

Plant Science

College of Agricultural
Sciences and Technology

Department of Plant Science

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<http://cast.csufresno.edu/PlantSci/>

B.S. in Plant Science

Options:

- Agronomy
- Horticulture
- Plant Health
- General Plant Science

M.S. in Plant Science

Minor in Plant Science

Plant Science

Join the leader in science, technology, and management. The Department of Plant Science offers programs in production with classes in science and technology and in business management. Students select an option in agronomy (CRSC and SW courses), horticulture (OH, HORT, VIT, and some CRSC courses), or plant health (PLTH, CRSC, HORT, OH, and VIT courses), or they may choose a broad general plant science option.

Courses offered by the department integrate physiology, soils and nutrition, cultural practice, protection against plant pests, marketing, storage and handling practices, and mechanization to provide students with a well-balanced background for positions in plant/soil sciences, and crop production. In addition, courses in areas such as micropropagation, plant improvement, and seed technology provide students with a background for further studies in plant biotechnology.



Each degree option integrates departmental curricula with the basic sciences (e.g., biology, chemistry, mathematics, physics) and management skills to build a well-balanced foundation.

The irrigation and viticulture programs have received the Western Region and National Awards for Excellence in Agricultural Technology Instruction respectively. These prestigious awards are sponsored by the National Association of State Departments of Agriculture and R. J. Reynolds Industries Inc.

For information about laboratory units and supervised projects, contact the department office.

Career Opportunities

The courses offered within each of the disciplinary areas in the department provide the required background and experience to qualify graduates of these programs for many exciting, well-paying careers. For a list of career opportunities, contact the department office.

Mandatory Advising

It is the policy of the department that every student see his/her assigned adviser at least once during the academic year.

Faculty

The faculty members hold advanced degrees in their fields of specialization from leading agricultural institutions and universities in the United States. They are well-qualified teachers who, through extensive research and interaction with major agricultural industries, bring a wealth of basic and practical information into the classroom. A faculty academic adviser is assigned to work with each student to plan and design an individualized program of study to meet the student's educational and career objectives.

Most of the faculty members are involved in one or more of the California Agricultural Technology Institute Centers — the Center for Irrigation Technology and the Viticulture and Enology Research Center — and the San Joaquin Experimental Range. The centers offer excellent opportunities to undergraduate and graduate students who gain experience by participating in applied research projects that address and help solve problems faced by California's agricultural industry.

James J. Farrar, *Chair*
 Bruce A. Roberts,
J.G. Boswell Chair of Agronomy
 Sharon E. Benes, *Co-Graduate Coordinator*
 Andrew B. Lawson, *Co-Graduate Coordinator*

Athanasios Alexandrou
 Daniel P. Bartell
 Charles Boyer
 John T. Bushoven
 Carlos Crisosto
 Kent M. Daane
 Todd C. Einhorn
 Dave Goorahoo
 Ken Heupel
 Charles F. Krauter
 Nigel W.T. Quinn
 Brad Ramsdale
 William Stringfellow
 David Zoldoske

Bachelor of Science Degree Requirements

Plant Science Major

Options: Agronomy, Horticulture,
 Plant Health, General Plant Science

Recommended curriculum for students interested in agronomy (crop science and soil and water courses), horticulture (ornamental horticulture, horticulture, viticulture, and some crop science courses), plant health, and general plant science.

Units

Major requirements 51

Plant Science Core..... (30)

- PLANT 99, 107; PLTH 103, 105, 106; SW 2, 100, 100L; MEAG 3
- Choose one from CRSC 1, OH 1, HORT 1
- Choose 2 units from PLANT 180, 190, 194, 196, or VIT 196

After consultation with your adviser, choose an option and courses that best serve your career objectives. Core courses cannot be counted in the option.

Agronomy Option (21)

Choose a minimum of 12 upper-division units from CRSC and/or SW courses

Choose a minimum of 9 units including one course from three different prefixes (6 upper-division units): PLTH, SW, PLANT 108, PLANT

170T, and MEAG (excluding MEAG 1S)

Horticulture Option (21)

Choose a minimum of 12 upper-division units from HORT, OH, VIT, CRSC 111 and CRSC 112

Choose a minimum of 9 units including one course from three different prefixes (6 upper-division units): PLTH, SW, PLANT 108, PLANT 170T, and MEAG (excluding MEAG 1S)

Plant Health Option..... (21)

Choose a minimum of 12 upper-division units from PLTH and/or SW courses

Choose a minimum of 9 units including one course from three different prefixes (6 upper-division units): OH, HORT, CRSC, VIT, PLANT 108, PLANT 170T, and MEAG (excluding MEAG 1S)

General Plant Science

Option (21)

Choose from the following:
 A minimum of 3 upper-division units from each of PLTH, SW

A minimum of 3 units from MEAG (excluding MEAG 1S)

A minimum of 6 units from OH, HORT, CRSC, PLANT 108, PLANT 170T, and/or VIT

18 units must be upper division

Additional requirements 20-21*

CHEM 3A*, BOT 10*, AGECE 1*, CHEM 8 or 3B, BOT 130, BIOSC 140A or PLANT 150, AGECE 76

Depending on career goals, choose either of the following:

Management courses:** AGECE 31 and select one from AGECE 110N, 117, 120, 130, 160, 164

Science courses: CHEM 150 and MICRO 20

General Education requirements..... 51

(Includes 12 upper-division units, to be taken no sooner than the term in which 60 units of coursework are completed.)

Note: Consult your departmental adviser for other G.E. courses that are recommended for the plant science major. No General Education Integration or Multicultural/International course offered by the Plant Science Department may be used to satisfy the G.E. requirements for majors in the department.

Electives 0

Total units..... 122-123*

* This total assumes that CHEM 3A, BOT 10, and AGECE 1 are being used to satisfy 9 units of the G.E. requirement.

** Additional prerequisites may be required for some upper-division AGECE courses.

Advising Notes

1. During the Add/Drop period of their first semester, students are required to attend a department undergraduate orientation session. Alternatively, they are required to meet with the department chair. In either case, they will be assisted in selecting an appropriate faculty adviser and be given the curriculum checklist(s) from which to select a catalog year.
2. Meet with your academic adviser prior to registration each semester.
3. General Education courses designated as required by the department are prerequisites to many courses in the program of study. The General Education requirement of 51 units may be exceeded depending upon your selection of courses.
4. *CR/NC* grading is not permitted for courses included in the major.
5. Upper-division G. E. courses (i.e., 100-level courses) should not be attempted prior to the semester in which 60 lower-division units toward the degree have been completed.
6. The upper-division writing skills requirement can be met by passing the university Upper-Division Writing Examination (UDWE) or by passing an approved upper-division writing skills course. One unit of credit (i.e., ENGL 100W) may be earned for passing the exam; 3 units of credit is earned by obtaining a letter grade of *C* or higher in an approved course, i.e., PLANT 110W. In either case, the requirement will have been met.

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- One semester prior to graduation, contact your academic adviser to prepare and file an official Certification of Major Requirements form. Your Application for Graduation cannot be processed by the Evaluations Office until this form has been submitted.
- Students interested in becoming Certified Professional Agronomists, Crop Scientists/Specialists or Soil Scientists/Specialists should consult with their department faculty adviser for additional requirements for certification.

Plant Science Minor

The 21 units of courses will constitute a basic background in plant science. The program is similar to the major core and provides students with an introduction to the broad spectrum of plant science. Other majors in the College of Agricultural Sciences and Technology, particularly the Agricultural Business and Education majors, require students to be knowledgeable of plant science in order to pursue their careers or teach the subjects of agricultural production. This minor would be a way in which students could acquire those courses they need and get credit for completing a program of study rather than only a series of courses.

Units

Select from the following 3

- PLANT 107: Plant Propagation
- PLANT 196: Crop Project* (MEAG 3 and permission of instructor and appropriate production course)
- PLANT 150: Crop Improvement* (BOT 10 or BIOL 10)

Select from the following 6

- PLTH 103: Economic Entomology* (BOT 10 or BIOL 10 or ZOOL 10)
- PLTH 105: Weeds* (BOT 10 or BIOL 10 and CHEM 3A)
- PLTH 106: Plant Pathology* (BOT 10 or BIOL 10)

Select from the following 3

- SW 2: Agricultural Water
- SW 100: Soils* (CHEM 3A)

Select from one of the option areas in Plant Science (at least 6 units must be upper division) 9

Total units 21

*Course requires a prerequisite.

Note: The Plant Science Minor also requires a 2.0 GPA and 6 upper-division units in residence.

Master of Science Degree Requirements

The Master of Science in Plant Science is a 30-unit program designed to provide advanced studies and in-depth knowledge in the fundamentals of crop production and physiology, as well as experimental design, technical writing, and formal presentation of research reports. This degree is for individuals seeking advanced knowledge in plant sciences. The areas of emphasis include agronomy, pomology, horticulture, weed science, plant physiology, pest management, plant pathology, soils and irrigation. Coursework provides a broad understanding of most aspects of crop production and thesis research allows for specialization. Graduate courses are offered in the late afternoon or evening permitting students to earn their degree within two or three years when working closely with an adviser.

Admission Requirements. The Master of Science in Plant Science assumes preparation equivalent to a Bachelor of Science degree in Plant Science. The following courses or equivalents are expected to be completed prior to admission to the master's program:

Units	Subject Area
3	Plant Physiology
3	Statistics
3	Soils
3	Plant Health (entomology, pathology, nematology, integrated pest management, biological control, etc.)
6	Physical Science (chemistry, physics, etc.) of which a minimum of 3 units must be in chemistry
9	Natural Science (biology, ecology, genetics, agricultural sciences, etc.)

Students who do not have all the prerequisite courses may be admitted to the program with conditionally classified standing and are expected to complete the prerequisites before being granted classified standing.

To apply, students must complete the online application at www.csufresno.edu/gradstudies/admission required for university admission, and must also submit the following materials to the Department of Plant Science, Ag Sciences Building, Room 222:

- one complete set of transcripts of all prior college or university work
- college application to the master's degree program
- 500-word statement of purpose by the candidate
- three letters of recommendation from persons in a position to make an evaluation in support of graduate study, and
- one copy of the Institutional Score Report of the GRE exam.

All graduate applicants whose native language is not English, regardless of citizenship, must demonstrate English language proficiency through an official TOEFL report showing a minimum total score of 550 on the paper-based test or 66 on the Internet-based test, unless they have a baccalaureate degree from an institution of higher education in which English is the language of instruction.

The packet of materials must be delivered to the Department of Plant Science by the following deadlines:

Submit of Enrollment Packet by

Spring Semester: September 30

Fall Semester: March 1

Admission as a classified student will be based on consideration of a combination of all the following criteria:

- GRE scores, which must be submitted with application (suggested minimum scores of 480 verbal, 580 quantitative, and 4.0 analytical writing)
- grade point average for the last 60 units (minimum 2.75 GPA)
- college transcript verifying completion of prerequisite courses and conferral of the bachelor's degree
- completed Department of Plant Science "Graduate Programs Admission Application"
- three letters of reference, and
- a typewritten statement of 500 words explaining the applicant's professional goals.

Classified standing will be granted to students who meet all of the admission criteria.

Conditional classified standing may be granted to applicants with a 2.5 to 2.74 GPA (last 60 semester units) and/or those required to complete prerequisite coursework. Prerequisite coursework is not included in

the 30-unit master's program and students must achieve a 3.0 GPA on prerequisite coursework. Students must request classified standing in the program by the semester in which a minimum of 10 units to be used toward the degree are completed.

Program Requirements

All students must complete a 13-unit common core. Students must also complete 9 units of additional requirements, including one course from each of three sets of courses, as well as 2-5 units of approved electives. Each student is also expected to complete thesis research (3 or 6 units of PLANT 299) in consultation with a thesis committee.

Units

Core 13

AGRI 200, 201, 220; PLANT 257, 270

Additional requirements 9

Three courses, one from each of three sets:

Set A: PLANT 252, 254, 255

Set B: PLANT 258, 261

Set C: PLANT 253, 256

Electives 2-5

In consultation with their advisers, students select additional courses from the three sets listed above, and/or from the department's approved electives list.

Culminating experience 3 or 6

PLANT 299

Total minimum requirements 30

Graduate Advising Notes

- Several of the approved elective courses have prerequisites other than the courses listed as admission requirements.
- To obtain the required college application form and more specific information concerning the Master of Science in Plant Science, interested students should refer to <http://cast.csufresno.edu/PlantSci> or call the department office at 559.278.2861. Upon acceptance to the Master of Science in Plant Science program, students should obtain the *Graduate Student Handbook* from the department office.
- Upon acceptance into the M.S. in Plant Science program, students will be assigned an initial faculty adviser by the graduate program coordinators. Students may subsequently select a faculty adviser upon obtaining his/her approval and notifying the department office of that selection.

- Elective courses are selected in consultation with the student's faculty adviser from the three sets of courses listed under additional requirements. They may also be selected from the department's list of approved electives, consisting of chemistry, biology, and plant science courses.
- To progress through the graduate program, the student must (a) complete all prerequisite coursework, (b) attain classified standing, (c) maintain a minimum GPA of 3.0, (d) meet the university graduate writing requirement, (e) pass the department's qualifying examination, (f) file for advancement to candidacy, (g) complete the program requirements, (h) file a master's thesis committee assignment form, and (i) satisfactorily present and defend the thesis research results.
- Advancement to candidacy requires the completion of 9 program units in residence, meeting the university graduate writing requirement, and filing a Petition for Advancement to Candidacy a minimum of one semester prior to enrollment in thesis (PLANT 299) and within the deadline.
- Students must meet the university graduate writing competency requirement by passing the writing component of AGRI 220 or FN 200, which includes written certification by the instructor. See the Plant Science Department's *Graduate Policy Manual* and *Student Handbook* or the graduate program coordinators for details.
- All students must successfully complete the department's qualifying exam. This exam is designed to be taken during the third semester of the M.S. program and after completion of AGRI 200, AGRI 201, and PLANT 257. Information on the department's qualifying exam is available from the Plant Science Department's administrative coordinator.
- See *Division of Graduate Studies* section in this catalog for university requirements or visit www.csufresno.edu/gradstudies.

COURSES

Note: Active immunization against tetanus (available through Student Health Services) is a prerequisite for registration in any laboratory course in agriculture and for any student employment within the University Agricultural Laboratory.

Note: Cost to the student of extended field trips varies each semester depending upon

itinerary. The student should ask the course instructor.

Crop Science — Agronomy and Vegetable Crops (CRSC)

CRSC 1. Introduction to Crop Science (3)

Not open to students with credit in upper-division CRSC courses. Principles of production for cereal, row, forage and vegetable crops. Culture, insect and disease control, harvesting, storage, and marketing.

CRSC 101. Row Crops (3)

Prerequisites: BOT 10 or BIOL 10, CRSC 1. The culture of beans, cotton, sugar beets, and other fiber and oil crops; varieties, nutrition, insect, disease, and weed control; harvest, storage, uses, and marketing. (2 lecture, 3 lab hours)

CRSC 102. Cereal Crops (3)

Prerequisites: BOT 10 or BIOL 10, CRSC 1. The culture of barley, corn, grain sorghum, oats, rice, rye and wheat; varieties, nutrition, insect disease, and weed control; harvest, storage, uses, and marketing. (2 lecture, 3 lab hours) (Two 1-day field trips)

CRSC 103. Forage Crops (3)

Prerequisites: BOT 10 or BIOL 10, CRSC 1. The culture of alfalfa, silage, irrigated pasture and range related to livestock feed enterprises; varieties, nutrition, insect, disease and weed control; harvesting, uses, and marketing. (3 lecture hours; field trips)

CRSC 104. Seed Production and Technology (3)

Prerequisites: BOT 10 or BIOL 10, CRSC 1, CHEM 3A, 3B, or 8. The principles of specialized agronomic seed production; harvesting, mechanical conditioning, storage, treatment and viability testing. (2 lecture, 3 lab hours) (2-3 day field trip fee, \$65)

CRSC 105. Range Management (3)

Prerequisites: BOT 10 or BIOL 10, CRSC 1. Identification of range plants; carrying capacity; methods of range improvement, grazing management, water development, rodents, fertilization, reseeding, brush removal; mountain range resources. (2 lecture, 3 lab hours)

CRSC 111. Warm Season Vegetables (3)

Prerequisites: BOT 10 or BIOL 10, CRSC 1. Cultural practices, harvesting, processing, and marketing of warm season vegetables of economic importance to California and the San Joaquin Valley. (2 lecture, 3 lab hours) (2-3 day field trip fee, \$65)

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CRSC 112. Cool Season Vegetables (3)
Prerequisites: BOT 10 or BIOL 10, CRSC 1. Cultural practices, harvesting, processing, and marketing of cool season vegetables of economic importance to California and the San Joaquin Valley. (2 lecture, 3 lab hours) (2-3 day field trip fee, \$65)

Horticulture (HORT)

HORT 1. Introduction to Fruit Science (3)

Not open to students with credit in upper-division HORT courses. Origin and distribution of grape and tree fruit crops. Botanical and commercial classification of grapes and tree fruits and their culture in California. (Formerly VTF 1; FRSC 1)

HORT 110. Fruit Species of California (3)

Prerequisite: BOT 10 or BIOL 10 or HORT 1 or OH 1. Fruit and nut species common to California, their adaptation and uses. (Formerly VTF 110; FRSC 110)

HORT 112. Principles of Pomology (3)

Prerequisite: BOT 10 or BIOL 10 or HORT 1. Pruning, fruit and vegetative development, pollination, rootstocks; propagation, and nutrition. Crop cultural practices. (2 lecture, 3 lab hours) (Formerly VTF 112; FRSC 112)

HORT 113. Citrus and Subtropical Fruits (2)

Prerequisite: BOT 10 or BIOL 10 or HORT 1, 110, or 112. Geographic distribution, climatic and soil adaptation of subtropical fruit crops. Fruit and vegetative development and cultural practices for globally important fruit crops. Emphasis on citrus and olive. (1 lecture, 3 lab hours) (Formerly VTF 113; FRSC 113)

HORT 114. Postharvest Handling of Perishable Crops (3)

Prerequisite: BOT 10 or BIOL 10. Physiological aspects of fruit maturation and ripening. Principles of postharvest handling of fruit and vegetables for the fresh market as they apply to harvesting, packaging, storage, and transportation. (2 lecture, 3 lab hours) (2-day field trip fee, \$75) (Formerly VTF 114; PLANT 114)

Mechanized Agriculture (MEAG)

Note: Suitable eye protection is required in many MEAG laboratory classes.

MEAG 1S. Introduction to Agricultural Mechanics (3)

Selection, care, and use of common tools, projects of wood and metal; mechanical skills in the field of agriculture. (2 lecture, 3 lab hours) (Course fee, \$25) (Formerly MEAG 1)

MEAG 3. Agricultural Tractors (3)

Study of functions, physical capabilities, applications, economics, and improvement of tractors. Testing and analysis of tractors in laboratory and field conditions to maximize efficiencies. (2 lecture, 3 lab hours; 5 hours field operation)

MEAG 5. Power Equipment Safety (1)

Safety training for operation of power equipment. Meets requirements of Senate Bill 198 and University Agricultural Laboratory (UAL) for classroom safety instruction on using tractors and similar power equipment. Satisfactory completion meets safety training portion requirement of the UAL Tractor License. (16 hours, meets four consecutive times) *CR/NC* grading only.

MEAG 20. Agricultural Machinery and Equipment (3)

The study of functions and applications of machinery and equipment. Setup, calibration, analysis, and adjustment of agricultural machinery common to the San Joaquin Valley under field conditions will be emphasized. Equipment will be evaluated for efficiency and effective performance. (2 lecture, 3 lab hours)

MEAG 50. Metallurgical Processes (3)

(Same as IT 71.) Fundamentals of metallurgy; properties and characteristics of metals; survey of metal welding processes, equipment, and procedures; theory-discussion and laboratory experience in oxygen-fuel welding, cutting, brazing, and shielded metallic arc welding. (2 lecture, 3 lab hours) (Course fee, \$20)

MEAG 53. Electricity and Electronics (3)
(See IT 52.)

MEAG 103. Electro-Hydraulics (3)

Prerequisite: MEAG 3. Theory and practice in the operation, service, adjustment, and function of the component parts of fluid power systems. Design application of systems to agricultural equipment. Major emphasis is on computerized electronic controls of hydraulic systems. (2 lecture, 3 lab hours)

MEAG 112. Power Systems Technology (3)

Prerequisite: MEAG 3. Principles of the internal combustion engine; overhauling, repairing, and adjusting of gasoline, diesel, and LPG farm engines. Practices in repair technology and engine replacement as well as cost analysis decisions. (2 lecture, 3 lab hours)

MEAG 113. Power Transmissions (3)

Prerequisite: MEAG 3. Theory and operation of electro-hydraulic assist transmissions, synchronized transmissions; gear transmissions; clutches; brakes; final drives, selecting devices, mechanical front wheel drives, four wheel drive, and rubber/steel track drives. (2 lecture, 3 lab hours)

MEAG 114. Small Gasoline and Compact Diesel Engines (3)

Prerequisite: MEAG 1S. Theory of operation, maintenance, and repair of small gasoline and compact diesel internal combustion engines. Emphasizes use of small engines in agricultural education. (2 lecture, 3 lab hours)

MEAG 120. Advanced Farm Machinery (3)

Prerequisite: MEAG 3. Theory, operation, and management economics of planters, tillage tools, harvesting, spraying equipment, and precision farming equipment. Managerial responsibilities under state and federal mandates will be emphasized. (2 lecture, 3 lab hours)

MEAG 130. Precision Agriculture (3)

Survey of current geo-spatial technologies (GIS) and their application to agriculture. Theory and application of precision agriculture technologies such as remote sensing, parallel swathing, yield monitoring, precision navigation, and variable rate application to California crops. (2 lecture, 3 lab hours) (Formerly PLANT 170T)

Ornamental Horticulture (OH)**OH 1. Introduction to Ornamental Horticulture (3)**

Not open to students with credit in upper-division OH courses. Planting and maintenance of the home landscape; selection, planting, fertilization, and pruning of plants; lawn planting and care. (2 lecture, 3 lab hours)

OH 2. Introduction to Landscape Design (3)

History and development of landscape design. Study of the need for landscaping in the modern human environment. Consideration of landscaping practices for modern home and their effect on the home microenvironment.

OH 4. Floral Design (3)

Principles and rules of design and color using plants as a media; European and Japanese influences; emphasis on American line-mass and contemporary designs. An assortment of arrangements are made in lab. (2 lecture, 3 lab hours) (Course fee, \$50)

OH 101. Greenhouse Management (3)

Prerequisites: BOT 10 or BIOL 10, OH 1. The construction, operation and management of greenhouses; cultural and environmental techniques used in the production of greenhouse crops. Foliage plant identification. (2 lecture, 3 lab hours; field trips)

OH 105. Nursery Management (4)

Prerequisite: OH 1. Practices and principles in planning and managing a retail nursery, flower shop, or garden center; includes some aspects of production and construction of occasional floral designs. (3 lecture, 3 lab hours; field trips)

OH 107. Landscape Design (4)

Prerequisites: OH 1, 109. History and development of landscape design. Landscapes for the modern home, with consideration of effect on microenvironment. Graphic techniques used in developing landscape designs. Analysis and solution of landscape design problems of residential and commercial structures. (3 lecture, 3 lab hours; field trips)

OH 108. Ornamental Trees (3)

Prerequisites: BOT 10 or BIOL 10, OH 1. Trees grown in California for landscaping, shade and ornamentation; identification, habits of growth, cultural requirements, landscape use. (2 lecture, 3 lab hours; field trip)

OH 109. Plant Identification and Botanical Gardens (3)

Prerequisites: BOT 10 or BIOL 10, OH 1. Identification, growth habits, culture and landscape use of shrubs, vines and ground covers. Botanical gardens of the U.S. and California with particular emphasis on their history and design. (2 lecture, 3 lab hours; 2 Saturday field trips)

OH 110. Turfgrass Production and Management (3)

Prerequisites: BOT 10 or BIOL 10, OH 1. Production and maintenance of grass for lawns, public parks, public institutions, playgrounds, playing fields, golf courses, bowling greens; identification of turfgrasses and turfgrass seed. (2 lecture, 3 lab hours; field trip)

Plant Health (PLTH)**PLTH 1. Introduction to Plant Health (3)**

Not open to students with credit in upper-division PLTH courses. Origin, history, and evaluation of protective measures (chemical, biological, and cultural) for management of insects, diseases, weeds, and rodents in the field and around the home.

PLTH 102. Pesticides (3)

Prerequisite: CHEM 3B or 8. Modes of action and effective application of insecticides, herbicides, fungicides, rodenticides, nematocides and plant growth regulators. Emphasis on effective and safe use of agricultural chemicals by reading labels and following laws/regulations. (2 lecture, 3 lab hours)

PLTH 103. Economic Entomology (3)

Prerequisite: BOT 10 or ZOOL 10. Biology, ecology, management and taxonomy of economically important arthropods, with special emphasis on agricultural ecosystems in California. (2 lecture, 3 lab hours)

PLTH 105. Weeds (3)

Prerequisites: BOT 10 or BIOL 10; CHEM 3A, 3B, or 8. Vegetation management in California. Identification of common weeds. Fundamentals of preventive, cultural, biological, physical, and chemical weed control methods. (2 lecture, 3 lab hours)

PLTH 106. Plant Pathology (3)

Prerequisite: BOT 10 or BIOL 10. Study of the causal agents, disease cycles, and control of plant diseases. (2 lecture, 3 lab hours)

PLTH 107. Biological Control (3)

Prerequisite: PLTH 103. Study of the action of parasites, predators, and pathogens on the population dynamics of their host/prey organisms; focus on arthropods, with additional emphasis on microorganisms, weeds, nematodes, and vertebrates. (2 lecture, 3 lab hours)

PLTH 108. Integrated Pest Management (3)

Prerequisite: PLTH 103. Concepts and principles of integrated pest management. Insect and mite pest problems; sampling techniques; biology and ecology of major agricultural crop pests; integration of control measures for management of economic pests. (2 lecture, 3 lab hours)

PLTH 109. Diagnosis and Control of Plant Diseases (3)

Prerequisite: PLTH 106. Techniques for diagnosis of specific diseases in California and selection criteria for control strategies. Students will practice diagnostic techniques and select preventative, cultural, biological, physical, and chemical disease control strategies for major plant diseases. (2 lecture, 3 lab hours)

Plant Science (PLANT)**PLANT 80. Undergraduate Research (1-4; max total 4)**

Open to freshmen and sophomores with permission of instructor. Exploratory work on a suitable agricultural problem in plant science. Approved for *RP* grading.

PLANT 99. Introduction to Biometrics (3)

Prerequisite: ELM requirement met. Introduction to experimental methods and statistical procedures with particular emphasis on applied biological systems. Design of experiments; statistical analysis and interpretation. (2 lecture, 3 lab hours)

PLANT 105. Food, Society, and Environment (3)

Prerequisites: G.E. Foundation and Breadth Areas B. Linkages among food production systems, human social behavior, and environmental quality. Basic principles of environmental and agricultural sciences as applied to interrelationships among social value systems, agricultural activities and environmental resources. G.E. Integration IB.

PLANT 107. Plant Propagation (3)

Prerequisite: BOT 10 or BIOL 10; CHEM 3A. Principles and practices of propagating plants, sexual and asexual. Seeds, cuttings,

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layering, grafting, budding, and tissue culture. Propagation media and rooting aids. (2 lecture, 3 lab hours; field trips)

PLANT 108. Micropropagation (3)

Prerequisites: BOT 10 or BIOL 10; BOT 130 or CHEM 150 or permission of instructor. Principles of plant propagation by aseptic cell and organ culture as a means of rapid cloning, elimination of systemic plant diseases, production of somatic hybrids, ploidy change, and other genetic variants for use in plant breeding. (2 lecture, 3 lab hours) (Formerly PLANT 102)

PLANT 110W. Dimensions in Agriculture (3)

Prerequisite: satisfactory completion of the ENGL 5B and 10 graduation requirement. Current agricultural problems and developments; nature of agricultural industries in a changing world. Interrelationships among agriculture, government, labor, and the public. Meets the upper-division writing skills requirement for graduation.

PLANT 115. Computer Applications in Plant Science (4)

Overview of computer hardware. Basics of PC operating systems. Software applications for plant science. Word processing, spreadsheet analysis and modeling, database management, geographic information systems, remote sensing, surveying, and scientific data visualization technologies related to plant science. Hands-on instruction. (3 lecture, 3 lab hours)

PLANT 134. Microclimatology (3)

(See GEOG 114.)

PLANT 150. Crop Improvement (3)

Prerequisite: BOT 10 or BIOL 10. Application of genetic, cytological and environmental principles to improvement of plants; heredity and variation in plants, effects of environmental factors, biotechnology, self- and cross-fertilization, principles and results of selection and hybridization in plant improvement.

PLANT 170T. Topics in Plant Science (1-4; max total 6 per discipline if no topic repeated)

Prerequisite: junior standing. Selected topics in plant science, agronomy, horticulture, and other associated areas. Topics may require lab hours.

PLANT 180. Undergraduate Research (1-4; max total 4)

Open to juniors and seniors. Exploratory work on a suitable agricultural problem in plant science. Approved for *RP* grading.

PLANT 190. Independent Study (1-3; max total 6)

See *Academic Placement — Independent Study*. Approved for *RP* grading.

PLANT 194. Agricultural Internship (1-8; max total 8)

Prerequisite: junior standing; approval of faculty adviser and department chair. Field experience in your career specialty that integrates with classroom instruction. Written reports of knowledge and experience gained are required. *CR/NC* grading only.

PLANT 196. Crop Projects (1; max total 4)

Prerequisite: MEAG 3, appropriate production course, UAL Tractor License, and permission of instructor. Knowledge gained from classroom instruction applied to field conditions. Students will participate in growing and marketing a crop using the University Agricultural Laboratory. Approved for *RP* grading.

Soil and Water (SW)

SW 1. Introduction to Irrigated Soils (3)

Interpretation of physical and chemical properties of biological and mineral matter for the management of soils in irrigated agriculture. Emphasis on soil/plant and plant/water relationships.

SW 2. Agricultural Water (3)

Water resources and problems in California; water requirements for agricultural and ornamental crops; irrigation scheduling and application methods. (2 lecture, 3 lab hours)

SW 100. Soils (3)

Prerequisites: CHEM 3A, intermediate algebra. Physical, chemical, and biologic properties of soils as a medium for plant growth and as a natural body, factors that influence soil formation; food and fiber production; fertilizer and soil amendment use and environmental impact; soil's role in the biosphere.

SW 100L. Soils Lab (1)

Prerequisite: SW 100 (may be taken concurrently). Physical, chemical, and biological analysis. Interpretation of field and laboratory data. (3 lab hours) (Saturday field trip)

SW 101. Crop Nutrition (4)

Prerequisite: SW 100. Evaluation of nutrient elements in soils; application of fertilizers and organic waste to meet nutrient requirements; soil and plant tissue analysis and interpretation; fertilizer recommendations for different crops. (3 lecture, 3 lab hours)

SW 104. Soil and Water Management (3)

Prerequisites: SW 2, 100 (may be taken concurrently). Management of irrigated soils with particular emphasis on crop water requirements, irrigation scheduling, salinity, and other physical and chemical soil problems of field crops, permanent crops and landscapes.

SW 111. Irrigation Systems (3)

Prerequisite: SW 2. Principles of planning, installation and evaluation of irrigation systems for field crops, permanent crops and ornamental horticulture. Pressurized systems (sprinkler and drip irrigation) emphasized.

GRADUATE COURSES

The following graduate courses are open to students who have been accepted into the graduate program. Final semester senior undergraduate students may petition the Division of Graduate Studies to enroll in graduate courses. The petition form, which is available in the department office, must be accompanied by GRE scores to be considered.

Agriculture (AGRI)

AGRI 200. Biometrics in Agriculture (3)

Prerequisites: PLANT 99, AGECE 71, or MATH 101, or permission of instructor. Advanced concepts in the design of agricultural experiments. Emphasis is placed on the selection of appropriate designs to meet the objectives of well-planned experiments. Relative merits of various designs and topics in analysis, interpretation, and regression are covered.

AGRI 201. Agricultural Laboratory Techniques (3)

Prerequisite: One of the following courses: BOT 130; CHEM 105, 109; FSC 115. Agricultural problem solving through the application of advances in laboratory technology, crop management, foods, nutrition, soil and water quality. Theory and practice operation of scientific instruments and techniques are taught. Student defined

project and report required. (2 lecture, 3 lab hours)

AGRI 220. Research Methodology and Communications (3)

Critical literature review, quantitative and qualitative research design, scientific writing, questionnaire design and use, and presentation of research results. Ethical research issues examined. Approved for *RP* grading.

Plant Science (PLANT)

PLANT 250T. Topics in Plant Science (3; max total 12)

Prerequisite: upper-division plant science appropriate to study topic; permission of instructor. Advanced studies in a given area: crop physiology, plant breeding, plant pathology, plant nutrition, or economics. Topics may require lab hours.

PLANT 252. Plant Nutrition (3)

Prerequisite: BOT 130. Mineral requirements of plants; the acquisition and translocation of nutrients by higher plants and the role of nutrient elements in plant development. (2 lecture, 3 lab hours)

PLANT 253. Soil-Water Relationships (3)

Prerequisite: SW 100. Soil and water relationships influencing agricultural production and environmental quality. Soil quality concept and the role of organic matter; management alternatives for salinity, drainage, and trace element problems; irrigation water quality and the use of wastewaters for irrigation. (2 lecture, 3 lab hours)

PLANT 254. Plant Hormones and Regulators (3)

Prerequisites: BOT 130, CHEM 8. History of discovery, chemical nature, extraction, and identification of naturally occurring hormones. Physiological and biochemical effects of plant growth substances and hormones. Mechanism of action of auxins, gibberellins, cytokinins, inhibitors (A.B.A.), ethylene, and other hormones. Agricultural impacts of growth regulators. (2 lecture, 3 lab hours)

PLANT 255. Advanced Plant Breeding (3)

Prerequisites: PLANT 150 or equivalent. Principles and techniques of plant improvement, breeding methods, combining ability, sterility systems, quantitative genetic analysis, heritability estimates, experimental designs for plant breeding.

PLANT 256. Plant-Water Relationships (3)

Prerequisite: BOT 130. Physicochemical properties of water and solutions; movement of water, solutes, and growth regulators in plants; study of moisture-sensitive periods of various crops; factors affecting water absorption and retention.

PLANT 257. Physiology of Cultivated Plants (3)

Prerequisite: BOT 130. Plant cell structure and function. Response of cultivated plants to the environment. Physiology and hormonal control of flower induction, fruit set, and development. Review of pertinent current publications.

PLANT 258. Plant Disease Epidemiology and Control (3)

Prerequisite: PLTH 106. Epidemiology of plant disease outbreaks and principles of disease management strategies. Mathematical descriptions of disease development and disease forecasts. Methods and theory used in application of chemicals. Cultural controls and breeding for resistance. (2 lecture, 3 lab hours)

PLANT 261. Advanced Pest Management (3)

Prerequisite: PLTH 108 or permission of instructor. Comprehensive study of arthropod, disease, and weed pest problems in important California cropping systems. Examination of complex relationships among crop plants, herbivores, and other components of these agro-ecosystems leads to design of management programs that are both economically viable and ecologically sound.

PLANT 270. Seminar in Plant Science (1; max total 4)

Prerequisite: permission of instructor. Reviews of published and/or original research in the broad areas of crop science, soil and water relations, and plant health.

PLANT 290. Independent Study (1-3; max total 6)

See *Academic Placement — Independent Study*. Approved for *RP* grading.

PLANT 299. Thesis (3 or 6)

Prerequisite: prior advancement to candidacy. See *Criteria for Thesis and Project*. Preparation, completion, and submission of an acceptable thesis for the master's degree. Oral defense of thesis required. Approved for *RP* grading.

IN-SERVICE COURSE

(See *Catalog Numbering System*.)

Agriculture (AGRI)

AGRI 300. Topics in Agriculture (1-3; max total 6)

Topics may require lab hours. In-service professional training in selected areas of agriculture.