

# Graduate Programs

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[cafes.calpoly.edu/about\\_cafes/grad\\_programs](http://cafes.calpoly.edu/about_cafes/grad_programs)

## Programs of Study/Specializations Available

[Agribusiness – MS](#), see page 73

[Agricultural Education – Master of](#), see page 78

Agriculture – MS with Specializations in:

Agricultural Engineering Technology

Animal Science

Crop Science

Dairy Products Technology

Environmental Horticultural Science

Food Science and Nutrition

Irrigation

Plant Protection Science

Recreation, Parks, and Tourism Management

Soil Science

[Forestry Sciences – MS](#), see page 115

## General Characteristics

Graduate studies in the College of Agriculture, Food and Environmental Sciences (CAFES) 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;
- \* continued graduate work at other institutions.

## Admission/Acceptance Requirements – MS only

- File an application for Graduate Admission via [www.csumentor.edu](http://www.csumentor.edu) by the deadlines specified at [http://admissions.calpoly.edu/\\_admiss/grad/regular.html](http://admissions.calpoly.edu/_admiss/grad/regular.html)
- Submit Graduate Record Exam (GRE) General Test scores **electronically to Institution Code: R4038**
- Three Letters of Recommendation

## Prerequisites

For consideration as a graduate student, an applicant will have completed a bachelor's degree from an accredited college/university with a minimum grade point average of 2.75 in the last 90-quarter units. An applicant who meets these standards but lacks prerequisite coursework may be admitted as a conditionally classified student and must

make up any deficiencies before advancement to classified graduate standing.

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), taken within the last 2 years with a minimum score of 550 (paper version), 213 (computerized version), or 80 (internet based). Submit scores electronically to Institution Code: 4038. This requirement does not apply if your country of citizenship is listed on Cal Poly Admissions website:

<http://admissions.calpoly.edu/applicants/international/checklist.html>

Each specialization below may list additional prerequisites/requirements for the specific program.

## Programs of Study

There are four graduate degree programs in the college: MS Agribusiness, Master of Agricultural Education (non-thesis), MS Forestry Sciences, and MS Agriculture with the following specializations: Agricultural Engineering Technology, Animal Science, Crop Science, Dairy Products Technology, Environmental Horticultural Science, Food Science and Nutrition, Irrigation, Plant Protection Science, Recreation, Parks, and Tourism Management, and Soil Science.

**Thesis.** 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 based curriculum.

**Formal Study Plan.** Graduate students must file the formal study plan for the degree with the CAFES Graduate Coordinator 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 units required by the committee as reflected on the formal study plan 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.

All candidates must meet the current Graduation Writing Requirement; see page 62. All students are required to pass an oral comprehensive examination which is normally given during the final quarter of the program of study. A written comprehensive exam may also be required by the master's degree committee, but this is optional. For students in a thesis program the final oral comprehensive examination includes, but is not necessarily limited to, a defense of the thesis.

## Master of Science in Agriculture

### MS Agriculture, Specialization in AGRICULTURAL ENGINEERING TECHNOLOGY

Students have the opportunity to focus their program on the application of engineering technologies and management to solve agriculturally related problems.

	<i>Units</i>
<b>Required Courses</b> .....	23
BRAE 599 Thesis (6)	
AG 581/BRAE 581 Graduate Seminar (1)	
SS 501 Research Planning (4)	
STAT 512 Statistical Methods (4)	
STAT 513 Applied Experimental Design and Regression Models (4)	
BRAE 521 Systems Analysis of Ag Systems (4)	
<b>Approved electives</b> .....	22
Any 400 and 500 level courses approved by the student's graduate committee. At least half of all units required by the committee as reflected on the formal study plan must be at the 500 level.	
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### MS Agriculture, Specialization in ANIMAL SCIENCE

*Additional prerequisites:* Prospective students are required to: (1) submit a cover letter identifying interests, goals and experience relevant to the MS program, and (2) submit a résumé.

The program provides students with an interdisciplinary, science-based program, where students develop basic scientific knowledge, apply that knowledge to a research project, then write and defend a thesis. An individual's coursework and research project is focused based upon his or her interests and goals in Animal Science, and under the guidance of the advisor and thesis committee.

	<i>Units</i>
<b>Required Courses</b> .....	18
ASCI 581 Graduate Seminar (3)	
AG 581 Graduate Seminar (1)	
STAT 512 Statistical Methods (4)	
STAT 513 Applied Experimental Design and Regression Models (4)	
AG 599 Thesis (6)	
<b>Select 16 units from the following</b> .....	16
AG 500 Individual Study in Agriculture (6)	
ASCI 403 Applied Biotech in Animal Science (5)	
ASCI 405 Domestic Livestock Endocrinology (4)	
ASCI 406 Applied Animal Embryology (5)	
ASCI 415 HACCP for Meat and Poultry Ops (3)	
ASCI 420 Animal Metabolism and Nutrition (3)	
ASCI 438 Systemic Animal Physiology (4)	

ASCI 440 Immunology and Diseases of Animals (4) *or* ASCI 540 Advanced Immunology and Diseases of Animals (4)

ASCI 450 Computer Apps in Animal Science: Spreadsheet Analysis (4)

ASCI 500 Individual Study in Animal Science (6)

ASCI 503 Adv Molecular Tech in Animal Sci (4)

ASCI 593 Stem Cell Research Internship (5)

ASCI 594 Applications in Stem Cell Research (2)

AGED 438 Instructional Processes in Agric Ed (4)

BIO 501 Molecular and Cellular Biology (4)

BIO 524 Developmental Biology (2)

CHEM 528 Nutritional Biochemistry (3)

NR 532 Apps in Biometrics and Econometrics (4)

**Approved electives** ..... 11  
Any 400 and 500 level courses approved by the student's graduate committee. At least half of all units required by the committee as reflected on the formal study plan must be at the 500 level.

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### MS Agriculture, Specialization in CROP SCIENCE

For students with undergraduate preparation in plant agriculture. Research currently is focused primarily in postharvest technology, viticulture, and integrated pest management, with additional work being done in other areas, including agronomy, horticulture, and precision farming.

	<i>Units</i>
<b>Required Courses</b> .....	25
CRSC 445 Cropping Systems (4)	
CRSC 581 Graduate Seminar (3)	
CRSC 599 Thesis (6)	
HCS 511 Ecological Biometrics (4) <i>or</i> STAT 513 Applied Exp Design & Regression Models (4)	
HCS 570/571 Selected Topics Lecture (3)/Lab (1)	
SS 501 Research Planning (4)	
<b>Approved electives</b> .....	20
Any 400 and 500 level courses, approved by the student's graduate committee. At least half of all units required by the committee as reflected on the formal study plan must be at the 500 level.	
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### MS Agriculture, Specialization in DAIRY PRODUCTS TECHNOLOGY

*Additional prerequisites:* Prospective students are required to: (1) submit a cover letter identifying interests, goals and experience relevant to the MS program, and (2) submit a résumé.

An applied program for students who desire to use their academic preparation in food science and nutrition, dairy science, microbiology, chemistry, engineering, biochemistry and related fields to address applied research questions of impact to the field of dairy science and technology. The program requires the demonstration of strong analytical thinking, effective oral and written communication, and

project management. Coursework and thesis experience are designed with flexibility to enhance and increase proficiency in scientific methods while enriching students' overall preparation to enter the workforce. Graduates enter research and development positions with major food companies, leadership positions in dairy food processing and other allied areas, or further graduate study for the Ph.D. Students have opportunity to work on funded research projects of the Dairy Products Technology Center and interact with multidisciplinary teams of scientists from throughout the world. International students are encouraged to apply.

	<i>Units</i>
<b>Required Courses</b> .....	27
DSCI 401 Physical and Chemical Properties of Dairy Products (4)	
DSCI 444 Dairy Microbiology (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 523 Design and Analysis of Experiments (4)	
<b>Approved electives</b> .....	18
Any 400 and 500 level courses, approved by the student's graduate committee. At least half of all units required by the committee as reflected on the formal study plan must be at the 500 level.	_____
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### **MS Agriculture, Specialization in ENVIRONMENTAL HORTICULTURAL SCIENCE**

For students interested in careers in teaching, applied research positions in industry, or to students planning on continuing on for a Ph.D. It would also appeal to foreign students interested in an American graduate degree, particularly since California is internationally famous for its horticulture industry.

	<i>Units</i>
<b>Required Courses</b> .....	25
CRSC 581 or EHS 581 Graduate Seminar (3)	
HCS 500 Individual Study (4)	
HCS 511 Ecological Biometrics (4) <i>or</i> STAT 513 Applied Exp Design & Regression Models (4)	
HCS 570/571 Selected Topics/Lab (4)	
SS 501 Research Planning (4)	
EHS 599 Thesis (6)	
<b>Approved electives</b> .....	20
Any 400 and 500 level courses approved by the student's graduate committee. At least half of all units required by the committee as reflected on the formal study plan must be at the 500 level.	_____
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### **MS Agriculture, Specialization in FOOD SCIENCE AND NUTRITION**

For students with undergraduate preparation in food science, nutrition, or other science-based curricula. A thesis is re-

quired. Research areas vary with faculty expertise and interest; refer to Food Science and Nutrition Department and College of Agriculture, Food and Environmental Sciences web pages for more information on faculty research. Graduates are prepared for further study in doctoral programs or for responsible positions in nutrition and food industries.

	<i>Units</i>
<b>Required Courses</b> .....	15-17
FSN 581 Graduate Seminar (3)	
FSN 599 Thesis (6)	
SS 501 Research Planning <i>or</i> other 400-500 level research methods course (2-4)	
STAT 512 Statistical Methods (4)	
<b>Approved electives</b> .....	28-30
Any 400 and 500 level courses, approved by the student's graduate committee. At least half of all units required by the committee as reflected on the formal study plan must be at the 500 level.	_____
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### **MS Agriculture, Specialization in IRRIGATION**

*Additional prerequisites:* B.S. or B.A. with proficiency in basic chemistry and math. Students must have successfully completed at least one undergraduate class in general irrigation, soil science, crop science, calculus, and hydraulics, plus be familiar with spreadsheets. Students may complete prerequisite courses at Cal Poly if necessary.

	<i>Units</i>
<b>Required Courses</b> .....	37
BRAE 405 Chemigation (1)	
BRAE 414 Irrigation Engineering (4)	
BRAE 435 Drainage (4)	
BRAE 440 Agricultural Irrigation Systems (4)	
BRAE 438 Drip/Micro Irrigation <i>or</i> BRAE 439 Vineyard Water Management (4)	
BRAE 500 Individual Study (3)	
BRAE 532 Water Wells and Pumps (4)	
BRAE 533 Irrigation Project Design (4)	
BRAE 599 Thesis (6)	
400-500 level research methods or statistics course (3)	
<b>Approved electives</b> .....	8
Any 400 and 500 level courses approved by the student's graduate committee. At least half of all units required by the committee as reflected on the formal study plan must be at the 500 level.	_____
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### **MS Agriculture, Specialization in PLANT PROTECTION SCIENCE**

Provides research experience at the graduate level; provides the opportunity to conduct field and/or laboratory research programs with corporate stakeholders for career enhancement; allows students to develop more diverse or specialized

skill sets for post-graduation employment; provides opportunity to obtain required coursework for state licensing.

	<i>Units</i>
<b>Required Courses</b> .....	25
CRSC/EHS 581 Graduate Seminar (3)	
HCS 511 Ecological Biometrics (4) <i>or</i> STAT 513 Applied Exp Design & Regression Models (4)	
HCS 570/571 Selected Topics/Lab (4)	
PPSC 521 Plant-Pest Interactions (4)	
PPSC 599 Thesis (6)	
SS 501 Research Planning (4)	
<b>Select 8 units from the following</b> .....	8
PPSC 405 Advanced Weed Management (4)	
PPSC 414 Grape Pest Management (4)	
PPSC 427 Disease and Pest Control Systems for Ornamental Plants (4)	
PPSC 431 Insect Pest Management (4)	
PPSC 441 Biological Control of Insects (4)	
<b>Approved electives</b> .....	12
Any 400 and 500 level courses approved by the graduate committee. At least half of all units required by the committee as reflected on the formal study plan must be at the 500 level.	

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### **MS Agriculture, Specialization in RECREATION, PARKS, AND TOURISM MANAGEMENT**

Prerequisite: In order to develop an academic background in this discipline, students who have not completed a BS/BA degree in Recreation, Parks and Tourism Administration may be required to take the following courses: RPTA 360 and STAT 512.

	<i>Units</i>
<b>Required Courses</b> .....	27
POLS 510 Research Design (4)	
RPTA 450 Resource and Grant Development (4)	
RPTA 527 Leisure Behavior and Theory (4)	
RPTA 581 Graduate Seminar (2)	
RPTA 599 Thesis (9)	
STAT 513 Applied Experimental Design and Regression Models (4)	
<b>Approved electives</b> .....	18
Any 400 and 500 level courses approved by the graduate committee. At least half of all units required by the committee as reflected on the formal study plan must be at the 500 level.	

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### **MS Agriculture, Specialization in SOIL SCIENCE**

Provides graduate level knowledge and skills for soils interpretation and management, for teaching, or for continuation into a PhD program. Department facilities include modern instrumentation, laboratories, and a glasshouse. Students have access to several thousand acres of agricultural, forest, and range lands. Graduates 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.

	<i>Units</i>
<b>Required Courses</b> .....	40
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 501 Research Planning (4)	
SS 508 Environmental Assessment for Erosion Control (3)	
SS 522 Advanced Soil Fertility (3)	
SS 581 Graduate Seminar in Soil Science (3)	
SS 582 GIS in Advanced Land Management (3)	
SS 599 Thesis (6)	
<b>Approved electives</b> .....	5
Any 400 and 500 level courses approved by the graduate committee. At least half of all units required by the committee as reflected on the formal study plan must be at the 500 level.	

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Soil Science students with credit in SS 422, SS 423, SS 431, or SS 432 from the undergraduate degree may substitute other courses in the Required Courses list.

### **MBA, Specialization in AGRIBUSINESS**

The Orfalea 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 MBA curriculum and requires the completion of six graduate classes taught by the Agribusiness Department (see page 152, the Orfalea College of Business). Information and application materials may be obtained by writing to the MBA Coordinator, Orfalea 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 M.S. Engineering. Please see College of Engineering section of this catalog for more information.