

# HORTICULTURE & CROP SCIENCE

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Department Head: Scott Steinmaus

## Academic Programs

Program name	Program type
Agricultural and Environmental Plant Sciences	BS
Crop Science	Minor
Fruit Science	Minor
Landscape Horticulture	Minor
Plant Protection	Minor

The department offers the Agricultural and Environmental Plant Sciences major leading to the Bachelor of Science degree. Within this major are three concentrations: Environmental Horticultural Science, Fruit and Crop Science, and Plant Protection Science. Each concentration is well-grounded in the sciences and designed to prepare students for many attractive career opportunities.

## Experiential Learning Opportunities and Facilities

The Horticulture and Crop Science Department has well-equipped laboratories for instruction in plant biotechnology, insect and weed pest management, postharvest technology, plant production, and landscape horticulture, including CAD capabilities and plant materials.

Students have hands-on experiences in the production and marketing of landscape and ornamental plants using comprehensive facilities at the 16-acre Environmental Horticulture Unit. This unit includes 35,000 square feet of greenhouses, a 5,000 square-foot retractable roof greenhouse, 7,500 square feet of shade houses, a 10,000-square foot U.S. Golf Association specified experimental green, an extensive field container growing area, and a five-acre arboretum. Additionally there are six horticulture laboratories, four of which are fitted with "smart-room" technologies for state-of-the-art teaching. The Leaning Pine Arboretum and Gardens is an outdoor teaching laboratory while the 200 acres of landscaped campus are planted with many interesting and unusual trees and shrubs from all over the world, as well as California natives.

The Crops Unit has 70 acres of productive citrus, avocados, grapes, deciduous fruit trees, and berries, with additional nonbearing acreage for instructional use. There are also approximately 35 acres of annual vegetable and forage crops, of which eleven acres are certified for organic production. There is a modern building containing two teaching labs with prep rooms, two greenhouses, coolers, hydroponic vegetable production facility and a state-of-the-art fruit and vegetable processing line.

The technological aspects of instruction are enhanced by an array of equipment required in crop and fruit production systems, postharvest handling, biotechnology, seed processing, pesticide application, nursery and greenhouse operation, parks and sport grounds maintenance and landscape construction. Field trips supplement instruction and are encouraged for many classes.

Students are encouraged to gain experience and earn income by participating in the Enterprise project program or by working on the Department's farmland. Enterprise projects are run under faculty supervision but are student-operated. These projects provide students with a "no risk" glimpse of a commercial enterprise. The Department offers Enterprise projects in the production of vegetables, citrus, avocados, deciduous fruit and nut crops, floricultural crops, nursery plants, and forages. Available marketing outlets range from contract sales of vegetable seeds, wholesaling to area supermarkets, and direct marketing at local farmers' markets, garden centers, florist shops, and through campus outlets. Certified organic produce is marketed through weekly Farmers' Markets or it is sold to local restaurants and retailers.

The Department supports co-curricular activities for its students, including two student clubs: the Crops Club and the Horticulture Club. Student teams in flower judging, floral design and the landscape industry continue to win national championships.

## Undergraduate Programs BS Agricultural and Environmental Plant Sciences

The Horticulture and Crop Science Department at Cal Poly offers students an opportunity not just to learn, but to learn-by-doing. Our students benefit from a broad spectrum of opportunities ranging from hands-on experiences in our fields, groves, nurseries, and greenhouses to real world application through internships and other collaborations with our industry partners. We also excel in providing a foundational plant science background and instilling a passion for plants, as we produce the next generation of leaders in the agricultural and environmental plant sciences.

Students in this major begin with core courses that provide a thorough introduction to the various concentrations. Each concentration, in turn, has required courses, which may be shared by other concentrations. In their first year, students explore curricular and professional opportunities to enable them to choose a concentration. In consultation with professional and faculty advisors, students have the flexibility to select electives within the concentrations according to their career goals and interests.

Internships are readily available to students and are highly recommended. Interns are typically placed with private industry and public facilities all across the United States but may also take place in foreign countries.

Over \$100,000 in scholarships are available to students as are several undergraduate student assistantships which are sponsored by industry.

Program alumni are employed nationally and internationally and are often leaders in their industries. Graduates of the department are in great demand. Typically there are more internship and job opportunities than there are students to fill them.

## Concentrations

Each concentration offers introductory, intermediate and advanced classes. The concentrations offer their own course of study (including required courses and electives) as well as opportunities for cross-training and multi-disciplinary learning.

### Environmental Horticultural Science

This concentration offers students a comprehensive preparation for positions in the nursery, turf, greenhouse, landscape, and floriculture industries, including public horticulture. Graduates are employed as business owners, growers, managers, researchers, educators, arboreta and botanical garden directors, landscape contractors and designers, landscape management professionals, pest control advisors, and park, sports field and golf course superintendents. The curriculum stresses production and marketing of nursery plants, fresh flowers, and flowering and foliage plants, landscape contracting, design, installation and management, turf installation and management, integrated pest management, and horticultural education, native plant restoration, green roofs and walls, and the public display of plants.

### Fruit and Crop Science

The Fruit and Crop Science concentration provides students with detailed knowledge of the production of tree fruits and nuts, grapes, small fruits, vegetables and other row crops, and forages. The concentration details factors influencing the growth, development, and productivity of these crops (e.g., site selection, cultivar selection, field and plant establishment, pest management, harvesting, and postharvest handling). The concentration also focuses on ongoing and newly emerging specialty industries and concerns such as beekeeping, postharvest technology, plant breeding and biotechnology, integrated pest management, and precision agriculture.

### Plant Protection Science

Approximately one-third of the world's food crops are destroyed each year by insects, rodents, diseases and other pests. Finding ways to reduce these losses is the challenge of the plant protection specialist. In this concentration, students learn a broad range of pest management subjects including entomology, plant pathology, weed control and integrated pest management. Students develop an understanding of crop production principles, ecology, biotechnology, pesticide toxicology and environmental science. As environmental regulations continue to increase, employment opportunities will grow for those holding professional licenses, and this concentration prepares students to take the California Pest Control Advisor (PCA) and Certified Crop Advisor (CCA) license exams.

## Crop Science Minor

Designed for students majoring in related academic disciplines who desire careers in crop production or its associated industries. The minor offers a broad-based knowledge of the science and technology of agronomy and vegetable production, especially as practiced in California. Not open to AEPS majors concentrating in Fruit and Crop Science or Plant Protection Science.

## Fruit Science Minor

The minor is designed for students majoring in related academic disciplines who desire to seek careers in fruit production or its associated industries. The minor offers a broad-based knowledge of the science and technology of fruit and nut production. Not open to AEPS majors concentrating in Fruit and Crop Science or Plant Protection Science.

## Landscape Horticulture Minor

The minor provides students with an understanding of the landscape horticultural industry and provides basic skills to understand the design, installation, and maintenance of landscapes. Students develop a knowledge of landscape plants and plant care as well as the basics of landscape contracting, including construction processes and materials used in the landscape industry. Students may learn advanced skills and concepts in the areas of turfgrass for golf course/sports field applications, design/build, plant care and arboriculture. Not open to AEPS majors concentrating in Environmental Horticultural Science.

## Plant Protection Minor

This program emphasizes both plant protection and plant production. Within the plant protection field of study, the student is 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. Not open to AEPS majors.

## Interdisciplinary Minors

The department participates in offering interdisciplinary minors in Geographic Information Systems for Agriculture, Land Rehabilitation, and Sustainable Agriculture. Please see College of Agriculture, Food and Environmental Sciences (<http://catalog.calpoly.edu/collegesandprograms/collegeofagriculturefoodenvironmentalsciences>) section for more information.

## Graduate Programs

Cal Poly offers a Master of Science degree in Agriculture with specializations in Crop Science, Environmental Horticultural Science, and Plant Protection Science, among others. Please refer to the MS Agriculture (<http://catalog.calpoly.edu/collegesandprograms/collegeofagriculturefoodenvironmentalsciences/#graduate>) section of the College of Agriculture, Food and Environmental Sciences.

### AEPS Courses

**AEPS 101. Orientation to Horticulture and Crop Science. 2 units**  
CR/NC

Term Typically Offered: F

Understand the depth and breadth of horticulture, field crops, and plant protection careers. Examination of curricula within the department. Introduction to both student and professional organizations. Emphasis on curriculum and career planning. Required of all Horticulture and Crop Science students. Credit/No Credit grading only. 1 lecture, 1 activity.

**AEPS 110. People, Pests and Plagues. 4 units**

GE Area B2; GE Area B4

Term Typically Offered: F, SP

Introduction to the science of entomology, focusing on insect identification, biology, ecology, and interactions with humans. Insect pest and beneficial species, and their role in shaping how we live, work and eat. Not open to Agricultural and Environmental Plant Sciences majors or Wine and Viticulture majors (viticulture concentration). 3 lectures, 1 activity. Fulfills GE B2 & B4.

**AEPS 120. Principles of Horticulture and Crop Science. 4 units**

Term Typically Offered: F, W, SP

Introduction to horticulture and crop science. Basic plant processes, classification, anatomy, physiology, and biotechnology. Effect of environment on plants and how we control it. Introduction to plant growth including propagation, media, irrigation, nutrition, management, harvest, and post harvest handling. People's use of plants. Field trip required. 3 lectures, 1 laboratory.

**AEPS 123. Landscape Installation and Maintenance. 4 units**

Term Typically Offered: W

Prerequisite: AEPS 120.

Planting and maintenance of trees, shrubs, ground covers, perennial plantings, color beds, specialty plantings, and small turf areas. Site selection, cultural requirements, scheduling of maintenance activities, pruning, landscape renovation and irrigation system repair. Equipment operation, maintenance, and safety. Speakers from industry. 3 lectures, 1 laboratory.

**AEPS 124. Plant Propagation. 4 units**

Term Typically Offered: SP

Prerequisite: AEPS 120 and BOT 121.

Plant propagation practices with emphasis on understanding why practices are used, how they work, and how they are applied in commercial horticulture. Field trip required. 3 lectures, 1 laboratory.

**AEPS 126. Landscape Construction. 3 units**

Term Typically Offered: SP

Prerequisite: AEPS 120.

Design, construction techniques, and materials used in landscape and horticulture construction. Material quantity estimating, sustainable building practices, construction material substitutions, tools and equipment associated with landscape and horticulture construction, and equipment safety. Field trip required. 2 lectures, 1 laboratory.

**AEPS 127. Horticulture and Landscape Design. 4 units**

Term Typically Offered: W

Aesthetic aspects of environmental horticulture, introduction to computer aided design, presentation techniques and garden history. Field trip required. 2 lectures, 2 laboratories.

**AEPS 132. Pomology I. 4 units**

Term Typically Offered: W

Prerequisite: AEPS 120.

Orchard design and development, cultural practices, physiological responses of trees to cultural practices, propagation and strategies to maximize orchard profitability and sustainability. Not open to students with credit in AEPS 250. 3 lectures, 1 laboratory.

**AEPS 133. Pomology II. 4 units**

Term Typically Offered: SP

Prerequisite: AEPS 132.

Analysis of production and management strategies for major fruit and nut crops in California. 3 lectures, 1 laboratory.

**AEPS 150. Forage Crops. 4 units**

Term Typically Offered: F

Forages as a world resource in food and animal production, soil and water conservation and sustainable agricultural systems. Forage use systems: pasture and range, green chop, silage, hay and cubes. Identification and management of limiting factors of forage plant growth. Botany of legumes and grasses. Grass, legume and weed identification. Forage crop improvement. Forage composition and quality. Antiquity factors. 3 lectures, 1 laboratory.

**AEPS 175. Beekeeping. 3 units**

Term Typically Offered: F, SP

Studies and exercises in the handling of European honey bees with special reference to pollination of commercial crops. Honey processing and marketing. Hive inspection and disease detection. 2 lectures, 1 laboratory.

**AEPS 190. California Vegetable Production. 4 units**

Term Typically Offered: SP

Prerequisite: AEPS 120.

History, botany, growth characteristics and climatic adaptation, pests, and harvesting methods for the most important vegetable crops grown in California. Use of transplants, plastic mulches and row covers in vegetable production. Current topics in agriculture important to the vegetable industry. Field trip to a major California vegetable production area required. Survey of vegetable production for Agricultural and Environmental Plant Sciences majors. 3 lectures, 1 laboratory.

**AEPS 200. Special Problems for Undergraduates. 1-4 units**

Term Typically Offered: F,W,SP,SU

Prerequisite: Consent of instructor.

Individual investigation, research, studies, or surveys of selected problems. Total graduation credit limited to 4 units, with a maximum of 4 units per quarter. Report required.

**AEPS 202. Fruit Enterprise Project. 2 units**

CR/NC

Term Typically Offered: F, W, SP

Beginning field experience in management of orchards or honeybees. May include cultural practices, harvesting, processing, sales and marketing activities. Credit/No Credit grading only. 1 lecture, 1 activity.

**AEPS 203. Organic Enterprise. 2 units**

CR/NC

Term Typically Offered: F, W, SP

Beginning field experience in production and marketing of organic vegetable crops. May include cultural practices, harvesting, processing, sales and marketing activities. Credit/No Credit grading only. 1 lecture, 1 activity.

**AEPS 204. Vegetable Enterprise Project. 2 units**

CR/NC

Term Typically Offered: F, W, SP

Beginning field experience in vegetable production systems. May include cultural practices, harvesting, processing, sales and marketing activities. Credit/No Credit grading only. 1 lecture, 1 activity.

**AEPS 210. Viticultural Practices. 2 units**

Term Typically Offered: W, SP

Critical viticultural practices including planting, pruning, canopy management, fruit thinning, harvest, floor management, trellis and irrigation maintenance. 2 activities. Crosslisted as AEPS/WVIT 210.

**AEPS 212. Environmental Horticulture Enterprise Project I. 2 units**  
CR/NC

Term Typically Offered: F, W, SP

Beginning field experience in environmental horticulture. Selection and completion of a management/production project. Credit/No Credit grading only. 1 lecture, 1 activity.

**AEPS 215. Floral Design I. 3 units**

Term Typically Offered: F, W

Fundamentals of theory, techniques and skills currently practiced in the floral industry. Intended as consumer education for non-majors as well as initial preparation for pre-professionals. Includes applied art principles, post-harvest care and handling practices, and proper use of florist tools and materials in developing basic designs. 1 lecture, 2 laboratories.

**AEPS 225. Floral Design II. 3 units**

Term Typically Offered: SP

Prerequisite: AEPS 215.

Expanded exploration and application of design theory to commercial products and services in the retail floral industry. Appropriate utilization of current sales and business practices in a florist setting. Advanced techniques and skills for construction of designs for weddings, advanced arrangements, and designs for events. 1 lecture, 2 laboratories.

**AEPS 230. Environmental Horticulture. 4 units**

Term Typically Offered: F

Technical information and recommendations for the residential horticulturist. Propagation, pruning, planting, media, fertilizers, pest and weed control, landscaping, maintenance, identification and care of ornamental plants. Being a wise horticultural consumer. Not open to Agricultural and Environmental Plant Sciences majors. 3 lectures, 1 laboratory.

**AEPS 233. Plant Materials I. 4 units**

Term Typically Offered: SP

Identification, habits of growth, cultural requirements, and use of ornamental plants in the landscape. 3 lectures, 1 laboratory.

**AEPS 234. Plant Materials II. 4 units**

Term Typically Offered: F

Identification, habits of growth, cultural requirements, and use of ornamental plants in the landscape. 3 lectures, 1 laboratory.

**AEPS 240. Commercial Seed Production. 4 units**

Term Typically Offered: SP

Prerequisite: AEPS 120 or AEPS 260.

Production of field and vegetable seed. Seed technology, germination, quality control, seed enhancement, storage and handling of seed, and seed laws. Field trip to a seed conditioning/seed enhancement facility required. 3 lectures, 1 laboratory.

**AEPS 244. Precision Farming. 4 units**

Term Typically Offered: W

Prerequisite: AEPS 133 or AEPS 190 or AEPS 260 or BRAE 237 or BRAE 239.

Precision agriculture applications. Integrating GIS, GPS, and remote sensing technologies with site-specific farming practices to optimize agricultural productivity. Field trip required. 3 lectures, 1 laboratory. Crosslisted as AEPS/BRAE 244.

**AEPS 245. Horticultural Production Techniques. 3 units**

Term Typically Offered: F

Applied principles of plant growth in relation to the production horticulture industry. Emphasis on container media, fertilizing practices, irrigation, plant growth regulators, and miscellaneous growing structures. 2 activities, 1 laboratory.

**AEPS 250. California Fruit Growing. 4 units**

Term Typically Offered: F

Interrelationship of climate and cultural techniques on orchard productivity. California's place in the international production-marketing scheme. Field trip required. Not open to Agricultural and Environmental Plant Sciences majors, or students with credit in AEPS 132. 3 lectures, 1 laboratory.

**AEPS 260. Introduction to Vegetable Science. 4 units**

Term Typically Offered: F

Environmental and cultural principles involved in the production of California vegetable crops; temperature, daylength and fertility effects on production and yield, use of plastic mulches and row covers, and use of transplants. Harvest principles and precooling methods. Not open to Agricultural and Environmental Plant Sciences majors or students with credit in AEPS 190. 3 lectures, 1 laboratory.

**AEPS 270. Selected Topics. 1-4 units**

Term Typically Offered: TBD

Prerequisite: Open to undergraduate students and consent of instructor.

Directed group study of selected topics. The Schedule of Classes will list title selected. Total credit limited to 8 units. 1 to 4 lectures.

**AEPS 301. Principles of Landscape Design. 4 units**

Term Typically Offered: TBD

Prerequisite: AEPS 127, and AEPS 233 or AEPS 234.

Introduction to basic principles and elements of residential landscape design, design theory, plant composition, creative problem solving, functional and aesthetic uses of landscape materials, client and maintenance criteria, and sustainable design concepts. Intermediate computer aided design drafting and drawing skills. 2 lectures, 2 laboratories.

**AEPS 304. Introduction to Plant Breeding. 4 units**

Term Typically Offered: W, SP

Prerequisite: AEPS 120 and STAT 218. Recommended: one of the following: AEPS 132, AEPS 190, AEPS 230, AEPS 245, AEPS 250, or WVIT 233.

Principles of qualitative and quantitative genetics useful in the development of new plant varieties. Procedures for the creation of genetic variability, testing procedures, and selection schemes for development of improved plant types. 4 lectures.

**AEPS 312. Environmental Horticulture Enterprise Project II. 2 units**

CR/NC

Term Typically Offered: F, W, SP

Prerequisite: Consent of instructor.

Field experience in environmental horticulture. Selection and completion of a management/production project under faculty supervision. Credit/No Credit grading only. 1 lecture, 1 activity.

**AEPS 313. Agricultural Entomology. 4 units**

Term Typically Offered: F, SP

Prerequisite: AEPS 120 or BOT 121; and one of the following: CHEM 110, CHEM 111, or CHEM 127.

The science of entomology as it relates to insects of importance in agriculture. Focus on the biology, ecology and identification of insects and mites important to California horticulture, field crops and landscapes. 3 lectures, 1 laboratory.

**AEPS 315. Organic Crop Production. 4 units**

GE Area F

Term Typically Offered: SP

Prerequisite: Junior standing and completion of GE Area B.

Origins, application, regulation and technology of organic crop production. Theoretical and practical issues surrounding organic crop production from a cross-disciplinary perspective. Topics include the history of the organic movement; current regulation and certification; and field management practices and technologies. Features industry guest lecturers. 3 lectures, 1 activity. Crosslisted as AEPS/AG 315. Fulfills GE Area F.

**AEPS 321. Weed Biology and Management. 4 units**

Term Typically Offered: F, SP

Prerequisite: AEPS 120 or BOT 121.

Weed ecology, biology, and implications for management. Identification of weedy and invasive plant species in annual agricultural, perennial semi-managed, range, aquatic, and forest ecosystems, to elucidate weaknesses and strengths in order to facilitate vegetation management. Organic, cultural, biological, mechanical, and chemical methods and their integrated pest management (IPM) uses. 3 lectures, 1 laboratory.

**AEPS 323. Plant Pathology. 4 units**

Term Typically Offered: F, SP

Prerequisite: BIO 162 or BOT 121.

Comprehensive study of the causes and effects of disease in plants. Designed to lead to an understanding of the science and modern control methods. 2 lectures, 2 laboratories. Crosslisted as AEPS/BOT 323.

**AEPS 327. Vertebrate Pest Management. 4 units**

Term Typically Offered: W

Prerequisite: Junior standing.

Vertebrate pests injurious to crops, livestock, forest products, wildlife, stored products and humans. Life habits, identification, control methods, and materials. Related laws and regulations. 3 lectures, 1 laboratory.

**AEPS 329. Plants, Food, and Biotechnology. 4 units**

GE Area F

Term Typically Offered: TBD

Prerequisite: Junior standing and completion of one of the following: AEPS 120, BIO 111, BIO 114, BIO 161, or BOT 121.

Agriculture as applied biology and its impact on civilization. Application of technology to increase the efficiency of food production. Genetics and biotechnology; culminating in an assessment of genetically engineered foods, the myths, the controversy, the science. Not open to Agricultural and Environmental Plant Sciences majors. 3 lectures, 1 laboratory. Crosslisted as AEPS/BOT 329. Fulfills GE Area F.

**AEPS 331. Advanced Viticulture - Fall. 4 units**

Term Typically Offered: F, SU

Prerequisite: AEPS/WVIT 231 or WVIT 232 or WVIT 233.

Advanced viticulture theory and practice, with an emphasis on fall season activities. Identification of rootstocks, wine and table grapes, species taxonomy and diversity, and breeding for grapevine improvement. Field trips required. 3 lectures, 1 laboratory. Crosslisted as AEPS/WVIT 331.

**AEPS 332. Landscape Contracting. 4 units**

Term Typically Offered: SP

Prerequisite: AEPS 126 and AEPS 127.

Practices in supervising personnel and applying standard techniques in landscape construction. Cost finding and estimating for landscape trades. 3 lectures, 1 laboratory.

**AEPS 333. Greenhouse Vegetable Production. 2 units**

Term Typically Offered: F

Prerequisite: AEPS 120; CHEM 111 or CHEM 127; and SS 221.

Development, practices, history, and future of crop production in greenhouses. Research applications, commercial applications, production problems, marketing, and economics. Special emphasis on growing transplants in greenhouses and use of nutrient solutions. Field trips to a commercial greenhouse operation and/or analysis lab required. 2 activities.

**AEPS 339. Internship in Horticulture and Crop Science. 1-12 units**

CR/NC

Term Typically Offered: F,W,SP,SU

Prerequisite: Consent of instructor.

Selected Horticulture and Crop Science students will spend up to 12 weeks with an approved agricultural/horticultural firm engaged in production or related business. Time will be spent applying and developing production and managerial skills and abilities. One unit of credit may be allowed for each full week of completed and reported internship. Degree credit limited to 6 units. Credit/No Credit grading only.

**AEPS 340. Principles of Greenhouse Environment. 4 units**

Term Typically Offered: SP

Prerequisite: AEPS 245.

Analysis of problems and practices affecting the contemporary commercial horticulturist. Analysis and operation of greenhouses and related equipment stressing the effect of environment on plant growth. Field trip required. 3 lectures, 1 laboratory.

**AEPS 341. Cut Flower Production. 4 units**

Term Typically Offered: F  
Prerequisite: AEPS 120.

Production of cut flowers and other fresh florists' commodities in greenhouses and outdoors. Preparation and scheduling of such commodities for major markets. Field trip required. 3 lectures, 1 laboratory.

**AEPS 342. Potted Plant Production. 4 units**

Term Typically Offered: W  
Prerequisite: AEPS 245.

Production of major commercial flowering potted plants in greenhouses and outdoors. Preparation and scheduling of potted flowering greenhouse crops for major markets. Field trip required. 3 lectures, 1 laboratory.

**AEPS 343. Turfgrass Management. 4 units**

Term Typically Offered: F  
Prerequisite: AEPS 120 or BOT 121; and SS 121.

Turfgrass species and uses. Principles of turfgrass physiology and communities under different environments. Overview of procedures and equipment for propagation, mowing, irrigation, fertilization, aerification, and pest control. 3 lectures, 1 laboratory.

**AEPS 350. Abiotic Plant Problems. 3 units**

Term Typically Offered: W  
Prerequisite: AEPS 124; CHEM 111 or CHEM 127; and SS 121.

Diagnosis of physiological disorders associated with environmental and nutritional factors. Particular emphasis on the systematic inquiry process. Case histories, multimedia use. 2 lectures, 1 laboratory.

**AEPS 351. Experimental Techniques and Analysis. 4 units**

Term Typically Offered: W  
Prerequisite: Junior standing and MATH 118 or equivalent, and STAT 218.

Principal experimental designs used in agriculture and methods of statistical analysis of data collected from each. Statistical software. Field practice in planning and layout of typical experiments. 3 lectures, 1 laboratory.

**AEPS 355. Citrus and Avocado Fruit Production. 4 units**

Term Typically Offered: SP  
Prerequisite: AEPS 120 or AEPS 250.

World citrus and avocado production and marketing. Orchard management techniques. Relationship of environment to species, cultivar, and rootstock selection. Field trip to a major California production area required. 3 lectures, 1 laboratory.

**AEPS 381. Native Plants for California Landscapes. 4 units**

Term Typically Offered: W, SP  
Prerequisite: BOT 121 and junior standing.

Horticultural investigation of the California flora with emphasis on landscape use and potential. Plant recognition, identification, propagation and culture. Utilization of native plants in landscape design and habitat restoration. Field trip required. 3 lectures, 1 laboratory.

**AEPS 400. Special Problems for Advanced Undergraduates. 1-4 units**

Term Typically Offered: F,W,SP,SU  
Prerequisite: Consent of instructor.

Individual investigation, research, studies, or surveys of selected problems. Total degree credit limited to 4 units, with a maximum of 4 units per quarter. Report required.

**AEPS 402. Fruit Enterprise Project Management. 2 units**

CR/NC  
Term Typically Offered: F, W, SP  
Prerequisite: AEPS 202 and consent of instructor.

Advanced experience in production of orchards. Development and execution of a plan for field operations, fruit processing and/or marketing. Management decision-making. Total credit limited to 4 units. Credit/No Credit grading only. 1 lecture, 1 activity.

**AEPS 403. Organic Enterprise Project Management. 2 units**

CR/NC  
Term Typically Offered: F, W, SP  
Prerequisite: AEPS 203 and consent of instructor.

Advanced experience in production of organic vegetables. Development and execution of a plan for planting schedule, cultivation, harvest, and/or marketing. Management decision-making. Total credit limited to 4 units. Credit/No Credit grading only. 1 lecture, 1 activity.

**AEPS 404. Vegetable Enterprise Project Management. 2 units**

CR/NC  
Term Typically Offered: F, W, SP  
Prerequisite: AEPS 204 and consent of instructor.

Advanced experience in the production of vegetable crops. Development, management and implementation of cultural practices, harvesting, processing, sales and marketing activities for vegetable crops. Total credit limited to 4 units. Credit/No Credit grading only. 1 lecture, 1 activity.

**AEPS 406. Advanced Weed Management. 4 units**

Term Typically Offered: W  
Prerequisite: AEPS 321.

Advanced coverage of sustainable weed and invasive plant management technologies. Concepts include environmental fates, plant metabolism, ecology and biology of weeds, and mechanisms of action of herbicides. Plant biotechnology as it relates to herbicide resistance in crops and weeds. 4 lectures.

**AEPS 410. Crop Physiology. 4 units**

Term Typically Offered: SP  
Prerequisite: AEPS 120 or BIO 263; BIO 162 or BOT 121; and CHEM 216, CHEM 312 or CHEM 316.

Ecological and physiological interactions associated with the production of crop plants. Physiological and biochemical processes that elucidate the mechanism of whole plant performance and responses to the environment. 3 lectures, 1 laboratory.

**AEPS 414. Grape Pest Management. 4 units**

Term Typically Offered: F, SP

Prerequisite: AEPS/WVIT 231, WVIT 232 or WVIT 233; AEPS 313; AEPS/BOT 323.

Comprehensive survey of major grape pests including diseases, insects, weeds, vertebrates, and nematodes. Identification and biology of grape pests and natural enemies, monitoring, and integrated pest management (IPM) strategies, including cultural, biological, and chemical controls. Guest lectures. 3 lectures, 1 activity. Crosslisted as AEPS/WVIT 414.

**AEPS 421. Postharvest Technology of Horticultural Crops. 4 units**

Term Typically Offered: W

Prerequisite: Junior standing.

Respiration, ethylene, ripening and senescence; modified atmosphere packaging, controlled atmosphere storage, packinghouses and transportation; survey of postharvest techniques to maximize commodity shelf-life. Field trip required. 3 lectures, 1 laboratory.

**AEPS 423. Advanced Vegetable Science. 4 units**

Term Typically Offered: TBD

Prerequisite: AEPS 190 or AEPS 260.

Agricultural land conservation; current laws impacting vegetable production and marketing. Environmental and cultural effects on selected vegetables including specific effects on growth, flowering, fruiting and yield. Field trip to desert vegetable production regions required. 3 lectures, 1 laboratory.

**AEPS 424. Nursery Crop Production. 4 units**

Term Typically Offered: W

Prerequisite: AEPS 124.

Comprehensive and historical overview of the nursery industry. Types of wholesale nurseries and their products. Plant production systems, scheduling, and marketing. Emphasis on medium to large woody plants and deciduous field-grown ornamental trees and shrubs in the western U.S. Field trip required. 3 lectures, 1 laboratory.

**AEPS 425. Arboriculture. 4 units**

Term Typically Offered: F

Prerequisite: AEPS 123, AEPS 233, and AEPS 234 or NR 208 for FNR majors.

Theory and practice for the care and management of ornamental trees. Selection, planting, establishment, maintenance of specimen trees. Professional use of ropes and safety equipment. Tree evaluation, scheduling cultural practices, bracing, cabling, specialty hand and power equipment operation, safety regulations. 2 lectures, 2 laboratories.

**AEPS 427. Disease and Pest Control Systems for Ornamental Plants. 4 units**

Term Typically Offered: W

Prerequisite: AEPS 120, AEPS 313, AEPS 321, and AEPS/BOT 323.

Recognition, prevention and control of diseases, insect/mite pests and weeds that impact commercial ornamental plantings. Integrated pest management strategies presented including biological, cultural, and safe and proper pesticidal controls. Laboratory emphasizes monitoring, problem solving and application of appropriate pest control measures. 3 lectures, 1 laboratory.

**AEPS 431. Insect Pest Management. 4 units**

Term Typically Offered: W

Prerequisite: AEPS 313.

Principles of insect and mite pest management, including integrated pest management (IPM), applications of ecological theory to pest management, cultural, biological and chemical controls, pesticide resistance management, insect and mite monitoring, biotechnology applications, pesticide laws and regulations, pest control advisor and qualified applicator licensing and certification. Field trip required. 3 lectures, 1 laboratory.

**AEPS 432. Specialized Operations for Golf Courses and Athletic Fields. 4 units**

Term Typically Offered: SP

Prerequisite: AEPS 343.

Advanced maintenance and operation of golf course facilities and athletic field complexes. Specialized turf establishment and maintenance, environmental concerns, finance and personnel management, and professional development. Field trip required. 3 lectures, 1 laboratory. Not open to students with credit in AEPS 430 or AEPS 433.

**AEPS 434. Landscape Management. 4 units**

Term Typically Offered: TBD

Prerequisite: AEPS 123 and AEPS 126 and junior standing.

Maintenance procedures and operations. Operating a landscape management business. Estimating, scheduling, recordkeeping and implementation of landscape maintenance projects. Interior landscape maintenance. 3 lectures, 1 laboratory.

**AEPS 435. Advanced Landscape Design. 4 units**

Term Typically Offered: TBD

Prerequisite: AEPS 233, AEPS 234, AEPS 301. Recommended: AEPS 381.

Advanced principles of landscape design for residential properties. Design process, form, and space composition emphasized. Application of sustainable design concepts. Computer aided design applications, including three-dimensional design, emphasized. Field trip required. 2 lectures, 2 laboratories.

**AEPS 437. Park and Public Space Management. 4 units**

Term Typically Offered: F

Prerequisite: Junior standing.

Management and maintenance of private and public parks, arboreta, botanical gardens and recreational areas. Maintenance personnel management, safety and liability issues. Field trips required. 3 lectures, 1 laboratory.

**AEPS 441. Biological Control for Pest Management. 4 units**

Term Typically Offered: F

Prerequisite: AEPS 313.

Control of arthropods, weeds and vertebrates to include history of biocontrol; biology of beneficial arthropods; methods of introduction, augmentation and conservation; and case studies. Identification of beneficial arthropods to appropriate taxonomic level. Technology, laws and regulations governing use of biocontrol agents. Field trips to insectaries, quarantine facilities and/or crop production areas. 3 lectures, 1 laboratory.

**AEPS 445. Cropping Systems. 4 units**

Term Typically Offered: W

Prerequisite: AEPS 120; or BOT 121 and SS 121; or graduate standing.

Classification and description of agricultural systems of the world. Cropping systems as land management plans. Systems approaches to improvement of agricultural situations. Consideration of human factors and the agroecosystem in efforts to create a more sustainable agriculture. Field trip required. 3 lectures, 1 activity.

**AEPS 461. Senior Project I. 2 units**

Term Typically Offered: F, W, SP

Prerequisite: Junior standing, completion of GE Area A1, and STAT 218.

Initial information research for project definition and development. Projects are typical of problems which graduates must solve in their fields of study or employment. Project results are presented in AEPS 462. Contract drawn up with approval of advisor. 2 lectures.

**AEPS 462. Senior Project II. 2 units**

Term Typically Offered: F,W,SP,SU

Prerequisite: Consent of instructor.

Continuation of Senior Project development. Write-up of rough draft and formal draft of project. Completion of formal written report under advisor supervision. Minimum 60 hours.

**AEPS 470. Selected Advanced Topics. 1-4 units**

Term Typically Offered: TBD

Prerequisite: Consent of instructor.

Directed group study of selected topics for advanced students. The Schedule of Classes will list topic selected. Total credit limited to 8 units. 1-4 lectures.

**AEPS 471. Selected Advanced Laboratory. 1-4 units**

Term Typically Offered: TBD

Prerequisite: Consent of instructor.

Directed group laboratory study of selected topics for advanced students. Open to undergraduate and graduate students. The Schedule of Classes will list topic selected. Total credit limited to 8 units. 1-4 laboratories.

**AEPS 500. Individual Study in Horticulture and Crop Science. 1-6 units**

Term Typically Offered: F,W,SP,SU

Prerequisite: Consent of instructor.

Advanced independent study planned and completed under the direction of a member of the Horticulture and Crop Science faculty. Total credit limited to 6 units.

**AEPS 539. Graduate Internship in Horticulture and Crop Science. 1-9 units**

Term Typically Offered: F,W,SP,SU

Prerequisite: Consent of instructor.

Application of theory to the solution of problems of agricultural production or related business in the fields of horticulture and crop science. Analyze specific management problems and perform general management assignments detailed in a contract between the student, the firm or organization, and the faculty advisor before the internship commences. Degree credit limited to 6 units.

**AEPS 570. Selected Topics in Horticulture and Crop Science. 1-4 units**

Term Typically Offered: TBD

Prerequisite: Consent of instructor.

Directed group study of selected topics for advanced students. The Schedule of Classes will list title selected. Total credit limited to 12 units. 1-4 seminars.

**AEPS 571. Selected Topics Laboratory in Horticulture and Crop Science. 1-4 units**

Term Typically Offered: TBD

Prerequisite: Consent of instructor.

Directed group laboratory of selected topics for advanced students. The Schedule of Classes will list title selected. Total credit limited to 12 units. 1-4 laboratories.

**AEPS 575. Applied Systematics for Agriculture. 4 units**

Term Typically Offered: W

Prerequisite: Graduate standing. Recommended: a course in basic entomology, plant pathology, and weed science.

The application of evolutionary, phylogenetic, taxonomic and biogeographic principles as they pertain to current agricultural issues in the US. Attention is given to invasive species and their impact on California's agricultural industry. The course focus is insects, but invasive plants and microorganisms are also addressed. 4 seminars.

**AEPS 581. Graduate Seminar in Crop/Fruit Production. 3 units**

Term Typically Offered: TBD

Prerequisite: Graduate standing.

Group study of current problems, trends and research results pertaining to production or marketing of field, vegetable or fruit crops. 3 seminars.

**AEPS 596. Thesis in Crop Science. 1-9 units**

Term Typically Offered: F, W, SP

Prerequisite: Graduate standing and consent of instructor.

Systematic research of a significant problem in Crop Science. Thesis will include problem identification, significance, methods, data analysis, and conclusion. Students must enroll every quarter in which facilities are used or advisement is received. Degree credit limited to 6 units.

**AEPS 597. Thesis in Environmental Horticulture Science. 1-9 units**

Term Typically Offered: F, W, SP

Prerequisite: Graduate standing and consent of instructor.

Systematic research of a significant problem in environmental horticulture. Thesis will include problem identification, significance, methods, data analysis and conclusion. Students must enroll every quarter in which facilities are used or advisement is received. Degree credit limited to 6 units.

**AEPS 598. Thesis in Fruit Science. 1-9 units**

Term Typically Offered: F, W, SP

Prerequisite: Graduate standing and consent of instructor.

Systematic research of a significant problem in Fruit Science. Thesis will include problem identification, significance, methods, data analysis, and conclusion. Students must enroll every quarter in which facilities are used or advisement is received. Degree credit limited to 6 units.



**AEPS 599. Thesis in Plant Protection Science. 1-9 units**

Term Typically Offered: F, W, SP

Prerequisite: Graduate standing and consent of instructor.

Systematic research of a topic in plant protection science, including weed science, entomology, plant pathology, nematology or vertebrate management. Thesis to describe the problem and its significance, methodology, results, data analysis, discussion and conclusion. Enrollment required every quarter in which facilities are used or advisement received. Degree credit limited to 6 units. Total credit limited to 9 units.