

### **CRSC 202/402 Enterprise Project**

With the support of two agricultural businesses, Crop Science students learn to use a new transplanter to plant broccoli seedlings. This is one of many agricultural enterprise projects in which students gain practical experience. Over 700 students annually are fully responsible for growing, packing and marketing their farm products.

*Photos courtesy of College of Agriculture*

### **SS 431 Soil Resource Inventory**

*From left: Sarah Beaumont, Veronica Anzaldo, Wes Leith*

Students sampled and mapped serpentine soils and in a burned Sargent cypress grove on U.S. Forest Service land at nearby West Cuesta Ridge, two years after the Hwy. 41 Fire. As part of a six-hour field lab, students learned that the soil and vegetation had been modified in the short term-- the first step in regeneration of new vegetative communities. The students prepared a detailed soil survey report of this study area.

*Photo courtesy of Tom Rice, Soil Science Professor*

### **Horse Unit**

Gretchen Tumulsen, an Animal Science senior and horse breeding manager, lived at the Horse Unit along with three other students and cared for the horses which are bred and raised there. Once these horses are two years of age, enterprise students train them for riding and sell them to the public. The students develop their budget, estimating costs and what they expect to get for the horses, owned by the Cal Poly Foundation.

*Photos courtesy of College of Agriculture*

# College of *Agriculture*

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## ACADEMIC PROGRAMS

Agricultural Business.....	<i>BS, Minor</i>
Agricultural Communication.....	<i>Minor</i>
Agricultural Science.....	<i>BS</i>
Agricultural Systems Management .....	<i>BS</i>
Agriculture.....	<i>MS</i>
Animal Science.....	<i>BS</i>
Bioresource & Agricultural Engineering .	<i>BS</i>
Crop Science.....	<i>BS, Minor</i>
Dairy Science.....	<i>BS</i>
Environmental Horticultural Science.....	<i>BS</i>
Food Science.....	<i>BS, Minor</i>
Forestry and Natural Resources .....	<i>BS</i>
Fruit Science .....	<i>BS, Minor</i>
Geographic Information Systems for Agriculture.....	<i>Minor</i>
Nutritional Science .....	<i>BS, Minor</i>
Plant Protection Science .....	<i>BS, Minor</i>
Poultry Management.....	<i>Minor</i>
Recreation Administration .....	<i>BS</i>
Soil Science .....	<i>BS</i>
Wine and Viticulture.....	<i>Minor</i>
Water Science .....	<i>Minor</i>

The College of Agriculture offers programs reflecting the growing diversity of choices available and skills required in modern agriculture and its related professions.

Students take courses in their major field beginning with their first quarter of enrollment. This early exposure to their major provides them with knowledge of immediate interest to supplement that gained in other coursework in basic sciences, mathematics and the liberal arts. Moreover, it allows students to evaluate whether or not the curriculum selected is appropriate to their interests and abilities. Taking courses in the major throughout the academic program fosters personal contact with faculty and other students having common interests but varied backgrounds.

The students' early involvement in their major field, combined with the faculty's close contacts with schools, private industry, governmental agencies, and nonprofit organizations provide excellent opportunities for student internships during junior or senior years. Other opportunities which enhance education, provide financial assistance, and help prepare students for the job market include enterprise projects, scholarships, and work-study jobs.

Student clubs are active in every department. The 43 clubs, most of which are affiliated with national professional organizations, provide an excellent forum for student and faculty interactions. Active club members may practice leadership skills, and attend national, state and local professional meetings, as well as participate in a variety of professional and social events.

Faculty in the College of Agriculture are experts in their disciplines, and are dedicated to teaching. They are eager to help students learn, are readily available for consultation, and are proud of their close relationship with students.

The Agriculture Education Department provides an additional program to credential candidates who wish to become secondary school teachers of Agriculture. In partnership with the Brock Center for Agricultural Communication, the department also offers an agricultural communication emphasis.

The Master of Business Administration degree with an Agribusiness Specialization is offered by the College of Business in conjunction with the Agribusiness Department.

## FACILITIES

The College of Agriculture facilities include a 6,000 acre farm having beef cattle, dairy cattle, horse, sheep, swine and poultry units, rodeo and horse show arenas, a horse training track, vineyards, irrigated and non-irrigated fields for various crops, citrus groves, avocado and deciduous orchards, an arboretum, and greenhouses. The college facilities also include several microcomputer laboratories, a market news information facility, an irrigation demonstration field, reservoirs, an agroforestry demonstration plot, laboratories with modern equipment for soil-plant-water testing, engineering testing and manufacturing shops, complete food processing units for dairy products, meats, fruit and vegetables.

The College of Agriculture also operates the 3,200 acre Swanton Pacific Ranch in Santa Cruz County which has been generously donated by Al Smith, alumnus of the Crop Science Department. This unit provides students with an opportunity to live and work on a commercial farm with forestry, cattle and crop production activities.

All of these facilities are for student use. They provide students with unique opportunities for hands-on experiences which augment the instruction received in the classroom.

## COURSES

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

**Major.** The required cluster of courses in which the student expects to graduate. These courses constitute the core of specific preparation for the student's major field in agriculture.

**Support.** Courses in agriculture and closely allied fields which support and supplement the block of courses constituting the student's major.

**General Education.** Courses are selected from the physical and life sciences, mathematics, communications, arts and humanities, and social, political, and economic institutions. These courses furnish the student with background and support for agricultural courses as well as providing cultural background for the students' intelligent participation in a complex world society.

**Electives.** Course selection in this area is designed to provide freedom for students to pursue interests of their choosing in any university department.

## RECOMMENDED PREPARATION

In addition to pursuing the CSU mandated entrance requirements, high school and community college students are encouraged to participate in extra- and co-curricular activities as part of their preparation for admission to Cal Poly's College of Agriculture. These activities could include, but are not limited to, FFA, 4-H, leadership roles in school clubs, meaningful work experience and community organizations.

## LABORATORY SAFETY

Students are required to meet sanitation and safety regulations in laboratories. These regulations will be explained by the instructor at the first meeting of the class.

## AGRICULTURAL ENTERPRISE PROJECT FACILITIES

The College of Agriculture utilizes the student enterprise program of the Cal Poly Foundation to provide practical experience which supplements the regular production courses. This enterprise program leads to a fuller understanding of important production and managerial problems in agriculture.

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

The Animal Science Department conducts student enterprise projects with beef cattle, swine, sheep, horses and poultry. The stock utilized by our students represents the best bloodlines in the nation.

The beef program includes registered herds of 150 cows, stocker programs averaging 200 head, a 300-head performance test facility, a 200-head feedlot, and 15-20 show steers. These cattle are managed in a variety of settings from environmentally controlled confinement to our 3,000 acre native range operation. The cattle are dispersed over six different ranches away from the campus core and four distinct areas on campus. These animals and facilities are utilized for student projects including cow-calf, feedlot, stocker, performance, and show cattle operations.

The sheep section includes purebred flocks of 70 Suffolk and 35 Hampshire ewes and a commercial range flock of 185 whiteface ewes. The sheep are housed on one ranch of 600 acres near, but not on campus, and a group of pastures and facilities closer in. Students become involved in commercial ewe, lamb feeding, range ram, ram test, and show lamb projects.

The swine herd consists of two major breeds—Yorkshires and Hampshires. The facilities include a 10-unit farrowing house and outside lots and pastures for the brood sows. In addition there are 24 feeder units for student projects with capacity for approximately 20 market hogs per unit. Between 400 and 500 market hogs are produced in student projects each year.

The Foundation horse herd is made up of the Thoroughbred and Quarter Horse breeds. An approximate total of 60 head of broodmares, foals, yearlings and riding stock are housed at the horse unit facilities. Currently standing at stud are three stallions: two Quarter Horses and one Thoroughbred.

Emphasis is placed on basic horse handling and training procedures leading up to the breeding and training of two-year-olds for in-training sales. These sales expose students to professionals and their ideas and expose the industry to what we do at Cal Poly.

The poultry flocks comprise some 5,000 birds. Student projects involve mostly broiler production, started pullet production, and egg production—plus duck, geese, turkeys, and game birds on a limited basis. The equipment includes a modern incubator, egg-handling facilities, and brooding and rearing equipment. Students care for all of the operations under the supervision of technicians and faculty.

The Dairy Science herd includes purebred Jerseys and Holsteins. The dairy has all the necessary facilities for feeding, milking, calf and bull raising, artificial insemination, and management practices. A separate dairy

located on campus provides an opportunity for students with dairy projects. A modern dairy plant is also available for milk processing and manufacturing by-products.

The Food Science and Nutrition Department is equipped with a food operation pilot plant and meat processing facilities. The laboratories contain many types of pilot scale commercial processing equipment. Students process foods under faculty supervision. Some examples are: jams, condiments, fresh and processed meats, baked goods and specialty products. All food products manufactured by student enterprise projects and class work are marketed in the Campus Store.

The Natural Resources Management Department has faculty expertise and facilities available for raising Christmas trees and for agroforestry. Students conducting forestry projects learn all aspects of tree farming from establishment to marketing. A large, well-equipped greenhouse facility is available for raising tree seedlings. Also, a large area of redwood and mixed hardwood forest land is available for student projects on the Swanton-Pacific Ranch near Santa Cruz.

The Environmental Horticultural Science Department provides facilities consisting of fifteen greenhouses, six shade houses, extensive growing grounds, a sales area, a large plant tissue culture lab, extensive turf plots, disease and pest lab, and three large labs available for production. The unit has the latest equipment and machinery to facilitate student projects needs which encompass all phases of nursery and greenhouse production.

The Crop Science Department is well equipped with all types of machinery found on mechanized farms in California. All of the crop production and marketing operations are carried on under the supervision of the Crop Science Department through enterprise projects. Orchards, vineyards, crop land, fruit and vegetable packing facilities and marketing outlets are available for instructional purposes.

The Soil Science Department is equipped for the accurate analysis of soil and water with modern equipment and facilities. Under faculty supervision, Enterprise students have the opportunity to learn the management and operation of a soil and water testing program. The students provide soil and water data and information to home owners and growers for fertilizer practices in San Luis Obispo County.

**AGRICULTURAL COMMUNICATION MINOR**

**Brock Center for Agricultural Communication  
Agriculture Bldg. (10), Room 235  
(805) 756-6138**

This interdisciplinary minor will enhance the students' ability to seek careers in dynamic professions associated with the agricultural industry, including print journalism, broadcast journalism, and public relations.

A key feature of this minor is an interdisciplinary approach. It is a cooperative effort between the College of Agriculture and the College of Liberal Arts and advised by faculty members assigned to the Brock Center for Agricultural Communication. Students have the opportunity to participate in the Cal Poly chapter of the national Agricultural Communicators of Tomorrow Association.

**Required Courses**

JOUR 203 News Writing and Reporting .....	4
JOUR 205 Agricultural Communications.....	4
SPC 301 Business/Professional Communication.....	4
AGED 404 Agricultural Leadership .....	3

**Elective Area** ..... 15

*College of Agriculture Majors:*

Selected from adviser approved list. Minimum of 10 units must be at 300-400 level; two courses must be selected from JOUR, SPC, ENGL.

*Journalism, Speech Communications, and other Non-agriculture Majors:*

Courses to be selected from adviser approved list. A minimum of 10 units must be at 300-400 level

**GEOGRAPHIC INFORMATION SYSTEMS FOR AGRICULTURE MINOR**

An interdisciplinary program sponsored by three departments: Bioresource and Agricultural Engineering, Natural Resources Management, and Crop Science. New technologies of geographic information systems (GIS), global positioning systems (GPS), and orthophotography (uniform scale aerial photographs) are revolutionizing the management of resources. There are great employment opportunities for those who understand the technologies and society will benefit from improved management decisions. Students interested in this minor may come from the following majors: forestry and natural resources; crop science; soil science; landscape architecture, agricultural systems management; or animal science.

**Required Courses**

<i>Graphical Communication (select one of the following tracks).....</i>	4/6
•BRAE 133 Engineering Design Graphics (3) and BRAE 151 CAD for Agric.Engr. (1)	
•CE 114 Intro. CAD Civil & Environ. Engr (4)	
•LA 111 3-D Graphics/Landscape Arch (4) and LA 310 Intro Computing/Landscape Arch (2)	
<i>Surveying (select one of the following tracks).....</i>	4
•BRAE 237, 238 Engineering Surveying I, II (2)(2)	
•BRAE 247 Forest Surveying (2) and BRAE 238 Engineering Surveying II (2)	
•BRAE 239 Engineering Surveying (4)	
BRAE 345 Aerial Photogrammetry/Remote Sensing .....	3
BRAE 446 CAD for Land Modeling .....	2
FNR/LA 318 Applic. GIS in Natural Resources .....	3
FNR/BRAE/LA/CRSC 470 Selected Advanced Topics	3
<b>Emphasis areas (select one).....</b>	<b>11</b>
<i>Environmental Information Emphasis</i>	
BRAE 452 Boundary Law/Data Accuracy for GIS (3)	
FNR 306 Natural Res Ecology/Habitat Mgt (4) or BIO 325 General Ecology (4)	
FNR 416 Environmental Impact Analysis (4)	
<i>Precision Agriculture Emphasis</i>	
CRSC 444 Precision Farming (4)	
Select two of the following (7): CRSC 405, 410, 421, 431, 445; SS 433; VGSC 423	

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**WATER SCIENCE MINOR**

The Water Science minor emphasizes one of two areas of study: irrigation or watershed management. In California, 85% of the developed water is used for irrigation. Irrigation water use and management have tremendous impacts upon ground water quality, power usage, crop yields, surface water supplies and quality, drainage problems, and water availability for transfer to urban uses. For students interested in environment and water, the Water Science minor provides marketable skills.

**Required core courses**

BRAE 340 Irrigation Water Management .....	4
SS 121 Introductory Soil Science .....	4
FNR 408 Water Resource Law and Policy .....	3

**Select one emphasis area .....** 13-16

*Irrigation Emphasis (13)*

BRAE 237 Engineering Surveying (2)	
Select 11 units from the following: BRAE 331, 405, 435, 440, 492	

*Watershed Management Emphasis (16)*

FNR 306 Natural Res Ecology/Habitat Mgt (4)	
FNR 419 Watershed Management (4)	
FNR 420 Advanced Watershed Hydrology (4)	
SS 440 Forest and Range Soils (4)	

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**WINE AND VITICULTURE MINOR**

The goals of the minor are to educate students in the various aspects of wine and viticulture management, addressing knowledge of viticulture, enology, and marketing with skill areas of growing practices, winemaking and wine marketing. The minor is a cooperative effort between the Agribusiness, Food Science and Nutrition, and Crop Science departments, and is designed for students with majors from these departments.

**Required core courses**

AGB 443 Branded Wine Marketing .....	4
AGB 444 Wine Compliance and Market Analysis ...	4
FRSC 231 Viticulture .....	4
FRSC 331 Advanced Viticulture .....	4
FSN 341 Wines and Fermented Foods .....	3

**Adviser approved electives .....** 8

Select 8 units from the following: AG 339; AGB 405, 406; BRAE 340/440; CRSC 221; FRSC 414; FSN 274; SS 121, 221.	
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# *Master of Science in Agriculture*

## **MS Agriculture with Specializations in:**

Agricultural Engineering Technology  
 Agricultural Education  
 Dairy Products Technology  
 Food Science and Nutrition  
 Forestry Sciences  
 General Agriculture  
 International Agricultural Development  
 Irrigation  
 Soil Science

## **General Characteristics**

Graduate studies in the College of Agriculture allow the student to pursue either a professional program designed to enhance the competencies of agricultural educators, or an academic program of graduate-level scholarly activities and research in one of several specializations. Graduates are prepared for:

- \* professional-level positions with business and industry, government, and foreign service in agriculture and related fields;
- \* agricultural teaching in secondary schools or community colleges; or
- \* continued graduate work at other institutions.

## **When to Apply**

Application filing periods are given on page 93 of this catalog. To ensure adequate processing and full consideration, all application materials should be filed with the Cal Poly Admission's Office before the dates given below; nevertheless, applicants are encouraged to file during the initial filing period.

Fall Quarter ..... July 1  
 Winter Quarter ..... November 1  
 Spring Quarter ..... March 1  
 Summer Quarter ..... April 1

## **Prerequisites**

Consideration for admission to this program as a classified graduate student requires a minimum grade point average of 2.75 in the last 90 quarter units attempted. An applicant not meeting these academic standards, but who meets the basic university standard of a grade point average of 2.5 in the last 90 quarter units attempted may be considered for admission as a postbaccalaureate student; such admission does not constitute admission to graduate degree standing (refer to page 93). A change from postbaccalaureate status to graduate status requires application and additional processing through the university's admissions office.

An applicant meeting the grade point requirement for classified graduate status, but who is deficient in background courses in agriculture, natural resources and/or related support disciplines may be considered for admission as a conditionally classified graduate student. Before such a student is advanced to classified graduate status, deficiencies in prerequisites must be removed and satisfactory academic performance in a graduate program must be demonstrated by the completion of no fewer than 12 units of specified courses with a minimum grade point average of 3.0. Courses taken to remove deficiencies in prerequisites will not count toward the unit requirement for the degree.

All applicants who do not speak and write English as their primary language are required to complete the Test of English as a Foreign Language (TOEFL), with a minimum score of 550, and the Test of Written English (TWE), with a minimum score of 4.5.

## **Program of Study**

The MS Agriculture program includes the following specializations: Agricultural Education, Agricultural Engineering Technology, Dairy Products Technology, Food Science and Nutrition, Forestry Sciences, General Agriculture, International Agricultural Development, Irrigation, and Soil Science. The General Agriculture specialization provides students with the opportunity to focus their graduate study in one of several additional areas, including: Agricultural Education and Communication, Animal Science, Crop Science, or Environmental Horticultural Science. Although the program offers several specializations, there is a single degree; students may not earn more than one Master of Science degree in the College of Agriculture.

The thesis is based on independent, supervised research; students should contact individual departments to determine the availability of funding support for their research. The final copy of the thesis must meet the standards explained in the "Manual of Instructions for the Preparation and Submission of the Master's Thesis or Master's Project" available from the Cal Poly Research and Graduate Programs Office. At least one course in statistical methods and/or experimental design is required of students in a thesis curriculum.

Graduate students must file the formal program of study for the degree with the Graduate Studies Coordinator of the College of Agriculture no later than the end of the quarter in

which the 12th unit of approved courses is completed. The formal program of study must include at least 45 units of committee-approved graduate coursework; at least half of the minimum units required must be at the 500 level. Students should refer to the course descriptions in this catalog for credit limitations of individual courses; for example, total credit for AG 500, Individual Study, is limited to six units. Students also should refer to the Graduate Program Guidelines available from the Graduate Studies Coordinator. At least one course in statistical methods and/or experimental design is required of students in a thesis curriculum.

Graduate students must file the formal program of study for the degree with the Graduate Studies Coordinator of the College of Agriculture no later than the end of the quarter in which the 12th unit of approved courses is completed. The formal program of study must include at least 45 units of committee-approved graduate coursework; at least half of the minimum units required must be at the 500 level. Students should refer to the course descriptions in this catalog for credit limitations of individual courses; for example, total credit for AG 500, Individual Study, is limited to six units. Students also should refer to the Graduate Program Guidelines available from the Graduate Studies Coordinator.

All candidates must meet the current Graduation Writing Requirement; see page 97. All students are required to pass both a written and an oral comprehensive examination which normally are given during the final quarter of the program of study. Successful completion of the written comprehensive examination is required before the student may take the final oral comprehensive examination. For students in a thesis program, the final oral comprehensive examination will include, but not necessarily be limited to, a defense of the thesis.

### MS Agriculture, Specialization in AGRICULTURAL EDUCATION

Provides students with the opportunity to focus their graduate study in Agricultural Education, and is generally taken concurrently with the credential program.

#### Required Courses

AGED 539 Internship .....	6
AGED 520 Program Develop/Agric Education .....	3
AGED 522 Instructional Prog/Agric Mechanics .....	3

**Restricted electives** ..... 33

Any 400- and 500-level courses approved by the student's graduate committee. No fewer than 11 units must be at the 500 level. Students are required to complete one year of successful teaching or graduate level internship prior to the written and oral examinations.

### MS Agriculture, Specialization in AGRICULTURAL ENGINEERING TECHNOLOGY

#### Required Courses

AG 599 Thesis .....	6
BRAE 521 Systems Analysis of Agricultural Systems .....	4
BRAE 522 Instrumentation Control/ Microprocessors.....	4
BRAE 533 Irrigation Project Design .....	4
BRAE 581 Graduate Seminar Agric.Engineering ....	3
400-500 level research methods course .....	3

**Restricted electives** ..... 15

At least 9 units must be in computer related coursework; remaining units shall include at least 6 units at the 500 level.

**Electives** ..... 6  
400-500 level courses

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### MS Agriculture, Specialization in DAIRY PRODUCTS TECHNOLOGY

#### Required Courses

DSCI 401 Physical and Chemical Properties of Dairy Products .....	4
DSCI 522 Bioseparation Processes in Dairy Product Technology .....	4
DSCI 570 Selected Topics in Dairy Science .....	3
DSCI 571 Selected Adv. Lab in Dairy Science .....	3
DSCI 581 Graduate Seminar in Dairy Science .....	3
DSCI 599 Thesis .....	6
STAT 513 Applied Experimental Design and Regression Models .....	4

**Restricted electives may be selected from:** ..... 18

BRAE 427 Agricultural Process Engineering (3)	
BRAE 522 Instrum. Control/Microprocessors (4)	
CHEM 405 Advanced Physical Chemistry (3)	
CHEM 439 Instrumental Analysis (5)	
CHEM 473 Immunochemistry (4)	
CHEM 474 Protein Techniques Laboratory (2)	
DSCI 402 Quality Assurance & Control Dairy Prod (4)	
DSCI 433 Dairy Plant Mgt & Equipment (4)	
DSCI 434 Cheese and Fermented Dairy Foods (4)	
DSCI 435 Conc/Fract and Butter Technology (4)	
DSCI 444 Dairy Microbiology (4)	
DSCI 500 Individual Study (1-6)	
FSN 444 Engineering Concepts in Food Processing (4)	
FSN 409 Sensory Evaluation of Food (4)	
FSN 410 Nutritional Aspects-Food Processing (4)	
FSN 474 Advanced Food Processing (4)	
REC 450 Grant Development and Writing (4)	
SS 501 Research Planning (3)	

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**MS Agriculture, Specialization in  
FOOD SCIENCE AND NUTRITION**

**Required Courses**

AG 500 Individual Study .....	2
FSN 410 Nutritional Aspects of Food Processing ...	3
FSN 501 Lipid Metabolism and Nutrition .....	3
FSN 581 Graduate Seminar .....	3
FSN 599 Thesis .....	6
SS 501 Research Planning .....	3
STAT 512 Statistical Methods .....	4

**Select 9 units from the following**..... 9

BRAE 521 Systems Analysis of Agricultural Systems (4)	
BRAE 522 Instrum. Control/ Microprocessors (4)	
BIO 431 Physiology I: General (4)	
CHEM 439 Instrument Analysis (5)	
CHEM 528 Nutritional Biochemistry (3)	
EDUC 555 Counseling and Communication (4)	
FSD 455 Product Dev. and Sensory Evaluation (5)	
FSN 437 Advanced Food Processing (4)	
KINE 451 Nutrition for Fitness and Sport (3)	

<b>Electives (400–500 level courses)</b> .....	12
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**MS Agriculture, Specialization in  
FORESTRY SCIENCES**

An applied sciences area of study in disciplines such as oak woodland, chaparral, Sierran forest types, watershed hydrology, and fire ecology.

**Required Courses**

FNR 530 Social Systems in Forest Resources Mgt .	3
FNR 532 Applic Biometrics & Econometrics .....	4
FNR 534 Forest Ecosystem Mgt and Modeling .....	3
FNR 581 Graduate Seminar in Forest Resources.....	2
FNR 599 Thesis .....	9
SS 501 Research Planning .....	3
STAT 512 Statistical Methods .....	4

**Restricted Electives** ..... 17

Any 400- and 500-level courses approved by the student's graduate committee.	
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**MS Agriculture, Specialization in  
GENERAL AGRICULTURE**

The General Agriculture Specialization provides students with the opportunity to focus their graduate study in one of several areas, including: Agricultural Education and Communication, Animal Science, Crop Science or Environmental Horticultural Science.

**Required Courses**

AGED 539 Internship <i>or</i> AG 599 Thesis .....	6
400- or 500-level research methods course .....	3
Any 581 Graduate Seminar offered in College of Agriculture.....	3

**Restricted electives**..... 33

Any approved 400- and 500-level courses. No fewer than 11 units must be at the 500 level.	
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**MS Agriculture, Specialization in  
INTERNATIONAL AGRICULTURAL  
DEVELOPMENT**

A management oriented program designed primarily for enhancing the technical skills of returning Peace Corp volunteers and individuals that seek specialized employment in developing countries. Prerequisite. Bachelor's degree with coursework in macroeconomics, microeconomics, crop production, general soils, and agricultural irrigation. Students may complete prerequisite coursework at Cal Poly if necessary.

**Required Courses**

AG 599 Thesis .....	6
AGB 510 World Agriculture Development .....	3
AGB 515 International Agriculture Marketing .....	3
AGB 421/AGB 435/BRAE 521 .....	4
SS 453 Tropical Soils .....	4
400-500 level research/statistical methods course ...	3

**Restricted electives** ..... 13

Courses selected with adviser's approval from an area of emphasis in Agroforestry Technology, Cropping Systems Technology, or Irrigation Technology.

**Global Requirement**..... 6

400-500 level courses from ECON, POLS, GEOG, ANT, HIST. To be approved by student's graduate committee.

**Electives** ..... 3

To be selected from any 400-500 level course approved by the student's graduate committee.	
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### MS Agriculture, Specialization in IRRIGATION

Prerequisite: BS in a technical field of agriculture, or a BA with proficiency in basic chemistry, advanced algebra and trigonometry. All students must have had at least one undergraduate class in general irrigation, soil science, and crop science, plus be familiar with computer spreadsheet usage. Students may complete prerequisite courses at Cal Poly if necessary.

#### Required Courses

BRAE 405 Chemigation .....	1
BRAE 435 Drainage <i>or</i>	
BRAE 437 Conservation Engineering .....	3
BRAE 438 Drip/Micro Irrigation .....	4
BRAE 440 Agricultural Irrigation Systems .....	4
BRAE 492 Pumps and Pump Drivers <i>or</i>	
BRAE 531 Water Wells .....	3
BRAE 500 Individual Study .....	3
BRAE 533 Irrigation Project Design .....	4
BRAE 599 Thesis .....	6
400-500 level research methods course .....	3
581 Graduate Seminar .....	3
<b>Electives</b> .....	11

400-500 level courses approved by the student's graduate committee. A minimum of 23 units of 500-level coursework is required

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### MS Agriculture, Specialization SOIL SCIENCE

Prerequisite: B.S. degree in Soil Science, related field or physical or biological sciences, or a B.A. degree with proficiency in the basic sciences (chemistry, physics, botany, biology, and statistics). A computer science or applied computer science course is required. Students may complete prerequisite courses at Cal Poly if necessary.

#### Required Courses

SS 501 Research Planning .....	3
SS 508 Landscape Management-Erosion Control ...	3
SS 522 Advanced Soil Fertility .....	3
SS 581 Graduate Seminar in Soil Science .....	3
SS 582 Advanced Land Management .....	3
SS 599 Thesis .....	6
<b>Electives</b> .....	24

400-500 level courses approved by the graduate committee. At least 6 units of electives must be from outside of the College of Agriculture.

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### MBA, Specialization in AGRIBUSINESS

The College of Business and the Agribusiness Department jointly offer an Agribusiness Specialization in the Master of Business Administration program. The program is part of the two-year MBA curriculum and requires the completion of six graduate classes taught by the Agribusiness Department (see the College of Business). Information and application materials may be obtained by writing to the MBA Coordinator, College of Business.

### MS Engineering, Specialization in WATER ENGINEERING

The College of Engineering and the Bioresource and Agricultural Engineering Department jointly offer the Water Engineering Specialization under the MS Engineering. Please see College of Engineering section of this catalog for more information.

# Agribusiness

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Douglas G. Genereux	Marlin D. Vix
Lynn L. Hamilton	Marianne M. Wolf
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**ACADEMIC PROGRAMS**

**BS Agricultural Business  
 Agribusiness Minor**

The BS program in Agricultural Business emphasizes management preparation for careers in agribusiness as part of the world's food system. The food system encompasses all the direct functions such as inputs to producers, production, processing, distribution, and marketing. Emphasis is placed on the support functions such as finance, domestic policy, and international policy. The curriculum is based on a solid background in production agriculture.

**CONCENTRATIONS**

In addition to the required major courses in agricultural business, students select one of the following concentrations or individualized course of study based upon their interests and career goals.

**Agribusiness Finance and Appraisal.** The study of economic, legal and real estate principles in the investment, development and mortgaging of agricultural real estate. Employment opportunities are available with a variety of institutions such as the Farm Credit System, Farm Service Agency, commercial banks, and large insurance companies. Careers may include loan officer, fee appraiser, financial officer, and agricultural real estate management and sales.

**Agribusiness Marketing.** Coursework includes the analysis of marketing methods and planning, sales forecasting, and research design for agribusiness. Career opportunities involve the marketing, advertising, distribution, and sales of farm products.

**Agribusiness Policy.** Coursework includes the analysis of agricultural resource allocation issues with emphasis on policies that impact the production of food and fiber. Typical careers include policy analysts and lobbyists for agribusiness, farm organizations, commodity associations,

agribusiness trade associations, government regulatory agencies, and federal and state legislatures.

**Farm and Ranch Management.** Graduates frequently return to manage the increasingly complex operations of the family farm or find career opportunities with a large-scale farm or ranch operation. The study of farm and ranch management, including factors that influence profits and efficiency, accounting procedures and agricultural tax laws and preparation.

**International Agribusiness Management.** The opportunity for studying global agricultural production, marketing, trade policies and factors influencing U.S. exports of agricultural commodities and products. In addition to the required curriculum, students are encouraged to develop competency in a second language and complete an internship experience outside of the U.S.

**Individualized Course of Study.** Students have the option of choosing one of the above concentrations or developing an individualized course of study with adviser and department head approval. The agribusiness sector is changing rapidly with the evolution of biotechnology and information technology. Students are encouraged to explore these and other topics by developing a program of study that reflects individual talents and interests.

**BS AGRICULTURAL BUSINESS**

- 60 units upper division
  - 2.0 GPA
  - GWR
  - USCP
- \* = Satisfies General Education requirement

**MAJOR COURSES**

AGB 101 Introduction to Agribusiness .....	4
AGB 202 Sales, Communication, Leadership .....	4
AGB 212 Agricultural Economics.....	4
AGB 213 Agricultural Economic Analysis.....	4
AGB 301 Food and Fiber Marketing.....	4
AGB 310 Agribusiness Credit and Finance.....	4
AGB 312 Agricultural Policy .....	4
AGB 401 Managing Cultural Diversity in Agricultural Labor Relations (USCP).....	4
AGB 460 Research Methodology in Agribusiness ...	2
AGB 461 Senior Project.....	2
Concentration courses (see below) .....	28

**64**

**SUPPORT COURSES**

BUS 207 Business Law .....	4
BUS 212 Financial Accounting for Nonbusiness Majors .....	4
CHEM 110 World of Chemistry/Essentials (B1a) *	4
Life science elective with lab (B1b*).....	4
<sup>1</sup> ECON 222 Macroeconomics (D3)* .....	4
<sup>2</sup> MATH 118 Pre-Calculus Algebra <i>or</i> MATH 221 Calculus for Business & Econ. (B2)*	4
STAT 221 Probability/Statistical Inference (B2)*	5
ASCI 231 <i>or</i> PM 145 <i>or</i> DSCI 230 .....	3/4
SS 121 Introductory Soil Science .....	4
FRSC 131/230/231 <i>or</i> CRSC 131/230 <i>or</i> VGSC 230 <i>or</i> EHS 121 .....	4
Agricultural science electives .....	16/17
16 units in Agriculture with course prefixes other than AGB, AGED, REC, MSC. No more than 4 units from courses with AG prefix (AG 210, AG 301, and AG 371 do not satisfy units in this area). No more than 4 units from Enterprise Projects and Special Problems.	57

**GENERAL EDUCATION (GE) ..... 51**

72 units required; 21 of these units are in Major/Support.  
→See page 79 for complete GE course listing.  
→Minimum of 3 GE courses required at the 300-400 level.

**Area A Communication** (minimum 11 units)

Take one course from A1, A2, A3.

- A1 Expository Writing
- A2 Critical Thinking
- A3 Speech

If less than 11 units, take one course from:

- A4 Argumentative Writing

**Area B Science and Mathematics** (no additional units required)

17 units are in Support..

- B1a Physical Sciences \*see Support
- B1b Life Sciences \*see Support
- B2 Mathematics and/or Statistics \*see Support

**Area C Arts and Humanities** (minimum 15 units)

Take one course from each Area C category:

- C1 Literature
- C1 Philosophy
- C2 Fine/Performing Arts
- C3 Lit/Phil/Arts (300-400 level)

If less than 15 units, take one additional course from C1, C2, C3

**Area D Social, Political, Economic Inst.** (minimum 11 units)

4 units are in Support.

No more than one course in any Area D category.

Take one course from D1a and one course from D1b

- D1a HIST 202 (USCP) *or* HIST 204 *or* LS 211
- D1b POLS 110 *or* LS 212

Take two courses from D2, D4a, D4b

- D2 History (300-400 level)
- D3 Economics \*see Support
- D4a Social Institutions
- D4b Social Institutions (300-400 level)

**Area E Life Understanding** (minimum 3 units)

No more than one course in any Area E category.

Take one course from E1 *or* E2

- E1 PSY 201/PSY 202
- E2 Self Development

**Area F Technology** (minimum 2 units)

F1 Computer Literacy (AG 250 recommended)

**Additional GE Courses**

To complete 72-unit requirement, select additional courses from Areas A, B, C, D, E. No more than one additional course per area.

**ELECTIVES**..... 14  
**186**

**CONCENTRATIONS or  
INDIVIDUALIZED COURSE OF STUDY (select one)****Agribusiness Finance and Appraisal**

AGB 322 Principles of Farm Management .....	4
AGB 324 Agric. Property Management and Sales ...	4
AGB 326 Farm Appraisal.....	4
AGB 331 Farm Accounting .....	4
AGB 410 Management Practices/Agric. Lending ....	4
ECON 337 Money, Banking, and Credit.....	4
Adviser approved electives: AGB/BUS (300-400 level) or foreign language (any level) .....	4
	<u>28</u>

**Agribusiness Marketing Concentration**

AGB 318 Global Agricultural Marketing/Trade.....	4
AGB 323 Agribusiness Managerial Accounting.....	4
AGB 405 Agribus. Marketing Research Methods ....	4
AGB 406 Agribusiness Marketing Planning .....	4
AGB 421 Agribusiness Operations Analysis <i>or</i> AGB 433 Agricultural Price Analysis.....	4
AGB 450 Agribusiness Strategy Formulation .....	4
Adviser approved electives: AGB/BUS (300-400 level) or foreign language (any level) .....	4
	<u>28</u>

**Agribusiness Policy Concentration**

AGB 307 World Food Economy .....	4
AGB 315 Land Economics .....	4
AGB 323 Agribusiness Managerial Accounting.....	4
AGB 412 Advanced Agricultural Policy .....	4
AGB 421 Agribusiness Operations Analysis <i>or</i> AGB 435 Linear Programming in Agriculture.....	4
AGB 433 Agricultural Price Analysis .....	4
Adviser approved electives: AGB/BUS (300-400 level) or foreign language (any level) .....	4
	<u>28</u>

<sup>1</sup> AGB majors: AGB 212 is prerequisite for ECON 222, not ECON 221.

<sup>2</sup> MATH 116 and MATH 117 will substitute for MATH 118 and are taught at a slower pace for those who need more review. MATH 117 will satisfy GE area B2 .

**Farm and Ranch Management**

AGB 321 Farm Records .....	4
AGB 322 Principles of Farm Management.....	4
AGB 331 Farm Accounting .....	4
AGB 433 Agricultural Price Analysis.....	4
AGB 435 Linear Programming in Agriculture.....	4
AGB 456/457/458 Crop/Livestock/Dairy Management Problems .....	4
Adviser approved electives: AGB/BUS (300-400 level) or foreign language (any level) .....	4
	28

**International Agribusiness Management**

BUS 302 International and Cross Cultural Mgt.....	4
AGB 307 World Food Economy .....	4
AGB 318 Global Agricultural Mktg and Trade .....	4
AGB 323 Agribusiness Managerial Accounting.....	4
AGB 422 Logistics in Global Agribusiness <i>or</i> BUS 433 International Business Finance .....	4
AGB 451 Strategy and Cases in International Agribusiness.....	4
Area study concentration elective .....	4
To be selected from approved courses in anthropology, history, humanities, and foreign languages	
	28

**Individualized Course of Study**

Adviser and department head pre-approval of courses is required.....	28
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**AGRIBUSINESS MINOR**

In today's ever more complex, technology-driven world, it is a necessity for any graduate in agriculture to have some exposure to marketing, personnel management, financial management, budgeting, and economics if they are to succeed. The minor is designed to give students in the College of Agriculture this opportunity. Interested students must apply for acceptance into the minor through the Agribusiness Department.

**Required courses**

AGB 212 Agricultural Economics .....	4
AGB 301 Food and Fiber Marketing .....	4
AGB 310 Agribusiness Credit and Finance .....	4
AGB 401 Managing Cultural Diversity in Agricultural Labor Relations (4) (USCP) .....	4
BUS 212 Financial Accounting for Nonbusiness Majors <i>or</i> AGB 321 Farm Records .....	4
<b>Additional courses</b> .....	8

The student will choose 8 additional units of AGB courses (not including AGB 101, 200, 400) with *prior approval* by AGB Minor Coordinator.

28

**Interdisciplinary Minors**

The department participates in offering the interdisciplinary minor in Wine and Viticulture. Please see College of Agriculture section for more information.

# Agricultural Education & Communication

Department Office  
Agriculture Bldg. (10), Room 244  
(805) 756-2803

## Department Head, Glen R. Casey

Robert A. Flores  
William C. Kellogg

Sarah S. Lord  
Joseph E. Sabol

## ACADEMIC PROGRAMS

### BS Agricultural Science

The Agricultural Education and Communication Department offers a Bachelor of Science degree in Agricultural Science with a choice of one of seven concentrations. The program also offers 26/27 units of adviser approved electives which may be selected from one of three career pathways: preparation of teachers of agriculture for the public secondary schools of California, professional preparation in agricultural communication, or international agriculture.

The teaching credential program provides for early field experience and professional education coursework in the undergraduate curriculum. Specialized preprofessional and professional courses are offered for undergraduate and graduate students.

Postbaccalaureate work is required of students seeking the Single Subject in Agriculture, Home Economics and Agricultural Specialist credentials. Students interested in teaching agriculture may receive a B.S. degree in any of the agricultural science, production or management fields. Coursework toward the teaching credential should be started early in order to complete the total curriculum most effectively. A single subject credential in Home Economics is available for Home Economics graduates or graduates from related programs.

Student teaching is a vital part of the graduate program for agriculture and the home economics credential. Candidates must complete a minimum of 45 units of postgraduate coursework necessary for the "clear" teaching credential. For more information see, Teaching Credential Programs.

In association with the Brock Center for Agricultural Communication, selected interdisciplinary courses in Journalism, Graphic Communications, English, Speech Communication and Agriculture make up the Agricultural Communication minor. Career preparation includes a breadth and depth in agriculture along with foundations in journalism and an industry internship. The Brock Center for

Agricultural Communication provides students the opportunity for industry linkages and professional preparation in this rapidly growing career area.

The International Agriculture Career Area includes a breadth and depth of agricultural subjects, an industry internship, and minor in International Relations to form the basis for entering the global agriculture work place. The department works with each student to provide a dynamic, intensive and practical course of study, giving graduates the knowledge and creativity to develop innovative programs and approaches to agriculture in a global society.

Agricultural Education courses taken at the graduate level may be used to fulfill many of the units required for the MS Agriculture with a specialization in Agricultural Education. Detailed information may be obtained in the office of the Dean of the College of Agriculture or in the Agricultural Education and Communication Department.

## CONCENTRATIONS

**Agricultural Mechanics.** Designed to develop knowledge and ability necessary to perform agricultural mechanical operations and processes.

**Agricultural Products and Processing.** Principles and practices involved in the science of post harvest technology of agricultural products.

**Agricultural Supplies and Services.** Study of the consumable supplies and services needed in the production and post harvest phases of agriculture.

**Animal Science.** Principles and practices related to the economic use of resources in the production of livestock and poultry.

**Crop and Soil Science.** Principles and practices related to the economic use of resources in the culture and production of agricultural plants.

**Forestry and Natural Resources.** Principles and practices involved in the conservation, multiple use or improvement of natural resources.

**Ornamental Horticulture.** Principles and practices involved with the culture of plants used for ornamental or aesthetic purposes.

**BS AGRICULTURAL SCIENCE**

- 60 units upper division       GWR
- 2.0 GPA                               USCP

\* = Satisfies General Education requirement

**MAJOR COURSES**

AGED 202 Intro. to Agricultural Education .....	2
AGED 404 Agricultural Leadership .....	3
AGED 426 Presentation Methods in Agricultural Communication or AGED 438 Instructional Processes in Agricultural Education.....	3
AGED 460 Research Methodology in Agricultural Education and Communication .....	1
AGED 461 Senior Project .....	2
AGED 462 Senior Project .....	2
AGB 202 Communication, Leadership and Management Skills for Agribusiness.....	4
AGB 301 Food and Fiber Marketing .....	4
AGB 401 Managing Cultural Diversity in Agricultural Labor Relations (USCP) .....	4
ASCI 231 General Animal Science.....	3
BRAE 121 Agricultural Mechanics .....	2
BRAE 141 Agricultural Machinery Safety .....	3
BRAE 340 Irrigation Water Management .....	4
CRSC 230 Agronomic Crop Production.....	4
DSCI 230 General Dairy Husbandry .....	4
FNR 201/FSN 230/DSCI 231/AG 450 .....	3/4
FRSC 230 California Fruit Growing or VGSC 230 Introduction to Vegetable Science .....	4
EHS 230 Environmental Horticulture .....	4
PM 145 Introduction to Poultry Management .....	4
SS 121 Introductory Soil Science .....	4
Concentration courses (see below) .....	22
	<hr/>
	86/87

**SUPPORT COURSES**

CHEM 110 World of Chemistry/Essentials (B1a)*	4
Adviser approved restricted electives .....	27
12-20 units must be 300-400 level depending on concentration. Career area programs may be selected from teaching agriculture, agricultural communication, or international agriculture.	
	<hr/>
	31

**GENERAL EDUCATION (GE)**

**68**

72 units required; 4 of these units are in Major/Support.  
→See page 79 for complete GE course listing.  
→Minimum of 3 GE courses required at the 300-400 level.

**Area A Communication** (minimum 11 units)

Take one course from A1, A2, A3:

- A1 Expository Writing
- A2 Critical Thinking
- A3 Speech

If less than 11 units, take one additional course in:

- A4 Argumentative Writing

**Area B Science and Mathematics** (minimum 11 units)

4 units in Support.

Take one course from B1b:

- B1a Physical Sciences \*see Support
- B1b Life Sciences

Take two courses from B2:

- B2 Mathematics and/or Statistics

**Area C Arts and Humanities** (minimum 15 units)

Take one course from each Area C category:

- C1 Literature
- C1 Philosophy
- C2 Fine/Performing Arts
- C3 Lit/Phil/Arts (300-400 level)

If less than 15 units, take one additional course from C1, C2, C3

**Area D Social, Political, Economic Inst.** (minimum 15 units)

No more than one course in any Area D category.

Take one course from D1a and one from D1b

- D1a HIST 202 (USCP) or HIST 204 or LS 211
- D1b POLS 110 or LS 212

Take three courses from D2, D3, D4a, D4b

- D2 History (300-400 level)
- D3 Economics
- D4a Social Institutions
- D4b Social Institutions (300-400 level)

**Area E Life Understanding** (minimum 3 units)

No more than one course in any Area E category.

Take one course from E1 or E2

- E1 PSY 201/PSY 202
- E2 Self Development

**Area F Technology** (minimum 2 units)

- F1 Computer Literacy

**Additional GE Courses**

To complete 72-unit requirement, select additional courses from  
Areas A, B, C, D, E. No more than one additional course per area.

<b>ELECTIVES</b> .....	<u>7</u>
	<b>192</b>

**CONCENTRATIONS (select one)**

**Agricultural Mechanics**

BRAE 124 Small Engines .....	2
BRAE 237 Engineering Surveying I.....	2
BRAE 321 Agricultural Safety .....	3
BRAE 335 Internal Combustion Engines .....	4
IME 155 Industrial Welding Technology.....	1
BRAE electives (7 units at 300-400 level).....	10
	<hr/>
	22

**Agricultural Products and Processing**

DSCI 231 General Dairy Manufacturing .....	4
FSN 211 Meats .....	3
FRSC/VGSC 421 Postharvest Tech. Horticultural Crops.....	4
DSCI/FSN electives (6 units at 300-400 level).....	11
	<hr/>
	22

**Agricultural Supplies and Services**

AGB 212 Agricultural Economics .....	4
AGB 302 Agricultural Associations and Cooperatives .....	3
AGB 310 Agribusiness Credit and Finance .....	4
AGB 312 Agricultural Policy .....	4
AGB electives .....	7
	<hr/> 22

**Animal Science**

Select two: ASCI 141/142/143 .....	4,4
ASCI 220 Introduction to Animal Nutrition and Feeding.....	4
DSCI 330 Artificial Insemination and Embryo Biotechnology .....	4
ASCI/DSCI/PM electives (300–400 level).....	6
	<hr/> 22

**Crop and Soil Science**

CRSC/FRSC/VGSC 230 (Select course not taken in major column).....	4
SS 202 Soil and Water Conservation.....	4
CRSC 311 Insect Pest Management .....	4
SS 221 Fertilizers.....	4
CRSC/FRSC/VGSC electives (300–400 level).....	6
	<hr/> 22

**Forestry and Natural Resources**

BIO 227 Wildlife Conservation Biology .....	4
BIO 228 Wildlife Conservation Laboratory .....	1
FNR 202 Environmental Management .....	3
FNR 208 Dendrology.....	4
FNR 306 Natural Resource Ecology and Habitat Management.....	4
FNR electives (300–400 level).....	6
	<hr/> 22

**Ornamental Horticulture**

EHS 122 Fundamentals of Environmental Horticulture .....	4
EHS 123 Landscape Installation and Maintenance..	4
EHS 324 Foliage Plant Culture.....	4
EHS electives (6 units at 300–400 level).....	10
	<hr/> 22

# Animal Science

Department Office  
 Agriculture Bldg. (10), Room 101  
 (805) 756-2419

**Department Head, Andrew J. Thulin**

Gene A. Armstrong	William E. Plummer
Jonathan L. Beckett	Robert T. Rutherford
M. Steven Daugherty	Kenneth C. Scotto
Michael H. Hall	Dale A. Smith
Roger M. Hunt	Robert Spiller
Michael W. Lund	Clifford A. Stokes

**Affiliate Faculty:**

Brent G. Hallock, Soil Scientist  
 Edwin H. Jaster, Dairy Science  
 Rudy A. Wooten, Meat Scientist

**ACADEMIC PROGRAMS**

**BS Animal Science  
 Poultry Management Minor**

The BS in Animal Science program offers students opportunities to experience coursework that combines theory and practical applications for all of the species common to the livestock and poultry industries. In consultation with their faculty advisers, students choose electives according to their interests and may include one of the following areas: livestock production, poultry management, agribusiness, meats/muscle science, teaching agriculture, agricultural communication, resource management, and pre-veterinary/graduate school.

In addition, the department offers a wide assortment of activities including four student clubs and a nationally competitive livestock judging team. Students participate in organizing and conducting special meetings, seminars and field days. The department maintains herds of beef cattle, sheep, swine, horses and flocks of poultry. Some of the nation's most noted bloodlines can be found within the registered breeds on campus, including some which have arrived via embryo transfer and artificial insemination. By actively participating in the management of the herds and flocks, students simulate the larger scale operations of the industry. The enterprise project system is another valuable experience.

The department has an active role in the management of the Swanton-Pacific Ranch and is developing environmentally sound resource management practices including intensive controlled grazing, multiple species grazing and using the grazing animal as a tool to enhance the ranch environment.

**BS ANIMAL SCIENCE**

- 60 units upper division
- 2.0 GPA
- GWR
- USCP

\* = Satisfies General Education requirement

**MAJOR COURSES**

ASCI 101 Introduction to the Animal Sciences.....	2
ASCI 141 Market Beef Production .....	4
ASCI 142 Swine Science.....	4
ASCI 143 Systems of Sheep Production .....	4
ASCI 144 Equine Science .....	4
ASCI 220 Intro. Animal Nutrition and Feeding .....	4
ASCI 304 Animal Breeding.....	3
ASCI 401 Reproductive Physiology.....	4
ASCI 420 Animal Nutrition.....	3
ASCI 461 Senior Project .....	2
ASCI 462 Senior Project .....	2
ASCI 463 Undergraduate Seminar .....	2
ASCI 476 Issues in Animal Agriculture .....	3
FSN 211 Meats.....	3
PM 145 Introduction to Poultry Management .....	4
VS 223 Anatomy and Physiology of Farm Animals .	4
<i>Select two of the following: ASCI 311, 312, 313,</i>	
314; PM 240, 250 .....	6
Adviser approved electives.....	38

May be selected from: livestock production, poultry, agribusiness, meats/muscle science, teaching agriculture, agricultural communication, resource management, and pre-veterinary/graduate school. At least 60 units must be 300-400 level; of those at least 27 must be in major column.

**96**

**SUPPORT COURSES**

BIO 151 Introduction to Biology <i>or</i>	
BIO 101, 105 General Biology (B1b)*.....	4/5
BIO 302 Human Genetics <i>or</i>	
BIO 303 Genetics (Area B)* .....	3
CHEM 111/127 Survey of Chemistry (B1a)*.....	5/4
CHEM 212 Survey of Organic Chemistry <i>or</i>	
CHEM 216 Organic Chemistry (Area B)*.....	5/4
MATH 118 Pre-Calculus Algebra (B2)* .....	4

**19-22**

**GENERAL EDUCATION (GE) ..... 53**

72 units required; 17 of these units are in Major/Support.  
 →See page 79 for complete GE course listing.  
 →Minimum of 3 GE courses required at the 300-400 level.

**Area A Communication** (minimum 11 units)

Take one course from A1, A2, A3:

- A1 Expository Writing
- A2 Critical Thinking
- A3 Speech

If less than 11 units, take one additional course in:

- A4 Argumentative Writing

**Area B Science and Mathematics** (minimum 3 units)

17 units are in Support.

- B1a Physical Sciences \*see Support
- B1b Life Sciences \*see Support
- Area B \*see Support

Take one course from B2:

- B2 Mathematics and/or Statistics

**Area C Arts and Humanities** (minimum 15 units)

Take one course from each Area C category:

- C1 Literature
- C1 Philosophy
- C2 Fine/Performing Arts
- C3 Lit/Phil/Arts (300-400 level)

If less than 15 units, take one additional course from C1, C2, C3

**Area D Social, Political, Economic Inst.** (min. 15 units)

No more than one course in any Area D category.

Take one course from D1a and one from D1b

- D1a HIST 202 (USCP) or HIST 204 or LS 211
- D1b POLS 110 or LS 212

Take three courses from D2, D3, D4a, D4b

- D2 History (300-400 level)
- D3 Economics
- D4a Social Institutions
- D4b Social Institutions (300-400 level)

**Area E Life Understanding** (minimum 3 units)

No more than one course in any Area E category.

Take one course from E1 or E2

- E1 PSY 201/PSY 202
- E2 Self Development

**Area F Technology** (minimum 2 units)

- F1 Computer Literacy

**Additional GE Courses**

To complete 72-unit requirement, select additional courses from Areas A, C, D, E. No more than one additional course per area.

**ELECTIVES ..... 15-18**

**186**

**POULTRY MANAGEMENT MINOR**

The Poultry Management minor prepares students for a wide variety of positions in the commercial poultry industry and in many allied services related directly to the industry. Career opportunities are many and varied.

Students have an opportunity to conduct enterprise projects in the production of market eggs, hatching eggs, meat birds, replacement pullets, turkey, and game birds, which give them valuable experience in production techniques as well as exposure to a number of business activities related to production. Advanced students may have opportunities to study special topics related to problems in management of commercial poultry flocks.

The program is supported by a state-of-the-art poultry production facility. Cal Poly's new Poultry Unit is now considered one of the best in the Western United States; it will accommodate 14,000 layers, 7,000 replacement pullets, 7,000 broilers, 2,500 breeding hens, and 2,500 chickens/turkeys for testing and research purposes. These production facilities allow students to gain hands-on learning which complements their formal class work, and provides real-world experience.

**Required courses**

PM 145 Introduction to Poultry Management .....	4
PM 240 Poultry Business Management .....	3
PM 250 Poultry Processing .....	3
PM 330 Poultry Production Management .....	4
PM 340 Poultry Anatomy, Physiology Diseases .....	4
PM 350 Applied Poultry Feeding and Nutrition .....	3

**Electives ..... 7**

To be chosen from:

- AG 339; AGB 310; BUS 212; ENGL 310;
- BUS 346; FSN 274, 333, 334, 431;
- PM 290/490, 360

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# *Bioresource & Agricultural Engineering*

**Department Office**  
**Agricultural Engineering Bldg. (08), Room 101**  
**(805) 756-2378, FAX: (805) 756-2626**

## **Department Head, Kenneth H. Solomon**

James Bermann	Rollin D. Strohman
Charles M. Burt	Robert E. Walker
Richard A. Cavaletto	Paul R. Weckler
Samantha J. Gill	Douglas W. Williams
L. Joe Glass	James B. Zetsche, Jr.
M. Stephen Kaminaka	Mark A. Zohns

## **ACADEMIC PROGRAMS**

### **BS Agricultural Systems Management** **BS Bioresource and Agricultural Engineering**

The Bioresource and Agricultural Engineering Department offers two programs leading to a Bachelor of Science degree: Bioresource and Agricultural Engineering and Agricultural Systems Management.

Department facilities include well-equipped laboratories for hydraulic systems, evaluation and testing of power units, fabrication of agricultural machinery, agricultural electrical systems, design and construction of agricultural structures, photogrammetry, microcomputers and controllers.

Outdoor facilities include a water delivery unit with multiple pumping systems and operational canals, a field for evaluation of various irrigation systems including an operating linear move and land for experience in the mechanical production of farm products and safe operation of agricultural machinery.

Students are encouraged to participate in the student clubs of the department. The Agricultural Engineering Society is involved in a broad range of activities and services including Open House displays. The student branch of the American Society of Agricultural Engineers offers professional and extracurricular activities.

### **BS Agricultural Systems Management**

Students receive broad agricultural training with a business and management emphasis in one of the following areas: plant production, livestock production, food and fiber processing, environmental information management, water/irrigation, and processing and manufacturing. Students have the opportunity to develop management expertise through interdisciplinary experiences in agricultural technology and business oriented coursework.

Career opportunities are available in the manufacturing, sales, and service of agricultural equipment and machinery; management and production of animals and crops; processing of food and fiber; and management of water/irrigation facilities. The program is recognized by the American Society of Agricultural Engineers.

### **BS Bioresource and Agricultural Engineering**

The bioresource/agricultural engineer represents the most general type of engineer, adept at utilizing electrical and mechanical energy sources, water resources, and designing structural units. The curriculum features a unique combination of engineering and applied science coursework, with a focus on preparing graduates for practice in professional engineering.

Cal Poly's "learn by doing" philosophy is emphasized by the numerous design-centered laboratories and the senior project. In the senior design project, which is completed in a three-quarter set of capstone courses, students demonstrate their understanding of engineering knowledge and their ability to apply that knowledge creatively to practical problems.

Career opportunities exist in the design, evaluation and management of systems -- irrigation, drainage, hydrology, soil conservation; farm machinery; food processing; and agricultural environments. The program is accredited by the Engineering Accreditation Commission of the Accreditation Board for Engineering and Technology.

### **Minors**

The department participates in offering interdisciplinary minors in Water Science and Geographic Information Systems. Please see College of Agriculture section for more information.

### **Graduate Programs**

Cal Poly offers the MS in Agriculture with a specialization in Agricultural Engineering Technology and the MS in Engineering with a specialization in Water Engineering. Please see College of Agriculture and College of Engineering sections for more information.

**BS AGRICULTURAL SYSTEMS  
MANAGEMENT**

- 60 units upper division       GWR
- 2.0 GPA                               USCP

\* = Satisfies General Education requirement

**MAJOR COURSES**

BRAE 128 Careers in Bioresource/Agric. Engr .....	2
BRAE 129 Laboratory Skills and Safety .....	1
BRAE 133 Engineering Design Graphics .....	3
BRAE 141 Agricultural Machinery Safety .....	3
BRAE 142 Agric Power and Machinery Mgt .....	4
BRAE 151 CAD for Agricultural Engineering .....	1
BRAE 203 Agricultural Systems Analysis.....	3
BRAE 301 Hydraulic/Mechanical Power Systems ..	4
BRAE 321 Agricultural Safety .....	3
BRAE 324 Principles Agricultural Electrification...	4
BRAE 325 Agricultural Energy Systems .....	3
BRAE 340 Irrigation Water Management .....	4
BRAE 402 Agricultural Materials .....	3
BRAE 418 Management of Mechanical Projects I..	4
BRAE 419 Management of Mechanical Projects II.	4
BRAE 425 Computer Controls for Agriculture .....	3
BRAE 432 Agricultural Buildings .....	4
BRAE 460 Senior Project Organization .....	1
BRAE 461 Senior Project.....	2
BRAE 462 Senior Project.....	2
Adviser approved electives .....	15
Selected from: plant production, livestock production, food processing, environment information management, water/irrigation, agricultural waste management, process and manufacturing, or teaching agriculture	

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**SUPPORT COURSES**

AG 250/CSC 110/CSC 119 (F1)* .....	3
BIO 220 Physiology and Biological Adaptation <i>or</i> MCRO 221 General Bacteriology (B1b)*.....	4
CHEM 111 Survey of Chemistry (B1a)* .....	5
ENGL 218 Professional Writing: Argumentation and Reports (A4)*.....	4
MATH 118 Pre-Calculus Algebra (B2)* .....	4
MATH 119 Pre-Calculus Trigonometry (B2)*.....	3
PHYS 121 College Physics (Area B)* .....	4
SS 121 Introductory Soil Science .....	4
Agribusiness Minor .....	28
Animal or plant production course.....	3

**62**

**GENERAL EDUCATION (GE) ..... 45**

72 units required; 27 of these units are in Major/Support.  
→See page 79 for complete GE course listing.  
→Minimum of 3 GE courses required at the 300-400 level.

**Area A Communication** (minimum 10 units)

4 units are in Support;  
Take one course from A1, A2, A3:

- A1 Expository Writing
- A2 Critical Thinking
- A3 Speech
- A4 Argumentative Writing \*see Support

**Area B Science and Mathematics** (no additional units required)

20 units in Support;  
B1b Life Sciences \*see Support  
B1a Physical Sciences \*see Support  
B2 Mathematics and/or Statistics \*see Support  
Area B \*see Support

**Area C Arts and Humanities** (minimum 15 units)

Take one course from each Area C category:  
C1 Literature  
C1 Philosophy  
C2 Fine/Performing Arts  
C3 Lit/Phil/Arts (300-400 level)  
If less than 15 units, take one additional course from C1, C2, C3

**Area D Social, Political, Economic Inst.** (min. 15 units)

No more than one course in any Area D category.  
Take one course from D1a and one from D1b  
D1a HIST 202 (USCP) *or* HIST 204 *or* LS 211  
D1b POLS 110 *or* LS 212  
Take three courses from D2, D3, D4a, D4b  
D2 History (300-400 level)  
D3 Economics  
D4a Social Institutions  
D4b Social Institutions (300-400 level)

**Area E Life Understanding** (minimum 3 units)

No more than one course in any Area E category.  
Take one course from E1 *or* E2:  
E1 PSY 201/PSY 202  
E2 Self Development

**Area F Technology** (no additional units required)

3 units in Support.  
F1 Computer Literacy \*see Support

**Additional GE Courses** (minimum 2 units)

To complete 72-unit requirement, select additional courses from Areas C, D, E. No more than one additional course per area.

**ELECTIVES..... 6**

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**BS Agricultural Systems Management - by Year****Freshman**

BRAE 128 Careers in Bioresource/Agric. Engr. ....	2
BRAE 129 Laboratory Skills and Safety .....	1
BRAE 133 Engineering Design Graphics .....	3
BRAE 141 Agricultural Machinery Safety .....	3
BRAE 142 Agricultural Power/Machinery Mgt. ...	4
CHEM 111 Survey of Chemistry (B1a).....	5
PHYS 121 College Physics (B1a).....	4
AG 250/CSC 110/CSC 119 (F1) .....	3
ENGL 114 Writing: Exposition (A1).....	4
ENGL/PHIL/SPC 125 Critical Thinking (A2).....	3
MATH 118,119 Pre-Calc Algebra/Trig (B2).....	4,3
Electives.....	6
	<hr/>
	45

**Sophomore**

BRAE 151 CAD for Agricultural Engineers.....	1
BRAE 203 Agricultural Systems Analysis.....	3
BIO 220 <i>or</i> MCRO 221 (B1b).....	4
SS 121 Introductory Soil Science .....	4
ENGL 218 Prof Writing: Argument/Reports (A4)..	4
SPC 201 <i>or</i> SPC 202 Speech (A3).....	3
PSY 201/202 General Psychology (E1).....	3
Philosophy elective (C1).....	3
Fine and performing arts elective (C2) .....	3
Animal or plant production elective.....	3
Agribusiness electives.....	16
	<hr/>
	47

**Junior**

BRAE 301 Hydraulic/Mechanical Power Systems .	4
BRAE 324 Princ. of Agricultural Electrification ....	4
BRAE 325 Agricultural Energy Systems .....	3
BRAE 321 Agricultural Safety .....	3
BRAE 340 Irrigation Water Management .....	4
Adviser approved electives .....	11
Agribusiness electives.....	12
HIST 202 <i>or</i> HIST 204 <i>or</i> LS 211 (D1a) .....	3
POLS 110 <i>or</i> LS 212 (D1b).....	3
Literature elective (C1).....	3
	<hr/>
	50

**Senior**

BRAE 402 Agricultural Materials Science .....	3
BRAE 418, 419 Mgt Mechanical Projects I, II.....	4,4
BRAE 425 Computer Controls for Agriculture .....	3
BRAE 432 Agricultural Buildings .....	4
BRAE 460, 461, 462 Senior Project.....	1,2,2
Arts and humanities elective (Area C) .....	3
Literature, philosophy, arts (300-400) (C3) .....	3
Social/political/economics institutions (Area D) ...	3,3
Social/political/economics (300-400) (Area D).....	3
Adviser approved electives .....	4
Additional GE courses to complete 72-units.....	2
	<hr/>
	44

**186****BS BIORESOURCE AND AGRICULTURAL ENGINEERING**

☐ 60 units upper division ☐ GWR

☐ 2.0 GPA ☐ USCP

\* = Satisfies General Education requirement

**MAJOR COURSES**

BRAE 128 Careers in Bioresource & Ag Engr. ....	2
BRAE 129 Laboratory Skills and Safety .....	1
BRAE 133 Engineering Design Graphics.....	3
BRAE 151 CAD for Agricultural Engineering.....	1
BRAE 216 Fundamentals of Electricity .....	4
BRAE 226 Princ Bioresource Engineering .....	4
BRAE 232 Agricultural Structures Planning.....	4
BRAE 234 Intro Mechanical Systems-Agric.....	4
BRAE 236 Principles of Irrigation .....	4
BRAE 237 Engineering Surveying I.....	2
BRAE 312 Hydraulics .....	4
BRAE 328 Measurements/Computer Interfacing ....	4
BRAE 331 Irrigation Theory.....	3
BRAE 403 Agricultural Systems Engineering.....	4
BRAE 414 Irrigation Engineering .....	4
BRAE 415 Hydrology .....	3
BRAE 421, 422 Equipment Engineering.....	3,4
BRAE 433 Agricultural Structures Design.....	4
BRAE 460 Senior Project Organization.....	1
BRAE 461, 462 Senior Project.....	2,2
Adviser approved electives.....	9
	<hr/>
	76

**SUPPORT COURSES**

BIO 115 Animal/Human Structure & Function <i>or</i> MCRO 221 Survey of Microbiology (B1b)* .....	4
CE 201 Strength of Materials <i>or</i> CE 204, 205 Strength of Materials I, II (3) (2) .....	5
CE 206 Strength of Materials Laboratory.....	1
CHEM 124, 125 General Chemistry for the Engineering Disciplines (B1a)* .....	4,4
CSC 101/CSC 231/CSC 234 (F1)* .....	2
ECON 201/ECON 211 Economics (D3)* .....	3
ENGL 218 Prof Writing: Argumt/Reports (A4)* ....	4
MATH 141, 142 Calculus II (B2)* .....	4,4
MATH 143 Calculus III (Area B)* .....	4
MATH 241 Calculus IV (Area B)* .....	4
MATH 242 Differential Equations(Area B)* .....	4
ME 211 Engineering Statics .....	3
ME 212 Engineering Dynamics.....	3
ME 302 Thermodynamics .....	3
PHYS 131, 132, 133 General Physics (Area B)* ...	4,4,4
PHYS 206 Instrument/Experimental Physics .....	3
PHYS 256 Electrical Measurements Lab .....	1
SS 121 Introductory Soil Science .....	4
STAT 312 Statistical Methods-Engr. (Area B)*.....	4

**80**

**GENERAL EDUCATION (GE) ..... 40**

72 units required; 32 of these units are in Major/Support.  
 →See page 79 for complete GE course listing.  
 →Minimum of 3 GE courses required at the 300-400 level.

**Area A Communication** (minimum 10 units)

1 unit is in Support.

- A1 Expository Writing
- A2 Critical Thinking
- A3 Speech
- A4 Argumentative Writing \*see Support

**Area B Science and Mathematics** (no additional units required)

26 units in Support.

- B1b Life Sciences \*see Support
- B1a Physical Sciences \*see Support
- B2 Mathematics and/or Statistics \*see Support
- Area B \*see Support

**Area C Arts and Humanities** (minimum 15 units)

Take one course from each Area C category:

- C1 Literature
- C1 Philosophy
- C2 Fine/Performing Arts
- C3 Lit/Phil/Arts (300-400 level)

If less than 15 units, take one additional course from C1, C2, C3

**Area D Social, Political, Economic Inst.** (min. 12 units)

3 units are in Support.

Take one course from D1a and one from D1b

- D1a HIST 202 (USCP) or HIST 204 or LS 211
- D1b POLS 110 or LS 212

Take two courses from D2, D4a, D4b

- D2 History (300-400 level)
- D3 Economics \*see Support
- D4a Social Institutions
- D4b Social Institutions (300-400 level)

**Area E Life Understanding** (minimum 3 units)

No more than one course in any Area E category.

Take one course from E1 or E2

- E1 PSY 201/PSY 202
- E2 Self Development

**Area F Technology** (no additional units required)

2 units are in Support.

- F1 Computer Literacy \*see Support

**ELECTIVES ..... 0**  
**196**

**BS Bioresource and Agricultural Engineering**

**Freshman**

- BRAE 128 Careers in Bioresource/Agric. Engr. .... 2
- BRAE 129 Laboratory Skills and Safety ..... 1
- BRAE 133 Engineering Design Graphics ..... 3
- BRAE 151 CAD for Agricultural Engineering ..... 1
- BRAE 237 Engineering Surveying I ..... 2
- SS 121 Introductory Soil Science ..... 4
- CSC 101/CSC 231/CSC 234 (F1) ..... 2
- MATH 141, 142 Calculus I, II (B2) ..... 4,4
- MATH 143 Calculus III (Area B) ..... 4
- PHYS 131, 133 General Physics (Area B) ..... 4,4

- ENGL 114 Writing: Exposition (A1) ..... 4
  - ENGL 125/PHIL 125/SPC 125 Critical Think.(A2) 3
  - SPC 201 or SPC 202 Speech (A3) ..... 3
  - ENGL 218 Prof Writing: Argument/Reports (A4) ... 4
- 
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**Sophomore**

- BRAE 216 Fundamentals of Electricity ..... 4
  - BRAE 226 Intro Principles Bioresource Engr ..... 4
  - BRAE 232 Agricultural Structures Planning ..... 4
  - BRAE 234 IntroMechanical Systems in Agriculture 4
  - BRAE 236 Principles of Irrigation ..... 4
  - ME 211 Engineering Statics ..... 3
  - ME 212 Engineering Dynamics ..... 3
  - CHEM 124, 125 Gen Chemistry/Engineering (B1a) 4,4
  - MATH 241 Calculus IV (Area B) ..... 4
  - MATH 242 Differential Equations (Area B) ..... 4
  - PHYS 133 General Physics (Area B) ..... 4
  - BIO 115 or MCRO 221 (B1b)\* ..... 4
- 
- 50

**Junior**

- BRAE 312 Hydraulics ..... 4
  - BRAE 328 Measurements/Computer Interfacing .... 4
  - BRAE 331 Irrigation Theory ..... 3
  - BRAE 403 Agricultural Systems Engineering ..... 4
  - CE 201 Strength of Materials or  
 CE 204,205 Strength of Materials I, II (3,2) ..... 5
  - CE 206 Strength of Materials Lab ..... 1
  - ME 302 Thermodynamics ..... 3
  - PHYS 206 Instrumentation-Experimental Physics ... 3
  - PHYS 256 Electrical Measurements Lab ..... 1
  - ECON 201/211 Economics (D3)\* ..... 3
  - STAT 312 Statistical Methods for Engineers (B2)... 4
  - HIST 202 or HIST 204 or LS 211 (D1a) ..... 3
  - POLS 110 or LS 212 (D1b) ..... 3
  - PSY 201/202 General Psychology (Area E) ..... 3
  - Fine and performing arts elective (C2) ..... 3
  - Social, political, economics institutions (Area D) ... 3
- 
- 50

**Senior**

- BRAE 414 Irrigation Engineering ..... 4
  - BRAE 415 Hydrology ..... 3
  - BRAE 421 Equipment Engineering ..... 3
  - BRAE 422 Equipment Engineering ..... 4
  - BRAE 433 Agricultural Structures Design ..... 4
  - BRAE 460 Senior Project Organization ..... 1
  - BRAE 461, 462 Senior Project ..... 2,2
  - Philosophy elective (C1) ..... 3
  - Literature elective (C1) ..... 3
  - Literature, philosophy, arts elective (300-400) (C3) 3
  - Arts and humanities elective (Area C) ..... 3
  - Social/political/econ elective (300-400) (Area D).... 3
  - Adviser approved electives ..... 9
- 
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- 
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# Crop Science

**Department Office**  
**Agricultural Sciences Bldg. (11), Room 229**  
**(805) 756-1237**

## Department Head, H. Paul Fountain

Edgar H. Beyer	W. Keith Patterson
J. Wyatt Brown	John C. Phillips
Louis W. Harper	Robert P. Rice
David H. Headrick	Edwin C. Seim
Robert J. McNeil	Mark D. Shelton
Wesley J. Mueller	David L. Warfield
Gene P. Offermann	Jo Ann C. Wheatley

## ACADEMIC PROGRAMS

**Crop Science - BS, Minor**

**Fruit Science - BS, Minor**

**Plant Protection Science - BS, Minor**

Three major curricula leading to the Bachelor of Science degree are offered by the Crop Science Department and are designed to prepare students for many career opportunities. In consultation with faculty advisers, students majoring in Crop Science or Fruit Science select electives according to their career goals. These electives are designed to provide students with curriculum flexibility and choice. Students may select coursework in one of the following areas: crop production management, orchard and vineyard management, postharvest technology-marketing, crop/vegetable science, pomology, enology, crop ecology, and applied biotechnology.

The department has 70 acres of productive citrus, avocados, grapes, deciduous orchard, and berries. Additional nonbearing acreage for instructional use exists and new plantings are under way. About 400 acres are devoted to student production enterprises in field and vegetable crops. Students are encouraged to gain experience and earn income by participation in the enterprise project program or by working for the campus farm.

The technological phases of instruction are enhanced by equipment for fruit packing, grading, seed processing and pesticide application. Also available are the pesticide rinsate recycling system and specialized laboratory equipment for the study of various crops and postharvest technology. Field trips supplement instruction for crops not common to the San Luis Obispo area.

Cal Poly's Swanton-Pacific Ranch near Davenport, California offers internship experiences in managing not only crops but also livestock, rangeland and forests. Students are able to intern on this working ranch while concurrently taking university courses offered from the San Luis Obispo campus through distance-learning technology. The department supports extra- and co-curricular activities for its students, including two student clubs.

## BS Crop Science

Prepares graduates for careers in crop production, management, sales and service. Positions are available with commercial pest control firms, government regulatory agencies, and agriculturally related organizations. Graduates also pursue careers as agronomists and horticulturists with government or industry. Instruction includes agronomic crops, vegetable crops, and tropical crops.

## BS Fruit Science

Prepares graduates for management positions with orchards/vineyards, canneries, pest control firms, government regulatory agencies, fruit tree nurseries, research stations, and produce-marketing companies. Instruction includes deciduous fruits, nut crops, citrus, avocados, grapes, berries, tropical and subtropical fruits, and minor fruit species.

## BS Plant Protection Science

A multi-faceted discipline requiring knowledge of pest and beneficial organism biology as well as an understanding of crop production principles, ecology, biotechnology, pesticide toxicology, and environmental science. Plant protection specialists work with crop producers, the ornamental and turf industry, forestry, and livestock producers to reduce pest problems. As environmental regulations increase, employment opportunities grow for people holding professional licenses. The major prepares students to pass all categories of the California Pest Control Advisors License exam.

## Interdisciplinary Minors

The department participates in offering interdisciplinary minors in Geographic Information Systems for Agriculture, and Wine and Viticulture. Please see College of Agriculture section for more information.

**BS CROP SCIENCE**

- 60 units upper division       GWR
- 2.0 GPA                               USCP

\* = Satisfies General Education requirement

**MAJOR COURSES**

CRSC 101 Orientation to Crop Science.....	1
CRSC 131 Introduction to Crop Science .....	4
CRSC 132 Cereal Grain Production .....	4
CRSC 133 Row Crop Production .....	4
CRSC 202/VGSC 202 Enterprise Project.....	3
CRSC 221 Weed Science .....	4
CRSC 304 Plant Improvement.....	4
CRSC 311 Insect Pest Management .....	4
CRSC 411 Experimental Techniques and Analysis .	4
CRSC 445 Cropping Systems .....	4
CRSC 461, 462 Senior Project .....	3,3
CRSC 463 Undergraduate Seminar .....	2
VGSC 232 California Vegetable Production .....	4
CRSC/FRSC/VGSC 300-400 level electives.....	12
	<b>60</b>

**SUPPORT COURSES**

BIO 302/BIO 303 Genetics (Area B)*.....	3
BOT 121 General Botany (B1b)* .....	4
CHEM 111 Survey of Chemistry (B1a)* .....	5
FRSC 230 California Fruit Growing.....	4
MATH 118 Pre-Calculus Algebra (B2)* .....	4
(MATH 116 &117 will substitute)	
STAT 218 Applied Statistics/Life Sciences (B2)* ..	4
SS 121 Introductory Soil Science .....	4
Adviser-approved electives.....	34
<i>Minimum 8 units of BIO/BOT/CHEM. 12-15 units must be 300-400 level. Areas may include applied biotechnology, crop ecology, production mgt., post-harvest tech/marketing, crop/veg. science. May not include Enterprise Project/Mgt.</i>	<b>62</b>

**GENERAL EDUCATION (GE) ..... 52**

72 units required; 20 of these units are in Major/Support.  
 →See page 79 for complete GE course listing.  
 →Minimum of 3 GE courses required at the 300-400 level.

**Area A Communication** (minimum 11 units)

Take one course from A1, A2, A3:

- A1 Expository Writing
- A2 Critical Thinking
- A3 Speech

If less than 11 units, take one additional course in:

- A4 Argumentative Writing

**Area B Science and Mathematics** (no additional units required) 20 units in Support.

- B1b Life Sciences \*see Support
- B1a Physical Sciences \*see Support
- B2 Mathematics and/or Statistics \*see Support
- Area B \*see Support

**Area C Arts and Humanities** (minimum 15 units)

Take one course from each Area C category:

- C1 Literature
- C1 Philosophy
- C2 Fine/Performing Arts
- C3 Lit/Phil/Arts (300-400 level)

If less than 15 units, take one additional course from C1, C2, C3

**Area D Social, Political, Economic Inst.** (minimum 15 units)

No more than one course in any Area D category.

Take one course from D1a and one from D1b

D1a HIST 202 (USCP) or HIST 204 or LS 211

D1b POLS 110 or LS 212

Take three courses from D2, D3, D4a, D4b

D2 History (300-400 level)

D3 Economics

D4a Social Institutions

D4b Social Institutions (300-400 level)

**Area E Life Understanding** (minimum 3 units)

No more than one course in any Area E category.

Take one course from E1 or E2

E1 PSY 201/PSY 202

E2 Self Development

**Area F Technology** (minimum 2 units)

F1 Computer Literacy

**Additional GE Courses**

To complete 72-unit requirement, select additional courses from Areas A, C, D, E. No more than one additional course per area.

<b>ELECTIVES</b> .....	<b>12</b>
	<b>186</b>

**BS FRUIT SCIENCE**

- 60 units upper division       GWR
- 2.0 GPA                               USCP

\* = Satisfies General Education requirement

**MAJOR COURSES**

CRSC 101 Orientation to Crop Science .....	1
CRSC 221 Weed Science .....	4
CRSC 311 Insect Pest Management .....	4
CRSC 411 Experimental Techniques/Analysis .....	4
FRSC 422 Tropical/Subtropical Crop & Fruit Prod.	4
CRSC 461, 462 Senior Project .....	3,3
CRSC 463 Undergraduate Seminar .....	2
FRSC 131, 132, 133 Pomology .....	4,4,4
FRSC 202/402 Enterprise Project Management.....	6
FRSC 231 Viticulture .....	4
FRSC 331 Advanced Viticulture .....	4
FRSC 332 Fruit Plant Propagation .....	4
FRSC 342 Citrus and Avocado Fruit Production ....	4
FRSC 421 Postharvest Tech. Horticultural Crops ....	4
FRSC/CRSC/VGSC 300-400 level elective .....	4
	<b>67</b>

**SUPPORT COURSES**

BIO 302 or BIO 303 Genetics (Area B)* .....	3
BOT 121 General Botany (B1b)* .....	4
CHEM 111 Survey of Chemistry (B1a)*.....	5
CRSC 230 or VGSC 230 .....	4
MATH 118 Pre-Calculus Algebra (B2)* .....	4
(MATH 116 &117 will substitute)	
STAT 218 Applied Statistics/Life Sciences (B2)* ...	4
SS 121 Introductory Soil Science.....	4

Adviser-approved electives..... 29  
*8 units of BIO/BOT/CHEM. 8 units 300-400 level. Areas may include applied biotechnology, crop ecology, entology, orchard/vineyard mgt., pomology, postharvest tech/mktg.*  
**57**  
*May not include Enterprise Project/MGT.*

**GENERAL EDUCATION (GE)** ..... 52  
*72 units required; 20 of these units are in Major/Support.*  
 →See page 79 for complete GE course listing.  
 →Minimum of 3 GE courses required at the 300-400 level.

**Area A Communication** (minimum 11 units)  
*Take one course from A1, A2, A3:*

- A1 Expository Writing
- A2 Critical Thinking
- A3 Speech

*If less than 11 units, take one additional course in:*

- A4 Argumentative Writing

**Area B Science and Mathematics** (no additional units required)  
*20 units are in Support.*

- B1b Life Sciences \*see Support
- B1a Physical Sciences \*see Support
- B2 Mathematics and/or Statistics \*see Support
- Area B \*see Support

**Area C Arts and Humanities** (minimum 15 units)  
*Take one course from each Area C category:*

- C1 Literature
- C1 Philosophy
- C2 Fine/Performing Arts
- C3 Lit/Phil/Arts (300-400 level)

*If less than 15 units, take one additional course from C1, C2, C3*

**Area D Social, Political, Economic Inst.** (minimum 15 units)  
*No more than one course in any Area D category.*

*Take one course from D1a and one from D1b*

- D1a HIST 202 (USCP) or HIST 204 or LS 211
- D1b POLS 110 or LS 212

*Take three courses from D2, D3, D4a, D4b*

- D2 History (300-400 level)
- D3 Economics
- D4a Social Institutions
- D4b Social Institutions (300-400 level)

**Area E Life Understanding** (minimum 3 units)  
*No more than one course in any Area E category.*

*Take one course from E1 or E2*

- E1 PSY 201/PSY 202
- E2 Self Development

**Area F Technology** (minimum 2 units)

- F1 Computer Literacy (AG 250 Recommended)

**Additional GE Courses**

*To complete 72-unit requirement, select additional courses from Areas A, C, D, E. No more than one additional course per area.*

**ELECTIVES** ..... 10  
**186**

**BS PLANT PROTECTION SCIENCE**

- 60 units upper division       GWR
- 2.0 GPA                               USCP

\* = Satisfies General Education requirement

**MAJOR COURSES**

CRSC 101 Orientation to Crop Science .....	1
CRSC/FRSC/VGSC 202 Enterprise Project.....	3
CRSC 221 Weed Science .....	4
CRSC 304 Plant Improvement .....	4
CRSC 311 Insect Pest Management .....	4
CRSC 410 Crop Physiology .....	4
CRSC 411 Experimental Techniques/Analysis .....	4
CRSC 461 Senior Project .....	3
CRSC 462 Senior Project .....	3
CRSC 463 Undergraduate Seminar .....	2
Select one of the following Production sequences....	16
CRSC 131, 132, 133; FRSC 230	
FRSC 131, 132, 133; CRSC/VGSC 230	
FRSC 131, 231, 342; CRSC/VGSC 230	
Select from: CRSC 327, 405, 431, 441 .....	12
<b>60</b>	

**SUPPORT COURSES**

BIO 115 Animal/Human Structure/Function.....	4
BIO 302 or BIO 303 Genetics (Area B)*.....	3
BIO 325 General Ecology (Area B)* .....	4
BOT 121 General Botany (Area B)* .....	4
BOT 323 Plant Pathology.....	4
CHEM 111 Survey of Chemistry (B1a)* .....	5
CHEM 212 Survey Organic Chemistry (Area B)* ...	5
CHEM 313 Survey of Biochemistry (Area B)* .....	5
MATH 118 Pre-Calculus Algebra (B2)* .....	4
(MATH 116 & 117 will substitute)	
SS 121 Introductory Soil Science .....	4
STAT 218 Applied Statistics/Life Sciences (B2)* ...	4
ZOO 335 General Entomology.....	4
Adviser approved electives.....	9
<b>59</b>	

**GENERAL EDUCATION (GE)** ..... 52

*72 units required; 20 of these units are in Major/Support.*  
 →See page 79 for complete GE course listing.  
 →Minimum of 3 GE courses required at the 300-400 level.

**Area A Communication** (minimum 11 units)

*Take one course from A1, A2, A3:*

- A1 Expository Writing
- A2 Critical Thinking
- A3 Speech

*If less than 11 units, take one additional course in:*

- A4 Argumentative Writing

**Area B Science and Mathematics** (no additional units required)

*20 units are in Support.*

- B1b Life Sciences \*see Support
- B1a Physical Sciences \*see Support
- B2 Mathematics and/or Statistics \*see Support

**Area C Arts and Humanities** (minimum 15 units)

Take one course from each Area C category:

- C1 Literature
- C1 Philosophy
- C2 Fine/Performing Arts
- C3 Lit/Phil/Arts (300-400 level)

If less than 15 units, take one additional course from C1, C2, C3

**Area D Social, Political, Economic Inst.** (minimum 15 units)

No more than one course in any Area D category.

Take one course from D1a and one from D1b

- D1a HIST 202 (USCP) or HIST 204 or LS 211
- D1b POLS 110 or LS 212

Take three courses from D2, D3, D4a, D4b

- D2 History (300-400 level)
- D3 Economics
- D4a Social Institutions
- D4b Social Institutions (300-400 level)

**Area E Life Understanding** (minimum 3 units)

No more than one course in any Area E category.

Take one course from E1 or E2

- E1 PSY 201/PSY 202
- E2 Self Development

**Area F Technology** (minimum 2 units)

- F1 Computer Literacy

**Additional GE Courses**

To complete 72-unit requirement, select additional courses from Areas A, C, D, E. No more than one additional course per area.

<b>ELECTIVES</b> .....	<b>15</b>
	<b>186</b>

**CROP SCIENCE MINOR**

Designed for students majoring in related academic disciplines who desire careers in crop production or the associated industry. The minor offers a broad-based knowledge of the science and technology of agronomy and vegetable production, especially as practiced in California.

**Required courses**

CRSC 131 Introduction to Crop Science .....	4
CRSC 132 Cereal Grain Production or	
CRSC 133 Row Crop Production .....	4
CRSC 201 Agric. Chemical/Equipment Safety .....	1
CRSC 202 or VGSC 202 Enterprise Project .....	1
CRSC 221 Weed Science or	
VGSC 232 California Vegetable Production .....	4

**Restricted elective courses** ..... 16

Select any **four** courses from the following:  
BRAE 340; CRSC 304, 311, 331, 421, 445; VGSC 421

30

**FRUIT SCIENCE MINOR**

The minor is designed for students majoring in related academic disciplines who desire to seek careers in fruit production or the associated industry. The minor offers a broad-based knowledge of the science and technology of pomology, viticulture, and citrus and avocado production.

**Required courses**

FRSC 131, 132 Pomology .....	4,4
FRSC 133 Pomology or FRSC 231 Viticulture .....	4
FRSC 342 Citrus and Avocado Fruit Production ....	4
CRSC 201 Agric. Chemical/Equipment Safety .....	1
FRSC 202 Enterprise Project .....	2
FRSC 402 Enterprise Project Management .....	3

**Restricted elective courses**..... 8

Select any **two** courses from the following:

- BRAE 340; BOT 323; CRSC 311, 445;
- FRSC 331, 332, 421, 422, 436

30

**PLANT PROTECTION MINOR**

This program emphasizes both plant protection and plant production. Within the plant protection field of study, the student will be exposed to a broad range of pest management subjects including entomology, plant pathology, and weed control. Within the production area the student may emphasize fruit production, crop production, ornamental horticulture, or natural resource management.

**Required courses**

Advanced versions of the following courses may be substituted by production majors.

BOT 323 Plant Pathology or	
BOT 324 Ornamental and Forest Pathology .....	4
CRSC 221 Weed Science .....	4
CRSC 311 Insect Pest Management .....	4

**Courses in area of emphasis**..... 16

Students elect Emphasis I or Emphasis II based on their major.

**I. Emphasis for Plant Production Majors** (16 units)

Plant production majors: Crop Science, Fruit Science, Forestry and Natural Resources (Forestry Concentration) and Environmental Horticultural Science.

Select 16 units from: BIO 435; BOT 325, 431; CRSC 327, 405, 410, 431, 441; FNR 303; ZOO 335

**II. Emphasis for Non-Plant Production Majors** (16 units)

Select one of the groups below (12 units):

- CRSC 131, 132, 421
- FRSC 131, 231, 342
- CRSC 131, VGSC 232, VGSC 423
- EHS 121, EHS 124/330, EHS 324/424
- FNR 201, 204, 208, 260

Select one course from Emphasis I (4 units)

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# Dairy Science

Department Office  
Dairy Science Bldg. (18-2), Room 100  
(805) 756-2560

## Department Head, Leslie S. Ferreira

Leanne M. Berning  
Nana Y. Farkye  
William T. Gillis  
Stanley L. Henderson  
Rafael Jimenez-Flores  
Edwin H. Jaster  
Gary D. Reif  
Phillip S. Tong

## ACADEMIC PROGRAMS

### BS Dairy Science

The Bachelor of Science degree in Dairy Science is designed to prepare students for employment in the various phases of the dairy industry, as well as related fields. All students within the major take a common core of courses and, with adviser approval, select additional courses in an area of interest, which may include: dairy farm or plant management, processing technology, agriculture communication, management, preparation for graduate school, and agriculture teaching.

Excellent facilities are provided for students. The dairy herd includes purebred Jerseys and Holsteins, located on a well-planned unit, where feeding, milking, calf raising, artificial insemination, and management are carried out. The campus creamery is well-equipped with modern processing equipment. Students are employed on a part-time basis to work in both the production and processing areas.

The Dairy Products Technology Center (DPTC) focuses on multidisciplinary dairy foods research and training activities designed to support the dairy industry and consumers of dairy products. Current research areas are: cheese chemistry and technology, bioseparation processes, and new product and process development. The Center has state-of-the-art research and development facilities. Students may conduct dairy foods related research projects under the guidance of DPTC faculty. Opportunities also exist to work on joint projects with the University of California-Davis.

### Graduate Program

Cal Poly offers a Master of Science degree in Agriculture with a specialization in Dairy Products Technology. Please refer to the M.S. Agriculture section of the College of Agriculture.

## BS DAIRY SCIENCE

60 units upper division  GWR

2.0 GPA  USCP

\* = Satisfies General Education requirement

### MAJOR COURSES

DSCI 100 Enterprise Project <i>or</i>	
DSCI 339 Internship in Dairy Science.....	2
DSCI 101 Dairy Feeds and Feeding .....	4
DSCI 121 Elements of Dairying .....	4
DSCI 134 Intro. to Dairy Products Technology .....	4
DSCI 202 Dairy Promotion and Marketing .....	4
DSCI 223 Frozen Dairy Foods <i>or</i>	
DSCI 241 Dairy Cattle Selection, Breeds, Fitting and Showing .....	4
DSCI 233 Milk Processing and Inspection.....	4
DSCI 234 Dairy Foods Evaluation .....	2
DSCI 301 Dairy Cattle Nutrition <i>or</i>	
DSCI 401 Physical and Chemical Properties of Dairy Products .....	4
DSCI 321 Lactation Physiology <i>or</i>	
DSCI 444 Dairy Microbiology .....	4
DSCI 330 Artificial Insemination and Embryo Biotechnology <i>or</i> DSCI 434 Cheese and Fermented Dairy Foods.....	4
DSCI 333 Dairy Cattle Management, Safety and Animal Well-Being <i>or</i> DSCI 402 Quality Assurance and Control of Dairy Products.....	4
DSCI 422 Breeding and Genetics of Dairy Cattle <i>or</i> DSCI 435 Concentration/Fractionation and Butter Technology .....	4
DSCI 432 Advanced Dairy Herd Management <i>or</i>	
DSCI 433 Dairy Plant Mgt. & Equipment.....	4
DSCI 461 Senior Project .....	2
DSCI 462 Senior Project .....	2
DSCI 463 Undergraduate Seminar .....	2

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### SUPPORT COURSES

\* = Courses satisfy General Education requirement

MCRO 221 General Bacteriology (B1b)* .....	4
CHEM 111 Survey of Chemistry (B1a)*.....	5
CHEM 212 Survey of Organic Chemistry <i>or</i> BIO 151 Introduction to Biology (Area B)*.....	5
MATH 118 Pre-Calculus Algebra (B2)* .....	4

Adviser approved electives ..... 41  
 At least 24 units must be 300-400 level. May be selected from one of the following areas: dairy management, dairy industry, agriculture communications, pre-grad, pre-vet, agriculture education, dairy products technology, dairy processing pre-graduate. —

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**GENERAL EDUCATION (GE) ..... 54**

*72 units required; 18 of these units are in Major/Support.*  
 →See page 79 for complete GE course listing.  
 →Minimum of 3 GE courses required at the 300-400 level.

**Area A Communication** (minimum 11 units)

*Take one course from A1, A2, A3:*

- A1 Expository Writing
- A2 Critical Thinking
- A3 Speech

*If less than 11 units, take one additional course in:*

- A4 Argumentative Writing

**Area B Science and Mathematics** (minimum 2 units)

*18 units are in Support.*

- B1a Physical Sciences \*see Support
- B1b Life Sciences elective \*see Support

*Take one additional course from B2:*

- B2 Mathematics and/or Statistics
- Area B \* see Support

**Area C Arts and Humanities** (minimum 15 units)

*Take one course from each Area C category:*

- C1 Literature
- C1 Philosophy
- C2 Fine/Performing Arts
- C3 Lit/Phil/Arts (300-400 level)

*If less than 15 units, take one additional course from C1, C2, C3*

**Area D Social, Political, Economic Inst.** (minimum 15 units)

*No more than one course in any Area D category.*

*Take one course from D1a and one from D1b*

- D1a HIST 202 (USCP) or HIST 204 or LS 211
- D1b POLS 110 or LS 212

*Take three courses from D2, D3, D4a, D4b*

- D2 History (300-400 level)
- D3 Economics
- D4a Social Institutions
- D4b Social Institutions (300-400 level)

**Area E Life Understanding** (minimum 3 units)

*No more than one course in any Area E category.*

*Take one course from E1 or E2*

- E1 PSY 201/PSY 202
- E2 Self Development

**Area F Technology** (minimum 2 units)

- F1 Computer Literacy

**Additional GE Courses**

*To complete 72-unit requirement, select additional courses from Areas A, C, D, E. No more than one additional course per area.*

**ELECTIVES ..... 15**

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# *Environmental Horticultural Science*

**Department Office**  
**Agricultural Sciences Bldg. (11), Room 244**  
**(805) 756-2279 FAX (805) 756-2869**

## **Department Head, Virginia R. Walter**

Stephen F. Angley  
 Thomas E. Eltzroth  
 David W. Hannings  
 Daniel E. Lassanske

Robert P. Rice, Jr.  
 David J. Wehner  
 Michael D. Zohns

## **ACADEMIC PROGRAMS**

### **BS Environmental Horticultural Science**

The Bachelor of Science degree in Environmental Horticultural Science offers the student a comprehensive preparation for attractive positions in the nursery, greenhouse, landscape, and floriculture industries. This includes both the production and sales-service areas of these major fields. The curriculum stresses production and marketing of nursery plants, fresh flowers, flowering plants, and foliage plants; landscape contracting, design, installation and management; turf management; and marketing.

Graduates of the Environmental Horticultural Science Department are in demand for management and sales positions within the dynamic nursery and floriculture industries, as well as the large and diverse areas within the landscape industries.

Cal Poly graduates are employed nationally and internationally as business owners, growers, managers, researchers, educators, salespersons, landscape contractors, designers, landscape management professionals, extension agents, agricultural commissioners, consultants, and park and golf course superintendents.

The facilities of the department include a student-operated commercial greenhouse range and nursery in which students carry on a project program involving wholesale and retail sales and a student-operated plant shop. Also included are 35,000 square feet of greenhouses; 7,500 square feet of shadehouses; a 10,000-square foot US Golf Association specification experimental green; and an extensive field container growing area. The department also has several modern, well-equipped laboratories including: Tissue Culture, Landscape Industries with CAD, and Plant Materials. In addition to 200 acres of landscaped campus, an arboretum is also utilized as an outdoor laboratory. The campus is planted with many interesting and unusual trees

and shrubs from all over the world, as well as native plant materials.

Also available are the latest models of equipment necessary in nurseries, greenhouses, parks and grounds, landscaping, and florist shops. An extensive list of periodicals covering the field of environmental horticulture is available to students. Through the staff, affiliation in several national and state horticultural organizations is maintained.

The curriculum is well grounded in the sciences and, through the flexibility of 30 units of adviser-approved electives, students can tailor coursework to meet their individual needs. Areas of interest include: landscape management, landscape technologies and implementation, floriculture production and management, nursery production and management, retail horticulture, turf production and management, horticultural communications, horticultural biotechnology, post-harvest physiology and technology, and teaching agriculture. Students may also choose to complete a minor in Agribusiness, Agricultural Communication, Crop Science, Fruit Science, Plant Protection or Water Science.

### **Recommended Sequence: Major and Support Courses**

*The following is a guide for scheduling Major and Support Courses. By following this sequence, students should meet prerequisites for Major coursework. Courses are not always offered during the quarter indicated. Please consult with your academic adviser and the current Class Schedule.*

<b>1st Year</b>		
<i>Fall</i>	<i>Winter</i>	<i>Spring</i>
EHS 110	EHS 122	EHS 124
EHS 121	EHS 123	EHS 126
BOT 121		EHS 231
CHEM 111	CHEM 212	SS 121
<b>2nd Year</b>		
<i>Fall</i>	<i>Winter</i>	<i>Spring</i>
EHS 221	EHS 327	
EHS 232		
SS 221		
<b>3rd Year</b>		
<i>Fall</i>	<i>Winter</i>	<i>Spring</i>
CRSC 311		BOT 324
<b>4th Year</b>		
<i>Fall</i>	<i>Winter</i>	<i>Spring</i>
EHS 461	EHS 463	EHS 462
EHS 427		

## BS ENVIRONMENTAL HORTICULTURAL SCIENCE

- ☐ 60 units upper division      ☐ GWR  
☐ 2.0 GPA                              ☐ USCP

\* = Satisfies General Education requirement

### MAJOR COURSES

EHS 110 Orientation Environmental Horticult. Sci.	1
EHS 121 Fundamentals Environmental Hort. I .....	4
EHS 122 Fundamentals Environmental Hort. II .....	4
EHS 123 Landscape Installation and Maintenance .	4
EHS 124 Plant Propagation .....	4
EHS 126 Environmental Horticulture Construction	2
EHS 200/210/339/401 .....	1/2
EHS 221 Water Issues and Delivery Systems .....	3
EHS 327 Abiotic Plant Problems .....	3
EHS 231, EHS 232 Plant Materials .....	4,4
EHS 427 Diseases & Pest Control Sys. Orn. Plants.	4
EHS 461 Senior Project .....	2
EHS 462 Senior Project .....	2
EHS 463 Senior Seminar .....	1
Adviser approved electives. 300-400 level .....	30
	<b>73/74</b>

### SUPPORT COURSES

BIO 302/BOT 223/PHYS 104/PSC 101 (Area B)*.	3/4
BIO 435 Plant Physiology .....	4
BOT 121 General Botany (B1b)* .....	4
BOT 324 Ornamental and Forest Pathology .....	4
BUS 201/207 Business Law Survey .....	3/4
BUS 212 Financial Accounting for Nonbusiness Majors .....	4
CHEM 111 Survey of Chemistry (B1a)* .....	5
CHEM 212 Survey Organic Chemistry (Area B)*...	5
CRSC 311 Insect Pest Management .....	4
CSC 110 Computers & Computer Applications <i>or</i> AG 250 Computer Appl. to Agriculture (F1)* ....	3
MATH 118 Pre-Calculus Algebra (B2)* .....	4
(MATH 116 & MATH 117 will substitute)	
SPAN 111 Elementary Hispanic Language and Culture (USCP) .....	4
SS 121 Introductory Soil Science .....	4
SS 221 Fertilizers .....	4
STAT 130 Intro. to Statistical Reasoning <i>or</i> STAT 218 Applied Statistics/Life Sciences (B2)*	3/4
	<b>58/61</b>

### GENERAL EDUCATION (GE) ..... 49

72 units required; 23 of these units are in Major/Support.

→See page 79 for complete GE course listing.

→Minimum of 3 GE courses required at the 300-400 level.

#### Area A Communication (minimum 11 units)

Take one course from A1, A2, A3:

- A1 Expository Writing
- A2 Critical Thinking
- A3 Speech

If less than 11 units, take one additional course in:

- A4 Argumentative Writing

#### Area B Science and Mathematics (no additional units required)

20 units are in Support.

- B1b Life Sciences \*see Support
- B1a Physical Sciences \*see Support
- B2 Mathematics and/or Statistics \*see Support
- Area B \*see Support

#### Area C Arts and Humanities (minimum 15 units)

Take one course from each Area C category:

- C1 Literature
- C1 Philosophy
- C2 Fine/Performing Arts
- C3 Lit/Phil/Arts (300-400 level)

If less than 15 units, take one additional course from C1, C2, C3

#### Area D Social, Political, Economic Inst. (minimum 15 units)

No more than one course in any Area D category.

Take one course from D1a and one from D1b

- D1a HIST 202 (USCP) *or* HIST 204 *or* LS 211
- D1b POLS 110 *or* LS 212

Take three courses from D2, D3, D4a, D4b

- D2 History (300-400 level)
- D3 Economics
- D4a Social Institutions
- D4b Social Institutions (300-400 level)

#### Area E Life Understanding (minimum 3 units)

No more than one course in any Area E category.

Take one course from E1 *or* E2

- E1 PSY 201/PSY 202
- E2 Self Development

#### Area F Technology (no additional units required)

3 units are in Support.

- F1 Computer Literacy \*see Support

#### Additional GE Courses

To complete 72-unit requirement, select additional courses from Areas A, C, D, E. No more than one additional course per area.

### ELECTIVES..... 7-11

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# Food Science and Nutrition

**Department Office**  
**Agricultural Sciences Bldg. (11), Room 261**  
**(805) 756-2660**

## Department Chair (Position Vacant)

Louise A. Berner	Krishnakumar (Kris) S. Morey
Madoka Dawson	O. Robert Noyes
Brian C. Hampson	Mary E. Pedersen
Cynthia J. Heiss	Robert D. Vance
Hany M. Khalil	Paul R. Weckler
Kathleen A. McBurney	Rudy A. Wooten
Joseph Montecalvo, Jr.	

## ACADEMIC PROGRAMS

### Food Science - BS, Minor Nutrition - BS, Minor

The department offers two degree programs designed to prepare graduates for employment in the general areas of human nutrition and commercial food processing. Graduates in Nutrition find rewarding health service careers in hospitals, business, industrial plants, government institutions and education. Food Science graduates take responsible positions in commercial food processing and manufacturing, sales, services and government regulation. Opportunities for private consulting and business are available to graduates in both majors, depending on personal interests and initiative. The department also offers minors in Food Science and Nutrition.

The department is equipped with a food processing operations pilot plant and meat processing facilities. The laboratories are designed for teaching courses in nutrition, food service management, sensory evaluation, functional components of foods, and quality control as well as other food processing systems. Classroom and laboratory instruction is personalized as much as possible, and faculty adhere to the university's learn-by-doing philosophy.

Through the student enterprise program, students can manufacture and market various food products. Enterprise projects are designed to simulate industry and business practices. Students are further encouraged to gain industry experience by working during the summer months or by participating in one of the university co-op or internship programs.

There are two departmental clubs—Nutrition Club and Food Science Club. Club activities involve a wide range of social, professional and service projects. Clubs provide opportunity for leadership training and participation in professional societies and organizations.

## Graduate Program

Cal Poly offers an MS in Agriculture with a specialization in Food Science and Nutrition. Please refer to the MS Agriculture section of the College of Agriculture.

## Interdisciplinary Minors

The department participates in offering interdisciplinary minors in Packaging, and Wine and Viticulture. Please see College of Agriculture section for more information.

## BS Food Science

The program is designed to prepare students for employment in the commercial food processing industry. Principal areas of instruction are in fruit and vegetable processing, cereal and snack food manufacture and meat processing. Instruction qualifies graduates for careers in line production, quality control, food technology, marketing and management. The curriculum is approved by and is in compliance with minimum standards established by the Institute of Food Technologists, an international scientific society. IFT scholarship eligibility may require completion of selected courses in food engineering, technical calculus, and chemistry.

## BS Nutrition

The program offers a broad preparation in the science of nutrition. Coursework includes foods and nutrition, general chemistry, organic chemistry, biochemistry, microbiology, general biology, and sociology. Students select an area of concentration based upon their interests and career goals.

## Concentrations

**Applied Nutrition.** Prepares students for careers in various areas of nutrition, including dietetics, food systems management, nutrition communications, and community nutrition. The concentration is approved as a Didactic Program in Dietetics (DPD) by the American Dietetic Association, Commission on Accreditation/Approval for Dietetics Education. This approval indicates that program requirements satisfy criteria for admission to an accredited dietetic internship requisite to qualification as a registered dietitian. Graduates also are prepared to pursue advanced degrees in foods and nutrition, public health, and food systems management.

**Nutrition and Food Industries.** Designed for students who want to apply knowledge of nutrition to careers in the food industry and related organizations (such as commodity and other non-profit organizations, pharmaceutical companies, or government). Students will be prepared for positions in food product research and development, quality and regulatory operations, food and health communications, public relations, extension, and technical sales. In addition, students will be prepared for graduate study in food science, nutrition, or related fields.

**Nutrition Science.** Emphasizes a strong background in basic sciences and human nutrition for students planning further study in graduate school or a health-related profession such as medicine, dentistry, nursing, or physical therapy. Students need to check with their advisers for specific requirements for various health-related professions.

### BS FOOD SCIENCE

- ☐ 60 units upper division      ☐ GWR  
☐ 2.0 GPA                              ☐ USCP

\* = Satisfies General Education requirement

#### MAJOR COURSES

FSN 125 Introduction to Food Science.....	5
FSN 154 Basic Calculations in Food Processing.....	4
FSN 204 Food Processing Operations .....	4
FSN 209 Animal Food Products <i>or</i> FSN 211 Meats	3
FSN 210 Nutrition (E2)* .....	4
FSN 244 Cereal and Bakery Science .....	4
FSN 274 Food Plant Sanitation and Safety.....	4
FSN 325 Food Quality Control.....	5
FSN 334 Food Packaging .....	3
FSN 364 Food Chemistry .....	4
FSN 374 Food Laws and Regulations.....	4
FSN 384 Processed Meat and Poultry Products.....	4
FSN 434 Food Analysis.....	4
FSN 444 Engineering Concepts in Food Processing <i>or</i> FSN 494 Food Engineering .....	4
FSN 455 Product Develop/Sensory Evaluation .....	5
FSN 461 Senior Project .....	3
FSN 462 Senior Project .....	3
FSN 463 Undergraduate Seminar .....	1
FSN 474 Advanced Food Processing .....	4
	<b>72</b>

#### SUPPORT COURSES

AG 250 Computer Applic. Agriculture (F1)* .....	3
CHEM 111 Survey of Chemistry <i>or</i> CHEM 127, 128 General Chemistry (B1a)* .....	5/8
CHEM 212 Survey Organic Chemistry (Area B)*...	5
CHEM 313 Survey of Biochemistry and Biotechnology (Area B)* .....	5
<sup>1</sup> MATH 118 Pre-Calculus Algebra <i>or</i> MATH 131, 132 Technical Calculus (B2)* .....	4/8
MCRO 221 Survey of Microbiology (B1b)* .....	4
MCRO 421 Food Microbiology .....	4

PHYS 104 Introductory Physics (Area B)* .....	4
STAT 218 Applied Statistics/Life Sciences (B2)* ...	4
DSCI 231 General Dairy Manufacturing .....	4
Animal science adviser approved elective.....	3
Business adviser approved elective .....	3
Plant science adviser approved elective .....	4
	<b>52</b>

### GENERAL EDUCATION (GE) .....

72 units required; 26 of these units are in Major/Support.

→See page 79 for complete GE course listing.

→Minimum of 3 GE courses required at the 300-400 level.

#### Area A Communication (minimum 11 units)

Take one course from A1, A2, A3:

- A1 Expository Writing  
A2 Critical Thinking  
A3 Speech

If less than 11 units, take one additional course in:

- A4 Argumentative Writing

#### Area B Science and Mathematics (no additional units required)

20 units are in Support.

- B1b Life Sciences \*see Support  
B1a Physical Sciences \*see Support  
B2 Mathematics and/or Statistics \*see Support  
Area B \*see Support

#### Area C Arts and Humanities (minimum 15 units)

Take one course from each Area C category:

- C1 Literature  
C1 Philosophy  
C2 Fine/Performing Arts  
C3 Lit/Phil/Arts (300-400 level)

If less than 15 units, take one additional course from C1, C2, C3

#### Area D Social, Political, Economic Inst. (minimum 15 units)

No more than one course in any Area D category.

Take one course from D1a and one from D1b

- D1a HIST 202 (USCP) *or* HIST 204 *or* LS 211  
D1b POLS 110 *or* LS 212

Take three courses from D2, D3, D4a, D4b

- D2 History (300-400 level)  
D3 Economics  
D4a Social Institutions  
D4b Social Institutions (300-400 level)

#### Area E Life Understanding (no additional units required)

3 units are in Major.

No more than one course in any Area E category.

- E2 Self Development \*see Major

#### Area F Technology (no additional units required)

3 units are in Support.

- F1 Computer Literacy \*see Support

#### Additional GE Courses

To complete 72-unit requirement, select additional courses from Areas A, C, D, E. No more than one additional course per area.

### ELECTIVES.....

**16**

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<sup>1</sup> MATH 116 and 117 will substitute for MATH 118 and are taught at a slower pace. MATH 117 will satisfy GE area B2.

**BS NUTRITION**

- ☐ 60 units upper division      ☐ GWR
- ☐ 2.0 GPA                              ☐ USCP

\* = Satisfies General Education requirement

**MAJOR COURSES**

FSN 101 Orientation to Nutrition .....	1
FSN 121 Fundamentals of Food .....	4
FSN 210 Nutrition (E2)* .....	4
FSN 230 Elements of Food Processing.....	4
FSN 250 Food and Nutrition: Customs and Culture (USCP) .....	4
FSN 310 Maternal and Child Nutrition.....	4
FSN 315 Nutrition in Aging.....	4
FSN 328, 329 Advanced Nutrition I, II .....	4,4
FSN 415 Nutrition Education and Communications	4
FSN 461, 462 Senior Project .....	2,2
FSN 463 Undergraduate Seminar .....	1
AG 250 Computer Application to Agriculture or CSC 110 Computers/Computer Applic. (F1)* .....	3
MCRO 221 General Bacteriology (B1b)* .....	4
<sup>1</sup> CHEM 111 Survey of Chemistry or CHEM 127 General Chemistry (B1a)* .....	5/4
<sup>1</sup> CHEM 212 Survey of Organic Chemistry or CHEM 216 Organic Chemistry I.....	5/4
CHEM 313 Surv Biochemistry & Biotechnology....	5
ECON 201 Survey of Economics (D3)* .....	4
<sup>1, 2</sup> MATH 118 Pre-Calculus Algebra or MATH 120 Pre-Calculus Algebra & Trig (B2)*.	4/5
SOC 105 Introduction to Sociology (D4a)*.....	4
STAT 218 Applied Statistics Life Sciences (B2)*...	4
<sup>1</sup> BIO 115 Animal/Human Structure/Function or BIO 151 Introduction to Biology (Area B)* .....	4/5
Concentration courses (see below) .....	55-60
<b>135-142</b>	

**GENERAL EDUCATION (GE) ..... 37**

72 units required; 35 of these units are in Major/Support.  
 →See page 79 for complete GE course listing.  
 →Minimum of 3 GE courses required at the 300-400 level.

**Area A Communication** (minimum 11 units)

Take one course from A1, A2, A3:

- A1 Expository Writing
- A2 Critical Thinking
- A3 Speech

If less than 11 units, take one additional course in:

- A4 Argumentative Writing

**Area B Science and Mathematics** (no additional units required)

20 units are in Support.

- B1b Life Sciences \*see Major
- B1a Physical Sciences \*see Major
- B2 Mathematics and/or Statistics \*see Major
- Area B \*see Major

**Area C Arts and Humanities** (minimum 15 units)

Take one course from each Area C category:

- C1 Literature
- C1 Philosophy

- C2 Fine/Performing Arts
- C3 Lit/Phil/Arts (300-400 level)

If less than 15 units, take one additional course from C1, C2, C3  
**Area D Social, Political, Economic Inst.** (minimum 9 units)  
 8 units are in Support

No more than one course in any Area D category.  
 Take one course from D1a and one from D1b

- D1a HIST 202 (USCP) or HIST 204 or LS 211
- D1b POLS 110 or LS 212

Take one course from D2 or D4b

- D2 History (300-400 level)
- D3 Economics \*see Major
- D4a Social Institutions \*see Major
- D4b Social Institutions (300-400 level)

**Area E Life Understanding** (no additional units required)

4 units are in Major.  
 No more than one course in any Area E category.

- E2 Self Development \*see Major

**Area F Technology** (no additional units required)

3 units are in Support.

- F1 Computer Literacy \*see Major

**Additional GE Courses**

To complete 72-unit requirement, select additional courses from Areas A, C, D, E. No more than one additional course per area.

<b>ELECTIVES</b> .....	<b>7-14</b>
	<b>186</b>

**CONCENTRATIONS (select one)**

**Applied Nutrition Concentration**

FSN 321 Meal Management.....	4
FSN 343, 344 Institutional Foodservice I, II .....	3,3
FSN 416 Community Nutrition .....	4
FSN 417 Nutrition Counseling .....	4
FSN 426 Food Systems Management.....	3
FSN 429, 430 Clinical Nutrition I, II.....	4,4
ANT 201 Cultural Anthropology (Area D) .....	4
BIO 302 Human Genetics.....	3
BUS 212 Financial Acctg for Nonbusiness Majors..	4
BUS 384 Human Resources Management.....	4
MCRO 421 Food Microbiology .....	4
ZOO 240 Human Anatomy and Physiology I (B1b).	5
ZOO 241 Human Anatomy and Physiology II.....	5
	<b>58</b>

<sup>1</sup> Advanced level course required for Nutrition Science Concentration.

<sup>2</sup> MATH 116 and 117 will substitute for MATH 118 and are taught at a slower pace. MATH 117 will satisfy GE area B2.

**Nutrition and Food Industries Concentration**

FSN 154 Basic Calculations in Food Processing.....	4
FSN 274 Food Plant Sanitation and Safety.....	4
FSN 325 Food Quality Control.....	5
FSN 364 Food Chemistry .....	4
FSN 374 Food Laws and Regulations.....	4
FSN 410 Nutr Implications of Food Ind Practices...	4
FSN 420 Critical Evaluation of Nutrition Research.	2
FSN 434 Food Analysis.....	4
FSN 455 Product Development and Sensory Eval...	5
AGB 301 Agricultural Marketing or BUS 245 Elements of Marketing.....	4
JOUR 218/312/331 .....	4
MCRO 421 Food Microbiology .....	4
<i>Processing</i> – Select two from: FSN 209, FSN 244, FSN 341, DSCI 231.....	6-8
<i>Production</i> – Select one from: ASCI 231, CRSC 230, DSCI 230, FRSC 230, VGSC 230	3-4
	<u>57-60</u>

**Nutrition Science Concentration**

FSN 416 Community Nutrition.....	4
FSN 429 Clinical Nutrition I.....	4
FSN 430 Clinical Nutrition II .....	4
BIO 153 Biology of Animals.....	5
BIO 253 Orientation to the Health Professions.....	1
BIO 303 Survey of Genetics .....	3
PHYS 121 College Physics.....	4
SPC 375 Health Communication .....	4
ZOO 240 Human Anatomy and Physiology I (B1b)	5
ZOO 241 Human Anatomy and Physiology II.....	5
Adviser approved electives (must be selected with adviser's approval) .....	<u>16</u>
	55

**FOOD SCIENCE MINOR**

The minor is principally designed for students majoring in related academic disciplines who desire to seek employment in the food industry. Upon completion of this minor, students will have acquired the fundamental technical skills necessary to understand basic issues and concepts in food science such as food processing, food safety, quality assurance, and product development.

**Required core**

FSN 125 Introduction to Food Science .....	5
FSN 204 Food Processing Operations .....	4
FSN 274 Food Plant Sanitation and Safety .....	4
FSN 325 Food Quality Control .....	5
<b>Emphasis area courses:</b> .....	9

*Select 9 units from the following courses:*

FSN 154; FSN 209/211; FSN 244, 341, 354, 364,  
374, 384, 410, 434, 444, 455, 474;  
DSCI 231; MCRO 421; PM 250

27

**NUTRITION MINOR**

The minor is designed for students majoring in academic disciplines such as Chemistry, Biochemistry, Biological Sciences, and Kinesiology. By completing this minor, students will enhance their academic qualifications in terms of employment or for admission to medical or dental schools or to graduate programs in allied health.

**Required core**

FSN 210 Nutrition (E2) .....	4
FSN 310 Maternal and Child Nutrition .....	4
FSN 315 Nutrition in Aging .....	4
FSN 328 Advanced Nutrition I .....	4
FSN 329 Advanced Nutrition II .....	4

**Emphasis area courses:** .....

Select 7 units from one of the following areas:

*Clinical Nutrition*

FSN 250, 429, 430; CHEM 337/338; CHEM 377;  
PSY 317.

*Food Service Management*

FSN 250; 274, 343, 344, 374, 410, 426.

*Community Nutrition*

FSN 250, 410, 415, 416; POLS 326; PSY 317.

*Sports Nutrition*

CHEM 337/338; CHEM 377; KINE 303, 451;  
PSY 304

27

# *Military Science*

**Department Office**  
**Dexter Bldg. (34), Room 115**  
**(805) 756-7682**

**Department Head,**  
**Lieutenant Colonel Richard Kane**

Major Kirk McIntosh  
 Major John Bechtol  
 Captain Robert Wooldridge  
 Sergeant First Class Michael Johnson

## **Purpose**

The Military Science Department conducts a dynamic four-year program of instruction which develops the mental and physical qualifications of graduates in preparation for positions of leadership within the military and civilian communities. Students may enroll at any time for full academic elective credit without incurring any military service obligation. However, the last two years of the program are oriented toward preparing the student for a military career.

The innovative and well-taught courses complement all major areas of study by broadening the student's basic education. The complete curriculum includes both military leadership and management courses; courses which provide an awareness of the heritage of the U.S. military; the Armed Forces' role in national defense strategy; professional military subjects; and military ethics.

Students desiring to attain a highly sought-after commission as a Second Lieutenant in the U.S. Army must meet eligibility requirements and complete the entire Military Science/ROTC (Reserve Officers' Training Corps) Advanced Course (25 units). To be eligible for participation in the Cal Poly ROTC Program, a student must be enrolled full time (12 units) at Cal Poly, have at least two years remaining as a university student to permit completion of the advanced course prior to reaching the 30th birthday, and be physically qualified.

## **Financial Assistance**

Many opportunities for financial assistance are available to students. Three areas of opportunities are: ROTC cadets who sign a contract for Advanced Phase, students who earn an ROTC scholarship, and cadets who train with Reserve or National Guard units. All ROTC cadets sign a contract to participate in the Advanced Phase of ROTC and receive a \$150 a month allowance. Criteria to participate in the Advanced Phase are stated later. Highly competitive two-, three-, and four-year ROTC scholarships are available. The scholarship provides payment of full tuition, books, supplies, and the \$150 a month allowance for the duration

of the scholarship. Students interested in ROTC scholarship should contact the Military Science Department. Reserve or National Guard training provides an additional two sources of financial assistance: approximately \$165 a month for one weekend drill and approximately \$190 a month tuition assistance from the National Guard/Army Reserve "New GI Bill" benefits.

## **Equipment and Uniforms**

All necessary equipment, uniforms and textbooks for participation in the Military Science/ROTC program 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. Students entering into active commissioned service after graduation are granted a special \$300 uniform allowance.

## **Four-Year Program**

The four-year program elective military science curriculum is divided into two diverse phases. The basic phase is primarily for freshmen and sophomores, and the advanced phase is for junior and senior level students.

## **Basic Phase**

The Basic Phase is a two-year challenging opportunity where students may, without obligation, investigate the ROTC Program and the military as a full- or part-time career. Students may enter and leave this phase during any quarter. The curriculum for the basic phase is listed below and offers many exciting opportunities for all students. To become an ROTC cadet during this phase requires the student be registered for a Military Science class, completion of an ROTC enrollment form (obtained at the Military Science Department, Dexter Building, Room 115), and an interview with the ROTC Enrollment Officer. Because this phase is for students to examine the ROTC Program without obligation, participation in ROTC activities is encouraged but not mandatory. Entry to the challenging Advanced Phase is accomplished either by successfully completing the Basic Phase classes, completing ROTC Summer Basic Camp or completing any military basic training program.

## **ROTC Summer Basic Camp**

One method to qualify for the Advanced Phase is to successfully complete the six-week challenging ROTC Summer Basic Camp. Students normally attend Basic Camp between their second and third academic years. Transfer

students may complete the camp during the summer immediately prior to their matriculation at Cal Poly. It is important that potential transfer students who plan to participate in the two-year ROTC program make their intentions known directly to the Military Science Department no later than June 1 of the year they plan to register at the university even though this date may precede the date of their final acceptance by the university.

The government will provide a transportation allowance to and from Basic Camp and pay at the rate of one-half of a Second Lieutenant's basic pay. All equipment, uniforms, room, board and medical care are furnished free while at camp. A maximum of 7 units elective credit may be earned for attending Basic Camp. No military obligation is incurred for attending this camp.

### Basic Training

Outstanding students who have successfully served on active duty, regardless of the branch of service, are qualified to enter the Advanced Phase because they have completed basic training for their particular branch of service. Also, students who have been or are members of Reserve or National Guard units and have completed basic training are qualified for the Advanced Phase.

### Advanced Phase

The Advanced Phase is a two-year period where ROTC cadets receive advanced leadership and management training. The cadets receive many hours of hands-on, practical leadership experiences to prepare them for a military career or a management position in the civilian sector. To become a cadet in the Advanced Phase a student must complete the Basic Phase, ROTC Summer Basic Camp or Basic Training. The student must also make a commitment to attend all required training activities and sign a contract to accept a prestigious commission in the United States Army. In return for the student's commitment, the Military Science Department will provide \$150 a month, classroom instruction, real leadership opportunities, and continuous professional development of their leadership skills.

After their first year of the Advanced Phase, cadets usually attend a five-week camp where their leadership skills are further developed and assessed. All equipment, uniforms, room, board, and medical care are furnished free while at this camp. The cadets will also receive approximately \$700 during the six weeks. Upon successful completion of the Advanced Phase and graduation from the university, the cadet will be commissioned as a Second Lieutenant in the United States Army.

### Simultaneous Membership Program

Students can serve simultaneously in the National Guard or Army Reserve while they are cadets in ROTC and receive pay from both sources. Those who complete the ROTC Advanced Phase prior to graduation may continue serving in the Reserve or National Guard in the Simultaneous Membership Program. Since students can earn about \$3,000 each year, this program provides both substantial financial and experience benefits.

### BASIC PHASE

#### Freshman

- MSC 111 Orienteering (2)
- MSC 112 Survival Training: Wilderness (2)
- MSC 116 Basic Military Skills (2)

#### Sophomore

- MSC 211 Current Military Affairs (2)
- <sup>1</sup> MSC 212 Basic Camp (1-7)
- MSC 213 Mountaineering (2)
- MSC 215 Leadership Management Seminar (2)
- MSC 225 Advanced Survival Techniques (2)
- MSC 226 Advanced Orienteering (2)
- MSC 229 Ranger Challenge (2)

### ADVANCED PHASE

#### Junior

- MSC 311 Leadership and Management (3)
- MSC 312 Leader Communication Skills (3)
- MSC 313 Tactical Military Operations (3)
- <sup>2</sup> MSC 314 ROTC Advanced Camp (6)

#### Senior

- MSC 411 Military Professionalism and Ethics (3)
- MSC 412 Military Justice (2)
- MSC 413 Military Organization and Management (2)

<sup>1</sup> Basic Camp is an optional 6-week summer training course (1-7 units) at Fort Knox, Kentucky.

<sup>2</sup> Advanced Camp is a required 6-week summer training experience at Fort Lewis, Washington (6 credits).

# Natural Resources Management

**Department Office**  
**Agricultural Sciences Bldg. (11), Room 217**  
**(805) 756-2702**

## Department Head, Norman H. Pillsbury

Brian C. Dietterick	Douglas D. Piirto
Samantha J. Gill	Carolyn B. Shank
John H. Harris	Scott L. Stephens
William W. Hendricks	Richard P. Thompson
Walter R. Mark	James R. Vilkitis
Timothy G. O'Keefe	

## ACADEMIC PROGRAMS

**BS Forestry and Natural Resources**  
**BS Recreation Administration**

### BS Forestry And Natural Resources

The Bachelor of Science degree program in Forestry and Natural Resources prepares students for important careers in the protection, management, and development of our forest and natural resources. Students may elect to emphasize forest and land management disciplines, such as recreation management; urban forestry; environmental management; watershed, chaparral and fire management; hardwood management; wildlife biology.

Graduates qualify for such positions as forester, environmental interpreter, urban forester, environmental specialist, park administrator, resource manager, park ranger, resource planner, watershed manager, and fire manager.

Cal Poly graduates are employed throughout the world: establishing, managing and regenerating forests and urban wildland areas; providing opportunities for recreation use of forests; teaching; extension; research; harvesting forest crops; developing, processing and marketing wood products; and protecting and managing the environment.

**Senior Fall Field Quarter.** Starting Fall Quarter 2001, seniors must complete a full course load at Swanton Pacific Ranch, contingent on facilities. This experience will emphasize the integration of practical field skills and independent learning, with the acquisition of knowledge about natural resources and its management, including soils, water, trees, wildlife, forage. FNR 402, FNR 412, and FNR 416 will be taught each Fall at Swanton Pacific. It is important that students plan their class schedule in order to satisfy the prerequisites for these courses. For a fee, room and board will be available at Swanton. Prior to facility availability at Swanton, these course will be taught at Cal

Poly with laboratories and field activities using Swanton Pacific and local resource areas.

Students are required to complete a period of natural resources related work experience equivalent to one quarter of full-time work. This can be accomplished by the completion of an internship, a seasonal job, volunteer work, or cooperative education course. Work experience for academic credit must be documented by work supervisor and approved by student's academic adviser.

Students are required to purchase 8 inch high field boots, hard-hats (OSHA approved), hand calculator capable of linear regression, 10X hand lens, and an engineers scale ruler prior to taking 200- or 300-level major courses. Students are strongly encouraged to purchase a laptop (preferably Macintosh) before beginning 300-level major courses.

Forest and natural resources facilities assist in the development of field skills. Special campus sites include Christmas tree plantations, weather station, greenhouses, woodlots, biomass energy plantations, logging competition arena, experimental watershed and reservoirs. The forest at Swanton-Pacific, an off-campus site near Santa Cruz, offers many educational opportunities for coursework and special studies on its 3800 acres of forests, wildlands and agricultural land areas. The site includes hardwood and redwood forest types, diverse ecosystems, streams and riparian habitat zones. In addition, the 70-acre Atlee School Forest and other nearby private resource areas, regional and State parks, and National Forests also provide opportunities for field experiences.

Opportunities for graduate studies are also available. Students may choose to develop thesis programs with an emphasis in selected fields of forest and natural resources, such as watershed and fire management, forest management, recreation, chaparral and hardwood ecosystem management, urban forestry, and environmental studies. The Master of Science degree is awarded with a specialization in General Agriculture. In addition, an agroforestry study program can be developed through the Master of Science degree program with a specialization in International Agricultural Development. For additional information, see the MS Agriculture section.

Cal Poly is an institution accredited by the Society of American Foresters. Also, employment as a forester with the Federal Government is recognized by the U.S. Office of Personnel Management.

### Curricular Concentrations

Concentrations prepare students for entry into the profession of forestry and natural resources. The curriculum provides broad training in forest and natural resource management with emphasis in urban forestry, watershed, chaparral and fire management, hardwood management, natural resources recreation, environmental management, and wood energy systems. Extensive field training occurs concurrently with classroom instruction.

**Environmental Management.** Prepares students for employment as professionals in the fields of forestry and natural resources management planning, environmental impact assessment and evaluation, and environmental policy analysis. Individual student programs are developed.

**Forest Resources–Management.** Specialized areas of study are available through an emphasis in Hardwood Management or individualized studies in such areas as agroforestry, environmental studies, fish and wildlife management, parks and outdoor recreation, computer science, journalism, business administration, Spanish, and marketing.

*Hardwood Management:* The protection, utilization, and regeneration of hardwood communities as well as the principles of hardwood management that are necessary to meet the rising demand for the multiple use of hardwood forests and oak woodlands are studied.

**Forest Resources–Urban Forestry.** Management problems resulting from the continued trend of urbanization into the urban-wildland interface are studied. Urban Forestry focuses on the urban ecosystem including lesser vegetation, wildlife, and open space, as well as the trees. The curriculum emphasizes the application of forestry skills for management of urban forest ecosystems.

**Forest Resources–Watershed, Chaparral and Fire Management.** Students examine all aspects of water resource management in various forest ecosystems. The effects of watershed and fire management practices in chaparral and other Mediterranean-type ecosystems are studied in particular.

**Natural Resources Recreation.** Prepares students for employment in the planning, interpretation, development, and management of governmental and private resource-based parks and other recreational lands.

**Wildland Hydrology.** Provides students a focused and encompassing program including a proficiency in watershed hydrology in forest ecosystems and Mediterranean ecosystems, rangeland hydrology, post-fire water-shed evaluation, and urban/wildland hydrologic implications.

### Other Concentrations Available

The Wildlife Biology concentration offered by the Biological Sciences Department is available to Forestry and Natural Resources majors and prepares students for employment in the fish and wildlife areas of law enforcement, management, and production. FNR majors following this concentration will meet the Wildlife Society's certification education requirements or the certification requirements of the American Fisheries Society based on choice of restricted electives. Prerequisite courses in zoology are required of students entering this concentration. Students in the Wildlife Biology concentration may deviate up to 17 units of designated courses toward prerequisites with prior written approval of adviser. See concentration description in Biological Sciences for curricular requirements.

#### Recommended Sequence: Major and Support Courses

*The following is a guide for scheduling Major and Support Courses. By following this sequence, students should meet prerequisites for Major coursework. Courses are not always offered during the quarter indicated. Please consult with your academic adviser and the current Class Schedule.*

1st Year		
Fall	Winter	Spring
FNR 140	BOT 121	CHEM 111
FNR 201	MATH 120	SS 121
GEB	GEB	GEB
2nd Year		
Fall	Winter	Spring
FNR 208	AGB 212	FNR 260
ENGL 218	BRAE 247	STAT 218
CHEM 212 or	GEB	BIO 227
BOT 223 or -->	PHYS 121	SS 121
3rd Year		
Fall	Winter	Spring
FNR 306	FNR 307	FNR 365
FNR 315	FNR 326	GEB
FNR 318	FNR 335	BRAE 345
GEB	STAT 313/Calc.	(concentration)
4th Year		
Fall	Winter	Spring
FNR 402	FNR 414	FNR 435
FNR 412	FNR 419	FNR 465
FNR 416	(concentration)	(concentration)

### Geographic Information Systems For Agriculture Minor

This minor is an interdisciplinary program sponsored by three departments: Bioresource and Agricultural Engineering, Natural Resources Management, and Crop Science. New technologies of geographic information systems (GIS), global positioning systems (GPS), and orthophotography (uniform scale aerial photographs) are revolutionizing the management of resources. There are great employment opportunities for those who understand

the technologies and society will benefit from improved management decisions. Students interested in this minor may come from the following majors: forestry and natural resources; crop science; soil science; landscape architecture, agricultural systems management; or animal science.

For more information, see the College of Agriculture section.

**B.S. FORESTRY AND NATURAL RESOURCES**

- ☐ 60 units upper division      ☐ GWR
- ☐ 2.0 GPA                              ☐ USCP

\* = Satisfies General Education requirement

**MAJOR COURSES**

FNR 140 Career Development and Planning in Natural Resources Management.....	1
FNR 201 Introduction to Forest Ecosystem Mgmt ..	3
FNR 208 Dendrology.....	4
FNR 260 Harvesting and Forest Utilization.....	3
FNR 306 Natural Resource Ecology & Habitat Mgt	4
FNR 307 Fire Ecology.....	3
FNR 315 Forest Mensuration and Sampling.....	4
FNR/LA 318 Appl. GIS Natural Resources.....	3
FNR 326 Natural Resources Econ. & Valuation.....	4
FNR 335 Human Resources and Conflict Management in Natural Resources.....	4
FNR 365 Silviculture and Vegetation Management	3
FNR 402 Forest Health.....	4
FNR 412 Forest and Natural Resources Senior Assessment Project.....	4
FNR 414 Timber Management .....	4
FNR 416 Environmental Impact Analysis & Mgmt.	4
FNR 419 Watershed Management.....	4
FNR 435 Natural Resources Policy Analysis.....	4
FNR 465 Ecosystem Management.....	4
Concentration courses.....	24-30

**88-94**

**SUPPORT**

AGB 212 Agricultural Economics.....	4
BIO 227 Wildlife Biology (B1b)* .....	4
BOT 121 General Botany (B1b)* .....	4
BRAE/FNR 247 Forest Surveying.....	2
BRAE 345 Aerial Photogram. & Remote Sensing..	3
CHEM 111 Survey of Chemistry (B1a)* .....	5
ENGL 218 Professional Writing: Argumentation and Reports (A4)* .....	4
<sup>1</sup> MATH 120 Pre-Calculus Algebra and Trig. (B2)*	5
SS 121 Introductory Soil Science .....	4
STAT 218 Applied Statistics in the Life Sciences (B2)* .....	4
STAT 313 or MATH 221(Area B)*.....	4
Adviser approved science course (Area B)*	
BOT 223/CHEM 212/PHYS 121) .....	4/5
AG 250 Computer Application to Agriculture or	
CSC 113 Computers/Applications: Mac (F1)* ...	3

**50-51**

**GENERAL EDUCATION (GE) ..... 43**

72 units required; 27 of these units are in Major/Support.  
 →See page 79 for complete GE course listing.  
 →Minimum of 3 GE courses required at the 300-400 level.

**Area A Communication** (minimum 10 units)

4 units are in Support.  
 Take one course from A1, A2, A3.

- A1 Expository Writing
- A2 Critical Thinking
- A3 Speech
- A4 Argumentative Writing \*see Support

**Area B Science and Mathematics** (no additional units required)

20 units are in Support.  
 B1a Physical Sciences \*see Support  
 B1b Life Sciences \*see Support  
 B2 Mathematics and/or Statistics \*see Support  
 Area B \*see Support

**Area C Arts and Humanities** (minimum 15 units)

Take one course from each Area C category:  
 C1 Literature  
 C1 Philosophy  
 C2 Fine/Performing Arts  
 C3 Lit/Phil/Arts (300-400 level)  
 If less than 15 units, take one additional course from C1, C2, C3

**Area D Social, Political, Economic Inst.** (minimum 15 units)

No more than one course in any Area D category.  
 Take one course from D1a and one from D1b  
 D1a HIST 202 (USCP) or HIST 204 or LS 211  
 D1b POLS 110 or LS 212  
 Take three courses from D2, D3, D4a, D4b  
 D2 History (300-400 level)  
 D3 Economics  
 D4a Social Institutions  
 D4b Social Institutions (300-400 level)

**Area E Life Understanding** (minimum 3 units)

No more than one course in any Area E category.  
 Take one course from E1 or E2  
 E1 PSY 201/PSY 202  
 E2 Self Development

**Area F Technology** (no additional units required)

3 units are in Support.  
 F1 Computer Literacy \*see Support

**Additional GE Courses**

To complete 72-unit requirement, select additional courses from Areas C, D, E. No more than one additional course per area.

**ELECTIVES..... 4-11**

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**CONCENTRATIONS (Select one)****Environmental Management Concentration**

CRP 212 Introduction to Urban Planning .....	3
ENVE 330 Environmental Quality Control .....	3
FNR 339 Internship .....	6
FNR/CRP 404 Environmental Law <i>or</i> FNR 408 Water Resource Law and Policy .....	3
FNR 425 Applied Resource Analysis .....	4
Restricted electives with prior written approval of adviser .....	5

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24**Forest Resources–Management Concentration**

FNR 204 Resource Fire Control .....	3
FNR 339 Internship .....	6
FNR 434 Wood Properties and Products .....	5
Restricted electives with prior written approval of adviser .....	10

—  
24**Forest Resources–Urban Forestry Concentration**

FNR 311/EHS 421 .....	4
FNR 339 Internship .....	6
FNR 350 Urban Forestry .....	3
FNR 355 Hardwood and Woodlot Management .....	4
FNR 450 Community Forestry .....	3
Restricted electives with prior written approval of adviser .....	4

—  
24**Forest Resources–Watershed, Chaparral, and Fire  
Management Concentration**

FNR 204 Resource Fire Control .....	3
FNR 339 Internship .....	6
FNR 360 Survey & Mgt. of Mediter. Ecosystems ...	4
SS 440 Forest and Range Soils .....	4
Restricted electives with prior written approval of adviser .....	7

—  
24**Natural Resources Recreation Concentration**

FNR 311 Environmental Interpretation .....	4
FNR 339 Internship .....	6
FNR 410 Resource Recreation Management .....	4
FNR 417 Resource Recreation Planning .....	3
REC 101 Introduction to Recreation Parks and Tourism <i>or</i> FNR 112 Parks and Outdoor Recreation .....	3
Restricted electives with prior written approval of adviser .....	4

—  
24**Wildland Hydrology Concentration**

BRAE 415 Hydrology .....	3
ENVE 434 Water Quality Measurements .....	2
FNR 420 Advanced Watershed Hydrology .....	4
GEOL 201 Physical Geology .....	3
PHYS 121 College Physics .....	4
PHYS 122 College Physics .....	4
SS 321 Soil Morphology .....	4
SS 440 Forest and Range Soils .....	4

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28

<sup>1</sup> MATH 118 and 119 will substitute for MATH 120 and are taught at a slower pace for those who need more review. Also, MATH 116 and 117 will substitute for MATH 118 for those people who need extra review.

**BS Recreation Administration**

Organizations offering leisure services and products exist as a result of the demand for increased leisure opportunity. The Bachelor of Science degree program in Recreation Administration offers professional preparation for employment in public, non-profit, private, and commercial leisure service organizations. Students may pursue a concentration in commercial/tourism management, natural resources recreation or a course of study in program management that includes: special events, sport management and public non-profit recreation. In addition, leisure education courses provide university students with leisure lifestyle management skills. The major is accredited by the National Recreation and Park Association/American Association for Leisure and Recreation Council on Accreditation.

The major includes a 400 hour required internship (one quarter) in a leisure service organization. Graduates qualify for diverse positions as recreation supervisors, park and recreation administrators, travel and tourism specialists, environmental educators, park rangers, park naturalists, recreation related business owners, private recreation club managers, employee services and recreation specialists, chamber of commerce specialists, convention and visitor bureau program directors, meeting specialists and special event planners.

Recreation Administration graduates are employed in settings located in and out of the United States planning, organizing, implementing and evaluating leisure services to residents, tourists, and target participants. Sound administrative management skills learned in the program and through practical and research applications allow for career progress into executive management positions within the leisure service industry.

Students have access to the department's field laboratories and also develop competencies in a myriad of external sites to include ropes course leadership laboratories, environmental education centers, leisure businesses and recreation departments. Students operate major special events and programs and conduct applied research in required and elective coursework.

In addition to major requirements, the curriculum provides a full range of general education and support courses designed to fully educate and prepare students for a global society where cultural diversity and international understanding are developed.

**Curricular Concentrations**

**Commercial/Tourism Management.** Emphasizes preparation for employment in organizations that provide leisure products or services for profit or financial self-sufficiency. An emphasis on recreation business is targeted to the following settings: employee services and recreation, travel and tourism, product sales and manufacturing,

public/private entrepreneurship, joint commercial-public ventures, and small business opportunities. Specific focus on leisure industry entrepreneurship; relates leisure services management to economic development.

**Natural Resources Recreation.** Students interested in leisure services related to the natural environment may choose this concentration. Two areas of study are offered: recreation resource management and natural resources tourism. The former area prepares students for employment in park and recreation departments at the local, county/regional, state and federal levels in positions including park directors, managers, rangers, naturalists, interpreters, environmental education specialists, and planners. The latter area focuses on tourism enterprise and business emphasizing economic development and sustainability of natural resources such as ecotourism, agri-tourism, rural tourism, sustainable tourism, and cultural and heritage tourism.

**BS RECREATION ADMINISTRATION**

- 60 units upper division       GWR
- 2.0 GPA                               USCP
- \* = Satisfies General Education requirement

**MAJOR COURSES**

REC 101 Intro. to Recreation, Parks and Tourism ...	3
REC 110 Career Develop and Planning in Recreation Administration .....	1
REC 127 Cross Cultural Dimensions of Leisure .....	4
REC 210 Introduction to Program Design.....	4
REC 252 Recreation and Special Populations.....	4
REC 305 Recreation Areas and Facilities Mgt.....	4
REC 324 Legal and Legislative Patterns in Recreation Administration .....	4
REC 360 Assessment and Eval of Rec Parks and Tourism .....	4
REC 405 Management and Leadership for Recreation Administration .....	4
REC 424 Financing Recreation Services.....	4
REC 460 Research in Recreation, Parks & Tourism	4
REC 461 Senior Project .....	3
REC 463 Pre-Internship Seminar .....	1
REC 465 Internship .....	6
BUS 384 Human Resources Management .....	4
Concentration courses (see below) or adviser approved electives .....	28

**82**

**SUPPORT COURSES**

BUS 212 Financial Actg for Nonbusiness Majors....	4
BUS 346 Principles of Marketing .....	4
CSC 113 Computers and Computing <i>or</i> AG 250 Computer Applications (F1)*.....	3
ENGL 310 Corporate Communications .....	4
FNR 410/EHS 337/LA 363 .....	3
JOUR 312 Introduction to Public Relations .....	4

MATH 118 Pre-Calculus Algebra (B2)\* or  
MATH 116/117 (B2)\* ..... 4  
STAT 217 Statistical Methods (B2)\* ..... 4  
**30**

**GENERAL EDUCATION (GE)** ..... **61**  
*72 units required; 11 of these units are in Major/Support.*  
→See page 79 for complete GE course listing.  
→Minimum of 3 GE courses required at the 300-400 level.

**Area A Communication** (minimum 11 units)  
*Take one course from A1, A2, A3:*  
A1 Expository Writing  
A2 Critical Thinking  
A3 Speech  
*If less than 11 units, take one additional course in:*  
A4 Argumentative Writing

**Area B Science and Mathematics** (minimum 11 units)  
*8 units are in Support.*  
*Take one course from B1a and one from B1b, one with lab:*  
B1a Physical Sciences  
B1b Life Sciences elective

**Area C Arts and Humanities** (minimum 15 units)  
*Take one course from each Area C category:*  
C1 Literature  
C1 Philosophy  
C2 Fine/Performing Arts  
C3 Lit/Phil/Arts (300-400 level)  
*If less than 15 units, take one additional course from C1, C2, C3*

**Area D Social, Political, Economic Inst.** (minimum 15 units)  
*No more than one course in any Area D category.*  
*Take one course from D1a and one from D1b*  
D1a HIST 202 (USCP) or HIST 204 or LS 211  
D1b POLS 110 or LS 212  
*Take three courses from D2, D3, D4a, D4b*  
D2 History (300-400 level)  
D3 Economics  
D4a Social Institutions  
D4b Social Institutions (300-400 level)

**Area E Life Understanding** (minimum 3 units)  
*No more than one course in any Area E category.*  
*Take one course from E1 or E2*  
E1 PSY 201/PSY 202  
E2 Self Development

**Area F Technology** (no additional units required)  
*3 units are in Support.*  
F1 Computer Literacy \*see Support

**Additional GE Courses**  
*To complete 72-unit requirement, select additional courses from Areas A, B, C, D, E. No more than one additional course per area.*

**ELECTIVES** ..... **13**  
**186**

**CONCENTRATION OR ADVISER APPROVED ELECTIVES**

Select either a concentration or adviser approved electives.

**Commercial/Tourism Management Concentration**

REC 313 Issues in Natural Resources and  
Agri-Tourism ..... 4  
REC 314 Travel and Tourism Planning..... 4  
REC 317 Convention and Meeting Management ..... 3  
REC 414 Organization and Development of  
Commercial Leisure Services ..... 4  
Restricted electives ..... 13  
**28**

**Natural Resources Recreation Concentration**

REC 302 Environmental and Wilderness Education  
or REC 311 Environmental Interpretation..... 4  
REC 313 Issues in Natural Resources and  
Agri-Tourism ..... 4  
REC 314 Travel and Tourism Planning or REC  
417 Resource Recreation Planning ..... 4/3  
Restricted electives ..... 16/17  
**28**

**Adviser Approved Electives**

28

**Recommended Sequence: Major and Support Courses**

*The following is a guide for scheduling Major and Support Courses. By following this sequence, students should meet prerequisites for Major coursework. Courses are not always offered during the quarter indicated. Please consult with your academic adviser and the current Class Schedule.*

1st Year		
Fall	Winter	Spring
REC 101	REC 110	REC 127
	CSC 113/AG 250	MATH
2nd Year		
Fall	Winter	Spring
REC 210	REC 252	REC Elective
BUS 212	STAT 217	
3rd Year		
Fall	Winter	Spring
REC 305	REC 324	REC 360
ENGL 310	BUS 384	FNR 410/EHS 337/ LA 363
BUS 346	JOUR 312	REC Elective
4th Year		
Fall	Winter	Spring
REC 405	REC 461	REC 465
REC 460	REC 424	
REC 463		

# Soil Science

**Department Office**  
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## Department Chair, Thomas J. Rice, Jr.

Gaston Amedee	Thomas A. Ruehr
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## Affiliate Faculty:

William L. Preston	Calvin H. Wilvert
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## Academic Program

### BS Soil Science

Three-fourths of the world's food and nearly all of its fiber come from the fragile, thin skin of the land's surface—the soil. Moreover, soil absorbs and transmits rain and snow which replenish our groundwater; and it captures great quantities of environmental wastes. Soil scientists are the most knowledgeable and best trained people responsible for the management of soil, one of our most precious natural resources.

The Bachelor of Science degree in Soil Science provides fundamental knowledge and skills needed for field, laboratory, management, and teaching positions, as well as for graduate studies. Concentrations are offered in Land Resources, Environmental Management, and Environmental Science and Technology. These high quality programs help ensure that our graduates are well prepared for the diverse opportunities awaiting them. Moreover, graduates can meet educational requirements for professional certification by the American Registry of Certified Professionals in Agronomy, Crops and Soils, and as Certified Professional Erosion and Sediment Control Specialists.

Students are encouraged to reinforce their education, develop professional contacts, and strengthen their career potential by participating in any of the following activities: the Soils Club and the Soil and Water Conservation Society, each of which is nationally affiliated; the Soil Judging Team, which commonly qualifies for national competition; the Soil Testing Enterprise Program, which analyzes soil and water samples for local growers and gardeners; and internships and cooperative education programs with government and industry. Each of these opportunities, combined with a friendly, helping atmosphere, provide students a college experience that is highly personable as well as rewarding. Students also are encouraged to investigate opportunities for international education. Please see the Study Abroad program section of this catalog.

Facilities of the department include laboratories having up-to-date analyzers, a glasshouse and a computer room. The department has access to several thousand acres of

agricultural, forest and range land managed by the College of Agriculture. All of the facilities, equipment and land, which allow practical application of classroom knowledge, are for student use.

Our undergraduate soil science program ranks among the largest and strongest in the nation. Our graduates are employed from Alaska to Mexico, Maine to Hawaii, and on every continent. Their Cal Poly experience has provided them with the strong scientific foundation, practical skills and balanced general education needed to be flexible and competitive in today's diverse, and often unpredictable, job market.

Undergraduate and graduate students majoring in soil science earn a solid, useful education; likewise, students from other fields who select soil science courses as electives can augment their skills and knowledge, making them more adaptable to changing professional opportunities. Moreover, all students can discover soil's vital role in their lives, and the human dependence on the quality of soil for quality of life.

Cal Poly offers a Master of Science degree in Agriculture with a specialization in Soil Science. For information regarding this degree program, please refer to the MS Agriculture section.

## Curricular Concentrations

**Environmental Management.** Offers a solid scientific background melded with environmental policy and administration, site analysis, and resource planning. The program helps prepare students for managerial positions dealing with today's complicated environmental problems and opportunities.

**Environmental Science and Technology.** Provides the strongest foundation for evaluating and solving complex environmental problems, including land and water degradation and contamination by hazardous wastes. Additionally, the concentration includes courses needed for admission to rigorous graduate programs.

**Land Resources.** Prepares students for professional opportunities in soil and water conservation, farm advisement, fertilizer and agricultural chemicals industries, forest and range soils, urban land enhancement, laboratory analysis, soil surveying, environmental issues, and international agriculture. The flexibility of this concentration allows students to pursue one of several approved minors, and to prepare for graduate studies.

**B.S. SOIL SCIENCE**

- ☐ 60 units upper division      ☐ GWR  
 ☐ 2.0 GPA                              ☐ USCP

\* = Satisfies General Education requirement

**MAJOR COURSES**

SS 110 Orientation in Soil Science.....	1
SS 121 Introductory Soil Science .....	4
SS 202 Soil and Water Conservation.....	3
SS 221 Fertilizers and Plant Nutrition .....	4
SS 223 Rocks and Minerals .....	4
SS 321 Soil Morphology.....	4
SS 322 Soil Fertility.....	4
SS 345 Soil Interpretations and Management.....	4
SS 422 Soil Microbiology and Biochemistry.....	4
SS 423 Soil and Water Chemistry.....	5
SS 431 Soil Resource Inventory .....	4
SS 432 Soil Physics .....	5
SS 461 Soils Senior Project .....	1
SS 462 Soils Senior Project .....	3
SS 463 Undergraduate Soils Seminar .....	2
Concentration courses (see below) .....	28
	<b>80</b>

**SUPPORT COURSES**

BOT 121 General Botany (B1b)* .....	4
BRAE 340/BRAE 415/BRAE 435/BRAE 440.....	3/4
AG 250 Computer Application to Agriculture or CSC 111 Intro. to Computer Applications (F1)*	3
MCRO 221 General Bacteriology (E2)* .....	4
CHEM 127 General Chemistry (B1a)* .....	4
CHEM 128 General Chemistry (Area B)* .....	4
CHEM 129 General Chemistry (Area B)* .....	4
CHEM 313 Survey of Biochemistry (Area B)* .....	5
GEOL 201 Physical Geology.....	3
FNR/LA 318 Applic. of GIS in Natural Resources..	3
<sup>1</sup> MATH 118 Pre-Calculus Algebra or MATH 141 Calculus I (B2)* .....	4
<sup>1</sup> MATH 119 Pre-Calculus Trigonometry or MATH 142 Calculus II (B2)* .....	3/4
<sup>2</sup> PHYS 121/PHYS 131 (Area B)* .....	4
STAT 218 Appl Statistics-Life Sciences (Area B)*	4
	<b>52/54</b>

**GENERAL EDUCATION (GE) ..... 45**

72 units required; 27 of these units are in Major/Support.

→See page 79 for complete GE course listing.

→Minimum of 3 GE courses required at the 300-400 level.

**Area A Communication** (minimum 11 units)

Take one course from A1, A2, A3:

- A1 Expository Writing  
 A2 Critical Thinking  
 A3 Speech

If less than 11 units, take one additional course in:

- A4 Argumentative Writing

**Area B Science and Mathematics** (no additional units required)

20 units are in Support.

- B1b Life Sciences \*see Support  
 B1a Physical Sciences \*see Support  
 B2 Mathematics and/or Statistics \*see Support  
 Area B \*see Support

**Area C Arts and Humanities** (minimum 15 units)

Take one course from each Area C category:

- C1 Literature  
 C1 Philosophy  
 C2 Fine/Performing Arts  
 C3 Lit/Phil/Arts (300-400 level)

If less than 15 units, take one additional course from C1, C2, C3

**Area D Social, Political, Economic Inst.** (minimum 15 units)

No more than one course in any Area D category.

Take one course from D1a and one from D1b

- D1a HIST 202 (USCP) or HIST 204 or LS 211  
 D1b POLS 110 or LS 212

Take three courses from D2, D3, D4a, D4b

- D2 History (300-400 level)  
 D3 Economics  
 D4a Social Institutions  
 D4b Social Institutions (300-400 level)

**Area E Life Understanding** (no additional units required)

4 units are in Support.

No more than one course in any Area E category.

- E2 Self Development \*see Support.

**Area F Technology** (no additional units required)

3 units are in Support.

- F1 Computer Literacy \*see Support

**Additional GE Courses**

To complete 72-unit requirement, select additional courses from Areas A, C, D. No more than one additional course per area.

<b>ELECTIVES</b> .....	<b>9/11</b>
	<b>188</b>

**CONCENTRATIONS (select one):****Environmental Management Concentration**

CHEM 212 Organic Chemistry .....	5
CRSC 411/STAT 313.....	4
SS 433 Land Use Planning .....	3
Select from:	
FNR 202, 306, 311, 416, 425;	8
PHIL 340, REC 302.....	
Select from:	
CRP 404, 408, 420; FNR 408; LA 451.....	8
	<b>28</b>

<sup>1</sup> Students in the Environmental Science and Technology concentration take MATH 141 and MATH 142.

<sup>2</sup> Students in the Environmental Science and Technology concentration take PHYS 131.

**Environmental Science and Technology****Concentration**

CHEM 216 Organic Chemistry.....	4
CHEM 217 Organic Chemistry.....	5
<i>Select from:</i>	
CHEM 231, 318, 341, 342, 385, 481 .....	8
<i>Select from:</i>	
ENVE 325, 330, 434, 439; SS 442 .....	7
STAT 313 Applied Experimental Design and Regression Models .....	4
	<u>28</u>

**Land Resources Concentration**

CHEM 212 Organic Chemistry.....	5
CRSC 411 Experimental Techniques and Analysis .	4
Additional courses selected from approved list.	
These units may be selected to apply toward an approved minor. ....	<u>19</u>
	28