB, Alabama.

SEIBERLING, HARRISON P. (1963) Civil Engineering C.E., University of Cincinnati, 1939; graduate study, University of Cincinnati.

Experience: Associate engineer, U.S. Engineer Office; engineer, Larson Hunt and White; Walter and Wilham; construction analyst, Veterans Administration; engineer, Vogt, Ivers, Seaman and Associates; Muller and Seuberling.

SHAFIA, FRED (1964) Biological Sciences B.S., California State Polytechnic College, 1957; M.S., Brigham Young University, 1960; Ph.D., University of Nebraska, 1963.

Experience: Teaching assistant and research assistant, Brigham Young University; University of Nebraska; predoctoral fellow, U.S. Public Health Service; assistant professor of microbiology, Rutgers' University.

* Kellogg-Voorhis staff.
SHAPIRO, MILTON M. (1962) ....................................................Economics
A.B., Brooklyn College, 1943; Ph.D., University of Southern California, 1963.
Experience: Instructor, University of Southern California; assistant professor, Occidental College; economist and marketing analyst, National Industrial Conference Board, North American Aviation, Marquardt Corporation, World Trade Foundation, The Scherman Foundation, Jewish Agency for Palestine.

SHERMAN, ROGER L. (1961) .....................................................Business Administration
A.B., Ohio University, 1949; M.S., 1950.
Experience: Personnel representative, United Airlines; personnel supervisor, Boeing Airplane Company; employment and training manager, Hiller Aircraft Corporation; personnel manager, Dalmo Victor; personnel manager, Hazel Atlas Glass Company; personnel representative, Lockheed Aircraft Corporation; assistant professor of business, Texas A. & M.; extension instructor, University of California at Los Angeles and University of Washington.

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.

* SHRAGER, SIDNEY (1960) .................................................English
A.B., University of Southern California, 1949; M.A., University of California at Los Angeles, 1951; additional graduate study, University of Southern California.
Experience: Lecturer, University of Southern California; instructor, Chouinard.

*SIEGEL, BEN (1957) .....................................................Language Arts
B.A., San Diego State College, 1948; M.A., University of California, Los Angeles, 1950; Ph.D., University of Southern California, 1956.
Experience: Teaching assistant, University of California, Los Angeles, University of Southern California; lecturer, University of Southern California, Chouinard Art Institute; instructor, Los Angeles Evening Adult School; Danforth fellow, University of Chicago; radio, advertising, and newspaper work.

SILVER, GORDON A. (1964) ...........................................Physical Sciences
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, HAROLD F. (1958) .....................................Head, Mathematics Department
Experience: Teaching fellow, University of Wichita, Wichita, Kansas; graduate assistant, Iowa State College, Ames, Iowa; assistant professor, University of Wichita, Wichita, Kansas.

SIMMONS, ORIEN W. (1961) ........................................Welding and Metallurgical Engineering
B.S.E., University of Michigan, 1935; M.S.E., 1948.
Experience: Metallurgist, Carnegie-Illinois Steel Company; Packard Motor Car Company; instructor, Rose Polytechnic Institute; officer U.S. Navy; research engineer, Battelle Memorial Institute; senior research engineer, Frankford Arsenal; Rem Cru Titanium Company and Crucible Steel Company; Climax Molybdenum Company; registered professional engineer, Ohio.

* Kellogg-Voorhis staff.
SIMON, ALFRED W. (1955) (1959) ______________________________Physical Sciences  
B.S., University of Chicago, 1921; Ph.D., 1925.  
Experience: National research fellow in physics, California Institute of Technology; director, Cottrell Research Laboratory, Tennessee Coal, Iron and Railroad Company; research physicist, Stewart-Warner Corporation; American Harmonica Company and Naval Ordnance Laboratory; assistant professor, Washington University, St. Louis; associate professor, Tulsa University and Alabama Polytechnic Institute; physicist, U.S. Air Force.

* SKAMSER, HAROLD P. (1958) ________________________ Dean, Engineering Division  
B.E., Wisconsin State College, 1931; M.A., University of Minnesota, 1945; B.S.E.E., Michigan State University, 1948.  

* SKOUSEN, OWEN K. (1960) Electronic Engineering  
B.A., University of California, Los Angeles, 1949; M.S., Stanford University, 1950; E.E., 1952; additional graduate study, University of New Mexico, Brigham Young University, Stanford University.  
Experience: Senior instrumentation engineer, Marquardt Jet Laboratory, Ogden, Utah; research engineer, Sandia Corporation, Albuquerque, New Mexico; electronic development engineer, Hewlett-Packard Company, Palo Alto, California; instructor electrical engineering, Brigham Young University; electronics officer, U.S. Navy; teaching assistant, Stanford University.

* SLAMA, MICHAEL M. (1960) Assistant Librarian  
J.D., Charles University, Prague, 1945; M.A., University of Denver, 1954.  
Experience: Catalog librarian, order librarian, assistant librarian, technical processes, University of Idaho.

* SMEDLEY, DONALD B. (1959) _________________________ Electronic Engineering  
B.S.E.E., University of Oklahoma, 1956; graduate study, University of California, Los Angeles, and Los Angeles State College.  
Experience: Electronics engineer, advanced guidance group, General Dynamics; senior design engineer, Space and Information Division of N.A.A.

* SMITH, DONALD D. (1965) ____________________________ Physical Sciences  
B.S., University of Oklahoma, 1947; M.S., 1948; Ph.D., Purdue University, 1953.  
Experience: Senior chemist, Aerojet-General; research chemist, Dow-Corning Corporation, Ethyl Corporation; research fellow, teaching assistant, Purdue University; instructor, teaching assistant, University of Oklahoma.

* SMITH, DUDLEY R. (1957) ___________________________ Agricultural Engineering  
B.S., Cornell University, 1954; graduate study, Cornell University.  
Experience: Instructor in agricultural engineering, State University of New York, Morrisville.

SMITH, 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 Playhouse; lt. col. U.S. Marine Corps (retired).
SMITH, M. EUGENE (1946) Head, Social Sciences
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) Technical Arts
B.S., Lowell Technological Institute, 1960; M.S., 1962.
Experience: Senior systems analyst, quality control engineer, Raytheon Company, Lowell, Massachusetts.

* SMITH, RICHARD H. (1960) Business Management
B.S., Massachusetts Institute of Technology, 1948; M.B.A., Northwestern University, 1954.

* SMITH, STANLEY B. (1963) Assistant to the Dean of the College
B.S., University of Utah, 1953; M.B.A., 1962.
Experience: J. C. Penney Company; commissioned officer, U.S. Air Force; assistant director of personnel, University of Utah.

SMITH, WARREN T. (1952) Dean, Agriculture Division
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.

* SMITH, WILLIAM A. (1964) Social Sciences
Experience: Instructor, Pomona College, instructor, Mt. San Antonio College.

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.

SPINK, ROBERT (1960) Graduate Manager
B.S., California State Polytechnic College, 1957.
Experience: College union director, Clarkson College of Technology, Potsdam, New York.

* SPITAL, SIDNEY (1964) Mathematics
B.S., Brooklyn College, 1949; Ph.D., University of Rochester, 1957.
Experience: Associate professor, University of Toledo; staff scientist, Hughes Aerospace Corporation.

STALLARD, MARY L. (1965) Physical Education
Experience: Instructor, Hamilton Junior High, Fresno; teaching assistant, University of Washington.

* STALLINGS, DALE G. (1964) Agricultural Business Management and Economics
B.S., University of Idaho, 1950; M.S., Ph.D., University of Minnesota, 1954; additional graduate study, University of California.
Experience: Research assistant, University of Minnesota; cooperative agent, University of California; associate agricultural economist, United States Department of Agriculture; agricultural economist, U.S. Dept. of Agriculture.

* Kellogg-Voorhis staff.
STANSEL, DOYLE J. (1958)  Counselor, Test Officer
B.A., Pepperdine College, 1954; M.A., 1958; additional graduate study, University of Southern California.
Experience: Teaching assistant, acting test officer, Pepperdine College; psychometrist, Pepperdine Psychology-Speech Clinic; psychological intern, John Tracy Clinic, Los Angeles.

STANSFIELD, WILLIAM D. (1963)  Biological Sciences
B.S., California State Polytechnic College, 1953; M.A., 1959; M.S., University of California, Davis, 1962; Ph.D., 1963.
Experience: Cadet teacher, Chaffey Union High; line officer, U.S. Naval Reserve; vocational agriculture teacher, Fortuna Union High School; teaching assistant and research assistant, University of California.

STECHMAN, JOHN V. (1960)  Animal Husbandry
B.S., University of California, Davis, 1957; M.S., 1960.
Experience: U.S. Forest Service; U.S.D.A., Agricultural Research Service; laboratory assistant, University of California; biological assistant, U.S. Army.

STEFANAC, JOSEPH B. (1958)  Mathematics
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.

STEUCK, FRED H. (1947)  Head, Electronic Engineering Department
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.

STEVENS, DALE R. (1965)  Mathematics
B.S., Michigan State University, 1948; M.A., 1954; additional graduate study, Michigan State University, University of California, Los Angeles, University of Arizona.
Experience: Teacher, Midland Public Schools, Chaffey Union High School and College, Bloomfield Hills Public Schools, Upland High School; chairman, mathematics department, Upland High School.

STOFFEL, EDWARD O. (1957)  Mechanical Engineering
B.M.E., University of Santa Clara, 1950; M.E., University of Santa Clara, 1955.
Experience: Engineer, autonetics, Aerojet-General, Northrop Aircraft; Robertshaw-Fulton Controls, Norris-Thermador Corp.; chemist, U.S. Industrial Chemicals; registered professional engineer, California.

STONE, JOICS B. (1961)  Associate Dean (Counseling and Testing)
A.B., Brigham Young University, 1947; M.S., University of Utah, 1950; Ph.D., 1952.
Experience: Director, Industrial Psychological Services, California Test Bureau; assistant professor (personnel and guidance), Brigham Young University; consultant, Columbia-Geneva Steel Company.

STONER, HOWARD F. (1960)  Mechanical Engineering
B.S., U.S. Naval Academy, 1932; M.S., Massachusetts Institute of Technology, 1941.
Experience: U.S. Navy, operations officer for U.S. submarines; supervisor of shipbuilding, Electric Boat Co.; repair and construction superintendent, Mare Island Shipyard; production officer, Long Beach Naval Shipyard.

* Kellogg-Voorhis staff.
STOOKEY, ELLEN T. (1961) Home Economics
B.S., University of Illinois, 1943; M.A., 1950; additional graduate study, Stanford University.
Experience: Elementary teacher, Illinois; vocational home economics teacher, Illinois; supervising teacher, University of Illinois; teacher trainer, University of Illinois; special service, U.S. Army Air Force; regional supervisor, Bureau of Home-making Education, California State Department of Education.

STRASSER, J. EDWARD (1960) Technical Arts
B.S., California State Polytechnic College, 1958.

STRAUSS, L. HARRY (1961) College Librarian
B.S., George Williams College, 1935; M.A., Graduate Library School, University of Chicago, 1942; additional graduate study, University of Michigan.
Experience: Librarian, George Williams College; Chicago College of Osteopathy; Northwestern Michigan Junior College; instructor in audio-visual education, University of Oklahoma; audio-visual consultant, National Council of the Y.M.C.A.; executive secretary, Commission on Motion Pictures in Adult Education; superintendent of schools, Rapid City and Cedarville, Michigan.

STREICHERT, GRETCHELEN (1958) Home Economics
B.S., Oregon State College, 1956; M.S., 1951.
Experience: Teacher, high schools; home adviser, University of California Agricultural Extension; nursery school supervisor and instructor, Oregon State College; instructor, Modesto Junior College; personnel field counselor, Oregon Shipbuilding Corporation; teacher-counselor, Oregon State School for Girls.

STUART, JOHN S. (1964) Architecture and Architectural Engineering
B.Arch., Texas Technological College, 1950.
Experience: Private practice, Schmidt and Stuart; designer and supervisor, Atcheson and Atkinson, Architects.

STUBBS, DANIEL F. (1963) Mathematics
B.S., Purdue University, 1960; M.S., Rensselaer Polytechnic Institute, 1962; additional graduate study, Purdue University, University of California, Berkeley.
Experience: Teaching assistant, Purdue University; engineer, Knolls Atomic Power Laboratory.

* STULL, ROBERT B. (1947) Physical Education and Athletics
A.B., Whittier College, 1941; M.A., 1947; additional graduate study, University of Southern California.

* SUTHERLAND, RODNEY D. (1960) Head, Aerospace Engineering Department
B.S., University of California, Los Angeles, 1952; M.S., 1953; additional graduate study, Massachusetts Institute of Technology.
Experience: Rocket design and chemical engineer, U.S. Naval Ordnance Test Station, Inyokern; senior thermodynamics and propulsion engineer, Convair, Pomona.

* SUTTON, ARTHUR W., JR. (1961) Electronic Engineering
B.S.E.E., Rose Polytechnic Institute, 1956; graduate study, Ohio State University.
Experience: Project engineer, Wright Air Development Division, Dayton, Ohio.

* Kellogg-Voorhis staff.
SUTTON, JAMES E. (1964) Economics
B.S., University of Wisconsin, 1955; graduate study, University of Wisconsin, University of Michigan.
Experience: Teaching assistant, University of Wisconsin; instructor, University of Michigan; instructor, Pomona College; research coordinator, Southern California Research Council; lecturer, Pomona College.

SWARTZ, ALBERT E. (1965) Physical Education
Experience: Camp counselor, Waukegan, Illinois; surgical technician, Sartori Hospital, Cedar Falls, Iowa, and Henrotin Hospital, Chicago, Illinois; airborne medic, U.S. Army; student assistant trainer and backfield coach, State College of Iowa.

SYVERSON, MAGNUS (1957) Physical Education
Experience: Teacher-coach, Newburg and Klamath Falls, Oregon; instructor, Portland State College; assistant professor, University of California at Los Angeles; U.S. Navy.

SZIGETHY, NICHOLAS (1961) Library
Ph.D., Erzebet University, Pecs, Hungary, 1940; M.L.S., Columbia University Library School, 1958.
Experience: Columbia University School of Business Library; cataloger, Cornell University Library; cataloger, University of Nevada Library.

SZIJJ, LASZLO J. (1963) Biological Sciences
B.A., University of Sciences, Budapest, Hungary, 1954; Ph.D., University of Toronto, 1962.
Experience: Assistant curator of birds, National Museum, Hungary; research assistant, Royal Ontario Museum, Toronto, Canada; laboratory instructor, University of Toronto; instructor, Loyola University, Chicago.

B.A., Stanford University, 1923; graduate study, Massachusetts Institute of Technology.
Experience: Tester, Southern Pacific Company; research engineer, Fruit Industries, Inc.; engineer, Bureau of Seismology, U.S. Coast and Geodetic Survey; engineer, Southern Pacific Company; design engineer, Westinghouse Electric Corporation; registered professional engineer, California.

TELLEW, FUAD H. (1960) Business Administration
B.S., College of Commerce and Economics, Baghdad, Iraq, 1950; M.A., University of Southern California, 1954; Ph.D., 1959.
Experience: Accountant, Engineering Department, Iraqi State Railways; supervisor, Testing Bureau, University of Southern California; teaching assistant and lecturer, University of Southern California.

TENNANT, FRANK A. (1955) English and Journalism
B.A., University of California, Los Angeles, 1950; M.S., 1953.
Experience: Editor, Monterey Park Californian; reporter, Los Angeles Mirror; director of press relations, Title Insurance and Trust Company, Los Angeles; United States Army, psychological warfare unit.

THOMAS, WILLIAM O. (1960) Electronic Engineering
B.S., New Mexico State University, 1951.
Experience: Distribution engineer, estimator, Southern California Edison; communications officer, 40th Inf. Div., U.S. Army; graduate student training program, Westinghouse Electric Corp.; physical science laboratory supervisor, New Mexico State College.

* Kellogg-Voorhis staff.
THOMASSEAU, D. JEAN (1961) Placement Supervisor
B.A., Willamette University, 1946; M.A., California State College at Los Angeles, 1959.
Experience: Teacher, Los Angeles County Schools; self-employed, professional employment agency.

THOMPSON, BEN F. (1961) English and Journalism
Experience: Reporter, Harrisburg Patriot-News; state editor, Williamsport Sun-Gazette; business editor, Honolulu Star-Bulletin; Hawaii field representative, Dudley-Anderson-Yutzy; technical writer-editor, Institute of Transportation and Traffic Engineering, University of California, Richmond Field Station.

THOMSON, DAVID H. (1946) Biological Sciences
B.S., University of Arizona, 1944; M.A., Claremont Graduate School, 1948; additional graduate study, Oregon State College and University of Oregon.
Experience: Laboratory instructor, Pomona College; ranger-naturalist, Sequoia National Park.

THORNBURGH, PAUL A. (1962) Psychometrist (Counseling and Testing)
B.A., University of California, Santa Barbara, 1955; graduate study, Los Angeles State College.
Experience: Psychometrist, Advisement Service, Los Angeles City Schools.

THRASHER, FRANK P. (1963) Crops
B.S., Montana State College, 1951; M.S., 1963.

THURMOND, WILLIAM (1951) Biological Sciences
A.B., University of California, 1948; M.A., 1950; Ph.D., 1957.
Experience: Instructor, San Mateo Junior College; associate in zoology, University of California; instructor, summer session, University of California, 1957-59; Director, National Science Foundation, Summer Science Training Program for secondary students, California State Polytechnic College.

TICE, RUSSELL L. (1965) Physical Sciences
B.S., Marshall University, 1960; Ph.D., University of California, Los Angeles, 1965.
Experience: Teaching 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.

TOTTEN, JESSIE (1961) Physical Education
B.S., Oregon State College, 1953; graduate study, Portland State College, University of California at Riverside, University of California at Los Angeles.
Experience: West Linn High School and Beaverton High School in Oregon; instructor, University of Idaho; teacher, Pacific High School; city recreation work, counselor at Camp Tamarack.

TOWNSEND, NEAL R. (1965) Mathematics
B.S., Wisconsin State College, 1953; M.A., San Diego State College; additional graduate study, University of California, Los Angeles, Claremont Graduate School, 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.

* Kellogg-Voorhis staff.
TRAMMELL, JOHN L. (1965) Business Administration
Experience: Counselor, part-time Dean of Men, teaching assistant, lecturer, University of Southern California.

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.

* TUCKER, DOROTHY McNEILL (1957) Psychology
B.S., University of Minnesota, 1945; M.S., Illinois State Normal University, 1949; Ed.D., University of California, Los Angeles, 1959.
Experience: Recreation director, instructor, Washington Park High School, Racine, Wisconsin, Lincoln College, Western Illinois State College, San Bernardino city schools; counselor, San Bernardino Valley College; California certified psychologist.

TURNER, PEARL (1951) Library
A.B., San Jose State, 1937; M.S., University of Southern California, 1949; M.L.S., Texas State College for Women, 1951.
Experience: Teacher in elementary schools, Visalia, Los Angeles, Riverside; officer, U. S. Navy.

* TURNER, ROOSEVELT (1964) Physical Sciences
B.S., University of California, 1957; M.S., Purdue University, 1959; Ph.D., University of California, 1964.
Experience: Graduate research micrometeorologist, Purdue University; research chemist, University of California.

* TUUL, JOHANNES (1965) Physical Sciences
Experience: Instructor, Stockholm Technical Institute, Sweden; Pasadena City College; engineer, L. M. Ericsson Telephone Company, Sweden; research engineer, Electrical Prospecting Company, Sweden; research assistant and research associate, Brown University; research physicist, American Cyanamid Company; senior research physicist, Bell & Howell Research Center.

* Kellogg-Voorhis staff.
VANONCINI, LES (1965) Director of Extension Services
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.

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; assistant professor, Oregon State University; associate professor, Western New Mexico University; U.S. Army.

VOLLMAR, ARNULF (1965) Physical Sciences
Vordiplom, University of Tubingen, 1951; graduate study, University of Innsbruck; Diplomexamen, Ph.D., University of Heidelberg, 1957; additional graduate study, University of California, Los Angeles.
Experience: Research chemist, California Research Corporation.

VOLSKI, CHESTER A. (1962) Landscape Architecture
B.S., Michigan State University, 1956; M.L.A., Harvard University, 1957.
Experience: Landscape architect with Milton Baron, Lansing; Chambers and Moriece; site planner with Michigan State University campus site planning office, and A. Carl Stelling Assoc.; planner and landscape architect, The Architects Collaborative; urban planner, U.S. Air Force.

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.

VOUGHT, ELDON J. (1961) Mathematics
A.B., Manchester College, 1957; M.A., University of Michigan, 1958; additional graduate study, University of Michigan.
Experience: Instructor, Pomona College.

WAITE, HUGH G., Major, USA (1964) Military Science
B.S., Oregon State University, 1955; Basic Infantry Officers Course, 1956; Advanced Infantry Officers Course, 1960; Special Warfare School, 1963.
Experience: Infantry unit commander, General's aide, staff assignments in U.S. and Korea.

WALKER, HOWARD (1957) Physical Sciences
Experience: U.S. Public Health Service, postdoctorate fellow, American Meat Institute Foundation, University of Chicago; group leader, Veterans Hospital, Downey, Illinois; research associate, Northwestern University.

WALKER, WALTER A. (1963) Counselor
A.B., New School for Social Research, 1950; graduate study, New York University.
Experience: Supervising psychologist, Rockland County New York Center for Mental Health; psychotherapist, Rockland Consultation Center; certified psychologist, New York.

WANG, MARTIN I. (1959) Audio Visual
B.A., University of Southern California, 1949; M.S., 1950; additional graduate study, University of Southern California.
Experience: Instructor, Torrance, Long Beach, El Camino College; teaching assistant and instructor, audiovisual education, University of Southern California.

* Kellogg-Voorhis staff.
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.

WARHURST, DONALD E. (1957) Physical Education and Coordinator of Athletics
A.B., University of California, 1943; M.S., University of Southern California, 1951; additional graduate study, San Francisco State College, University of Nevada, University of California, Fresno State College.
Experience: Teacher, Piedmont High School, Santa Ana High School; coach, Santa Ana High School, San Bernardino Valley College, Modesto High School.

WASSEL, GUSTAV N. (1961) Electronic Engineering
Experience: Systems engineer, Space Science Department, Consolidated Systems Corp.; graduate research assistant, California Institute of Technology; development engineer, Nordon Division United Aircraft; machinist, Redland Electric Corp.; electrical draftsman, U.S. Electric Motors Corp.; instructor, electrical systems, U.S. Air Force; registered professional engineer, California.

WATSON, HAROLD J. (1964) Physical Sciences
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.

WEBSTER, JAMES P., JR. (1965) Agricultural Engineering
B.S., California State Polytechnic College, 1953.
Experience: U.S. Army; engineering aid, junior civil engineer, and assistant highway engineer, California Division of Highways; field survey chief and project engineer, Garing, Taylor, and Associates, Arroyo Grande.

WEEKS, LOWELL K. (1947) Chairman, Music Department
B.A., University of New Mexico, 1938; graduate study, University of New Mexico, University of Southern California, Claremont Graduate School.

WEISSBUCH, THEODORE N. (1962) Language Arts
Experience: Instructor, University of Nebraska; instructor, University of Iowa.

WELCH, HARRY V., JR. (1947) Building Program Coordinator
B.S., University of California at Los Angeles, 1941; M.S., 1953.
Experience: University of California Citrus Experiment Station, Riverside; Farm Security Administration.

WELCH, JOHN C., JR. (1965) Medical Officer
B.S., University of California, 1952; M.D., University of Southern California, 1959.
Experience: Internship, San Joaquin County General Hospital; general and surgical practice, Campbell, California; member, Mental Health Advisory Board, San Jose, California.

WELLS, HAROLD F. (1954) College Librarian
Experience: Reference assistant, Eastern Washington College of Education; junior librarian, Fresno State College.

* Kellogg-Voorhis staff.
* WELLS, WALTER (1963) ...................................................... Language Arts
  Experience: Market research analyst, Sealtest Division, National Dairy Corporation; radio and TV time buyer, Grey Advertising Incorporated, New York; teaching assistant, New York University; free lance political writer.

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) ......................................................... Assistant to the President
  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.

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.

WESTON, RALPH E. (1948) ..................................................... Mathematics
  A.B., Stanford University, 1922; M.A., 1932; additional graduate study, College of Pacific, Stanford University, University of Washington, University of California, Oregon State College.
  Experience: Electrical engineering, San Joaquin Light and Power Company; teaching, Stanford University, Chaffee Junior College, Sacramento Junior College, University of Idaho, Southern Branch; University of Southern California.

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) .................................................... Physical Sciences
  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.

WHITE, DERRELL B. (1964) ................................................... Biological Sciences
  Experience: Assistant professor, Eastern Illinois University.

WHITE, MARY LOU (1961) ..................................................... Coordinator, Women's Physical Education
  B.S., Oregon State University, 1946; M.S., Washington State University, 1953.
  Experience: St. Helens, Oregon, High School instructor; physical education instructor, Clark College, Vancouver, Washington.

* Kellogg-Voorhis staff.
* WHITE, MILTON R. (1959) ........................................ Placement Officer  
B.S., California State Polytechnic College, 1950.  
Experience: Agricultural consultant, Los Angeles Chamber of Commerce; sales  
and trade association executive, California Wool Growers Association; sales repre-  
sentative, General Mills, Inc., Larrowe; U.S. Marine Corps.

WHITING, FRANCIS F. (1946) ... Chairman, Manufacturing Processes Department  
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; officer, U.S.  
Navy.

* WHITLEY, MARY E. (1961) -------------------------- Business Management  
B.S., Northeastern State College, 1946; M.S., Oklahoma State University, 1954;  
additional graduate study, University of Hawaii.  
Experience: Secretary to superintendent of schools; instructor, College-High  
School; secretary, Department of Vocational Education; chairman of business de-  
partment, Central High School.

* WHITNEY, WALTER R. (1965) ..................... Language Arts  
B.S., Bowdoin College, 1923; M.A., Harvard University, 1935.  
Experience: Instructor, professor, University of Maine, Loyola University, New  
Orleans, Louisiana; Fresno State College.

WHITSON, MILO E. (1947) .................................. Head, Mathematics 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.

WICKENS, JAMES F. (1964) ................................ Social Sciences  
B.A., University of California, Berkeley, 1954; M.A., 1961; Ph.D., University of  
Experience: Teacher, Hamilton Junior High School, Oakland; lecture fellow,  
University of Denver; U.S. Army.

WIGHT, HEWITT G. (1952) .................................. Physical Sciences  
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) ................................ Mathematics  
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.

* Kellogg-Voorhis staff.
* WILKINSON, CHARLES D. (1965) Physical Education
A.B., University of Redlands, 1961.
Experience: Recreation leader, West Covina Department of Recreation; recreation supervisor, coach, Mt. San Antonio College; instructor, Edgewood High School.

* WILLIAMS, EDWIN H. (1960) Mechanical Engineering
B.S.M.E., University of California, Berkeley, 1949.
Experience: Mechanical engineer, City and County of San Francisco; design engineer, California Packing Corporation, San Francisco; development engineer, Fraser and Johnston Company, San Francisco; assistant test engineer, Pacific Gas and Electric Company, San Francisco; engineering and sciences extension instructor, University of California, Berkeley; registered professional engineer, California.

WILLIAMS, ROBERT E. (1957) Architecture and Architectural Engineering
B.S., California State Polytechnic College, 1954.
Experience: Assistant resident engineer, California Division of Highways; surveyor and designer, Pacific Engineers; Griffith Construction Co.

WILLSON, IRWIN A. (1958) Education
B.A., University of North Dakota, 1930; M.A., University of Denver, 1940; additional graduate study, University of Denver, 1948-1958.
Experience: Teacher, high schools, North and South Dakota; principal and director of elementary education, Canon City, Colorado; counselor, University of Denver; director of curriculum, Stanislaus County Schools, Modesto; superintendent of schools, Fall River Mills; assistant professor, San Diego State College; associate professor, chairman of the division of education and psychology, director of teacher education, Westmont College.

* WILSON, BRUCE E. (1963) Social Sciences
B.A., University of Miami, 1960; graduate study, Claremont Graduate School.
Experience: U.S. Army; newspaper editor; announcer, program director, radio station WWPF; sports play-by-play, WWPF, WFOY, WHOO, WGGG; manager, WSDX, WPRY; music director and Good Music magazine editor, WVCG; instructor, University of Miami (Florida), Mt. San Antonio College.

* WILSON, H. THOMAS (1963) Landscape Architecture
B. of Arch., Massachusetts Institute of Technology, 1950.
Experience: Architect, Perkins and Will, Chicago; Kistner, Wright, and Wright, Neutra and Alexander, Los Angeles; instructor, Pasadena City College, Extended Day; private practice.

WILSON, HAROLD O. (1936, 1946) Executive Dean and Director of Staff Services
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.

B.S., University of Southern California, 1953; M.B.A., 1954.
Experience: Owner-manager, Growell Shoes; lecturer, University of Southern California; U.S. Army and Air Force.

* WILSON, JOHN J. (1959) Economics
B.S., Middlebury College, 1926; M.A., Claremont Graduate School, 1959; additional graduate study, George Washington University, U.S. Army Command and General Staff School, U.S. Air Force Staff School.
Experience: Director of procurement and production, and comptroller in U.S. Air Force.

* Kellogg-Voorhis staff.
WINGER, 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.

* WINSWLOW, DOROTHY V. (1959) Physical Sciences
B.A., University of California, Berkeley, 1957; Ph.D., 1965.
Experience: Research biochemist, University of California Medical School, San Francisco.

* WINTERBOURNE, ROBERT J. (1953) Counselor
B.S., California State Polytechnic College, 1950; M.A., 1952.
Experience: Agricultural instructor, Shandon High School; director of vocational agriculture, Moorpark and Ventura High Schools; vice principal, Moorpark High School; Associate Dean, California State Polytechnic College.

WIRSHUP, ARTHUR D. (1952) Mathematics
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

* WOLF, HARRY K. (1942) Electronic Engineering
A.B., Arizona State College, 1933; A.M., University of Arizona, 1941; Ed.D., University of Southern California, 1953.
Experience: Engineer for the Agricultural Adjustment Administration, high school teaching, electronics instructor for the Signal Corps, National Bureau of Standards, electronic engineer.

B.S., University of Oklahoma, 1929; graduate study, University of California, Los Angeles.
Experience: Engineer, Bell Telephone Laboratories; Bendix; Hughes Aircraft Company; National Defense Research Committee; independent consultant; foundation field representative, Research Corporation; licensed professional engineer.

WOODWORTH, JOHN A. (1949) Mathematics
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.

* WOOTTON, WILLIAM T. (1963) Electronic Engineering
B.S., United States Naval Academy, 1943; B.S.E.E., United States Naval Postgraduate School, 1952; S.M., Massachusetts Institute of Technology, 1953; additional graduate study, University of Minnesota, Armed Forces Staff College.
Experience: Assistant professor, Rice Institute; director, research and development, weapon and missile systems, United States Navy Department; fleet command, U.S. Navy; commander (retired) U.S. Navy.

* Kellogg-Voorhis staff.
WORK, LLOYD J. (1958)                  Physical Sciences
B.S., California State Polytechnic College, 1954; graduate study, California State Polytechnic College, University of Kansas, Harvard University.

* WORLEY, G. DOW (1964)               Business Management
B.A., North Texas State University, 1950; M.B.A., 1954; additional graduate study, University of Southern California.
Experience: Instructor, mechanics, U.S. Air Force; production planner, Convair Aircraft Corporation; industrial engineer, Texas Aircraft Corporation; director, Radiological Section, U.S. Army Reserve; mathematics teacher, Texas Public School; instructor, Texas Wesleyan College, Baylor University; assistant professor, California State College at Los Angeles; assistant, Business Administration Advisement Office, University of Southern California; computer programmer and system analyst, Graduate School of Business Administration Computer Project, University of Southern California.

WRIGHT, DOROTHY S. (1946)            Library
A.B., Occidental College, 1926; library certificate, University of California, 1939.
Experience: Pasadena Public Library; Long Beach School Libraries; Occidental College Library.

* WRIGHT, J. GARRARD (1962)           Industrial Engineering
B.S., Oregon State College, 1954; graduate study, University of Washington.

WRIGHT, MARSHALL S. JR. (1960)        Physical Sciences
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.

* WRIGHT, ROBERT G. (1964)            Business Management
B.S., California State Polytechnic College, 1963; graduate study, University of Stockholm, Sweden; M.B.A., University of Southern California, 1964; additional graduate study, University of Southern California.
Experience: Commercial and legal representative, marketing coordinator, commercial supervisor, division service manager and acting marketing and division manager, General Telephone and Electronics; business and industrial researcher, University planning, University of Southern California; U.S. Marines.

B.S.I.E., Virginia Polytechnic Institute, 1947.
Experience: Industrial engineer, Boeing Airplane Company, Seattle; chief industrial engineer, Micamold Corp., Tazewell, Virginia; chief industrial engineer, O'Sullivan Rubber Corp., Winchester; manufacturing engineer, Convair, Fort Worth; senior industrial engineer, RCA Victor, Pulaski; motion and time study engineer, Brunswick, Marion; instructor, Virginia Polytechnic Institute.

* YORK, RICHARD G. (1961)            Associate Dean (Admissions and Records)
B.S., California State Polytechnic College, 1950; graduate study, California State Polytechnic College.
Experience: Director vocational agriculture, Simi Union High School; ranch manager, Perris and Santa Ana; production superintendent, Spinform Manufacturing Company, El Monte; pilot, U.S. Air Force; Registrar, California State Polytechnic College.

* Kellogg-Voorhis staff.
YOSHIKAWA, TOM T. (1962) Ornamental Horticulture
B.S., California State Polytechnic College, 1950.
Experience: Instructor, Citrus Adult Education; nursery operator, Glendora; salesman, Leffingwell Chemical Company; head propagator and production foreman, Keeline-Wilcox Nurseries.

YOUNG, CHESTER G. (1954) Assistant to Dean of College
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. Navy; assistant professor, acting chairman, Mathematics Department, University of Santa Clara; instructor, mathematics, California State Polytechnic College.

ZELESKI, MARGARET L. (1960) Registered Nurse
R.N., St. Vincent’s College of Nursing, Los Angeles, 1945.
Experience: Pacific Electric Medical Department, Los Angeles; Beverly Hospital, Montebello; Inter-Community Hospital, Covina.

ZELL, DARRYL C. (1964) Mechanical Engineering
B.S., University of Minnesota, 1958.
Experience: Design engineer, senior dynamics engineer, General Dynamics.

ZOLLARS, ALLEN M. (1959) Aeronautical Engineering
B.S., U.S. Naval Academy, 1927; M.S., Massachusetts Institute of Technology, 1933.
Experience: Captain, U.S. Navy; executive vice president, Bay City Shovels; director of customer relations, Chromalloy Corporation.

* Kellogg-Voorhis staff.
INDEX

A
Absences, 30
Accounting, 182, 367
Accreditation, 19
Administration, college, 12
state board of trustees, 11
Admissions, 23
graduate courses, 27
Advanced standing, graduate, 26
undergraduate, 25
Advisory system, 49, 276
Aeronautical engineering, 132, 332
Agricultural business management, 75, 293
Agricultural courses, related, 326
Agricultural education, courses, 79
Agricultural engineering, 81, 326
Agricultural inspection, 297
Agricultural teaching credentials, 75
Agriculture division, 71, 289
Agronomy, 94, 301
Air conditioning and refrigeration engineering, 138
Alumni association, 19
Animal husbandry, 89, 305
Application for graduation, 37
Applied Arts Division, 179
Applied Sciences Division, 235
Architectural engineering, 142
Architecture, 142
Art, 193, 409
Arts and Sciences Division, 367
Athletics, 47, 275
eligibility, 33
Attendance, 30
Audiovisual education, courses, 194, 410
Auditing of courses, 32

B
Bacteriology, 237, 373
Biochemistry, 257
Biological sciences, 236, 371
Biology, 238, 374
Board costs, 65, 283
Botany, 240, 376
Buildings and equipment, 43, 273
Bureau of Agricultural Education, 439
Business curricula, 180, 367

C
Calendar, academic, 5
California State Colleges, 13, 17
Change of program, 29
Chemistry, 256, 419
Civil Engineering, 340
class attendance, 30
college, aims of, 17
counseling center, 48, 276
course numbering system, 35
credentials, 66, 284
credit by examination, 32
crops, 94, 301
Curriculum, change of, 28
development, 29

D
Dairy husbandry and manufacturing, 101, 309
Data processing, 383
degrees, 36
Department heads, 437
dining halls, 49, 274
dismissal, 33
disqualification, 30
dormitories, 49, 64, 276, 283
double majors, 37

E
Economics, 185, 386
Education, 188, 427
electrical engineering, 148, 349
electronic engineering, 154, 347
Elementary education, 188, 284
eligibility, athletic, 33
employment, students, 50, 277
Engineering Division, 131, 331
english and speech, 196, 390
entrance requirements, 23
examination, credit by, 32
physical, 49, 276
expenses, 64, 282
expulsion, 34

F
Faculty, list of, 435
Family housing, 50, 66
Farm management, 106, 296
Fees and expenses, 64, 282
Food administration, 202
food processing, 110
Foods and nutrition, 311
Foundation, California State Polytechnic College, 19
Fruit production, 96, 314

G
General education requirements, 37
General information, 17, 273
Geography, courses, 265, 428
Grade requirements, 30
Grades, 31
Graduate standing, 26
Graduation, application for, 37
requirements, 37

H
Health center, 49, 276
History, courses, 266, 428
of college, 18
Holiday, school, 5
Home economics, 202
Honors, 32
Horseshoeing, 73
Horticulture, ornamental, 115, 322
Housing, dormitory, 49, 64, 276, 283
Housing, family, 50, 66
Housing, women students, 49, 276
INDEX—Continued

I
Incomplete, grade of, 31
Industrial Arts, 222
Industrial engineering, 161, 350
Industrial management, 186, 381
Industrial sales and service, 224
International Programs, 21

J
Journalism, 228, 397

K
Kellogg campus, 273

L
Landscape architecture, 318
Lands, of college, 18
Language Arts, 196, 390
Library, 44, 273
Life science, 236, 371
Literature, 198, 392
Living expenses, 65, 283
Loan funds, 58, 280

M
Manufacturing Processes, 166, 361
Marketing, 187, 399
Master of Arts Degree, 38
Mathematics, 243, 402
Matriculation, 28
Maximum and minimum load, 31
Mechanical engineering, 167, 354
Mechanized agriculture, 83
Medical service, 49, 276
Metallurgical engineering, 173
Military science, 47, 251
Military service, credit for, 32
Music, 208, 407

N
Nursery operation, 115, 322

O
Office Management, 381
Organizations, student, 47, 275
Ornamental horticulture, 115, 322
Overseas programs, 21

P
Park administration, 325
Personal conduct, 33
Philosophy, courses, 250, 429
Physical education, 211, 411
Physical examination, 49, 276
Physical sciences, 254, 417
Physics, 254, 421
Placement services, 50, 277
Placement, teachers, 50
Political science, 266, 430
Poly Royal, 48
Poly Vue, 275

Poultry, 120, 309
President's list, 32
Printing, 217
Probation, 30, 34
Project facilities, 73
Psychology, 194, 431
Public speaking, 200, 395
Publications, student, 48, 275
Recreation, 211, 411
Refrigeration and air conditioning, 138
Registration, 28
Regulations, 28
Requirements, general education, 37
graduation, 37
residence, 23, 37
Room, costs, 65, 283
R.O.T.C., 47, 251
Scholarship, 30
Scholarships, 51, 277
Secondary school teaching, 66, 284
Social sciences, 264, 425
Soil science, 124, 304
Spanish courses, 201, 398
Speech, 200, 395
Student body, membership, 47, 275
organizations, 47, 275
Student personnel services, 48, 276
Study list, change of, 29
Study load, maximum and minimum, 31
Summer conference, agricultural teacher, 46
Summer quarter, 46, 284
Teacher candidates, approval of, 66, 284
Technical arts, 222
Technical curricula, 38
agriculture, 72
Tests, guidance, 23
Transcripts, required for admission, 23, 28
Transfer, credit, 23
to other schools, 23
intercampus, 26
to other schools, 32
Veterinary science, 128, 310
Voorhis campus, 20
Welding, 173, 363
Withdrawal from courses, 29
Women students, housing, 49, 276
Zoology, 241, 377

O printed in CALIFORNIA OFFICE OF STATE PRINTING
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, California 94701

   ACT
   American College Testing Program
   P. O. Box 21-4127
   Sacramento, California 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.

Where do I write for further information?

Admissions Office, California State Polytechnic College, San Luis Obispo, California 93401

Admissions Office, Kellogg Campus, California State Polytechnic College, Pomona, California 91766