Pre-Fall 2011 General Education (GE): Arts and Humanities; Sciences and Engineering; Social Sciences; Div.-Domestic Diversity; Wrt.-Writing Experience
Fall 2011 and on Revised General Education (GE): AH—Arts and Humanities; SE—Science and Engineering; SS—Social Sciences;
ACGH—American Cultures; DD—Domestic Diversity; OL—Oral Skills; QL—Quantitative; SL—Scientific; VL—Visual; WC—World Cultures; WE—Writing Experience

Quarter Offered: I=Fall, II=Winter, III=Spring, IV=Summer; 2015-2016 offering in parentheses

Plant Pathology

Carlos Crisosto, Ph.D., Pomologist and Specialist (Plant Sciences)
Matthew Fidelibus, Ph.D., Associate Cooperative Extension Viticulture Specialist (Viticulture & Enology)
Sham Goyal, Ph.D., Agronomy Specialist (Plant Sciences)
Andrew Groover, Ph.D., Associate Adjunct Professor (Plant Biology)
Cai-Zhong Ji,ng, Research Plant Physiologist (Crops Path & Genetic Research)
Takao Kasuga, Ph.D., Molecular Geneticist (Plant Pathology)
Elizabeth Mitcham, Ph.D., Cooperative Extension and Pomology Systematic (Plant Sciences)
Ann Powell, Ph.D., Professional Research Biochemist (Plant Sciences)
Alan Rose, Ph.D., Associate Project Scientist (Molecular & Cellular Biology)
Matthew Tai, Ph.D., Associate AES (Plant Sciences)
Allen Van Deynze, Ph.D., Professional Researcher (Plant Sciences)

Graduate Study. The Graduate Group in Plant Biology provides a broad range of study and research leading to the M.S. and Ph.D. degrees. The program prepares students for careers in teaching and research at universities and colleges, government and industrial laboratories, and upper-level positions in agricultural business. Students specialize in one of the following areas: plant genetic engineering; plant cell biology; molecular biology; biochemistry; and genetics. The specialization permits students to meet individual academic needs within one of the major areas.

Preparation. For both the M.S. and Ph.D. programs, a level of scholastic development equivalent to a bachelor’s degree in a biological sciences from a recognized college or university is required. Courses in the following areas are considered to be prerequisite to the advanced degrees in Plant Biology: biology, inorganic chemistry, organic chemistry, introductory physics, genetics, plant development and structure, and molecular biology. Open to senior undergraduate students. May be repeated for credit. (S/U grading only.)—I, II, III. (I, II, III.)

212. Physiology of Herbical Action (3)
Lecture—3 hours. Prerequisite: Plant Biology 112, and a course in biochemistry. Lectures focus on the structure, analysis, synthesis, and development of metabolism of cell walls. Discussions center on analysis of scientific papers related to lecture topics. Offered in alternate years.—I. Labavitch

220. Plant Developmental Biology (4)
Lecture—3 hours, discussion—1 hour. Prerequisite: Plant Biology 112, and a course in biochemistry. Lectures focus on the structure, analysis, synthesis, and development of metabolism of cell walls. Discussions center on analysis of scientific papers related to lecture topics. Offered in alternate years.—I. Labavitch

222. Special Topics in Scientific Method (2)
Discussion—2 hours. Examine the historical and philosophical background of the scientific method. Analyze the rational, perceptual, causal, and social aspects of scientific knowledge. Clarify the roles of reason, experimentation and creativity in scientific research. (S/U grading only.)—I. Bradford

227. Plant Molecular Biology (4)
Lecture/discussion—4 hours. Prerequisite: Molecular and Cellular Biology 121 or 161. Molecular aspects of higher plant biology with emphasis on gene expression. Plant nuclear and organelle genome organization, gene structure, mechanisms of gene regulation, gene transfer, and special topics related to development and response to biological and environmental stimuli. Offered in alternate years.—Britt, Sinha

229. Molecular Biology of Plant Reproduction (3)
Lecture—3 hours. Molecular genetic basis of plant reproduction. Understanding the developmentally regulated gene expression as it relates to the major changes that occur during plant reproduction and the genetic control of flowering. Offered in alternate years.—O’Neill

290A. Faculty Seminar (1)
Discussion—1 hour. Discussion of research area of seminar speakers in Plant Biology Graduate Group Seminar Series. Restricted to Plant Biology graduate students (PBGG). May be repeated six times for credit. (S/U grading only.)—I, II, III, (I, III, III.)

290B. Seminar (1)
Seminar—1 hour. Seminars presented by visiting scientists on research topics of current interest. (S/U grading only.)—I, II, III, (I, III, III.)

290C. Research Conference in Botany (1)
Discussion—1 hour. Prerequisite: graduate standing and/or consent of instructor. Presentation and discussion by faculty and graduate students on research projects in botany. May be repeated for credit. (S/U grading only.)—I, II, III, (I, II, III.)

291. Graduate Student Seminar in Plant Biology (1)
Seminar—1 hour. Prerequisite: graduate standing. Students given seminars on topics in plant biology, with critiques by instructor and peers. How to give a seminar, including preparation of visual and other teaching aids. Students must be approved by instructor in charge. May be repeated for credit. (S/U grading only.)—I, II, III, (I, II, III.)

292. Seminars in Plant Biology (1)
Seminar—1 hour. Prerequisite: consent of instructor. Review of current literature in botanical disciplines. Disciplines and special subjects to be announced quarterly. Students present and analyze assigned topics. May be repeated for credit. (S/U grading only.)—I, II, III, (I, II, III.)

293. Seminar in Postharvest Biology (1)
Discussion—1 hour. Prerequisite: consent of instructor. Open to advanced undergraduates. Intensive study of selected topics in the postharvest biology of fruit, vegetables, and ornamentals. May be repeated for credit. (S/U grading only.)—I, II, III, (I, II, III.)

297T. Tutoring in Plant Biology (1–5)
Tutorial—3–15 hours. Offers graduate students, particularly those not serving as teaching assistants, the opportunity to gain teaching experience. (S/U grading only.)

298. Group Study (1–5)
May be repeated up to four times for credit. (S/U grading only.)

299. Research (1–12)
Prerequisite: graduate standing. (S/U grading only.)

Professional

390. The Teaching of Plant Biology (2)
Discussion—2 hours. Prerequisite: graduate standing; concurrent appointment as a teaching assistant in Plant Biology. Consideration of the problems of teaching botany, especially those not serving as teaching assistants, the opportunity to gain teaching experience. (S/U grading only.)—I, II, III, (I, II, III.)

Plant Pathology

(College of Agricultural and Environmental Sciences)
Thomas R. Gordon, Ph.D., Chairperson of the Department

Department Office. 354 Hutchison Hall
530-752-0300; http://plantpathology.ucdavis.edu/course/index.htm

Faculty
Richard M. Bostock, Ph.D., Professor
Gitta Cooper, Ph.D. Associate Professor
Douglas R. Cook, Ph.D., Professor
Richard Michael Davis, Ph.D., Professor
Lynn Epstein, Ph.D., Professor
Bruce W. Falk, Ph.D., Professor
Robert L. Gilbertson, Ph.D., Professor
Thomas R. Gordon, Ph.D., Professor
Bruce Kirkpatrick, Ph.D., Professor
Johan Leveau, Ph.D., Associate Professor
James D. MacDonald, Ph.D., Professor
Neil McRoberts, Ph.D., Assistant Professor
David Rizzo, Ph.D., Professor
Pamela C. Ronald, Ph.D., Professor
Ioannis Stergiopoulos, Ph.D., Assistant Professor
Neal K. VanAlfen, Ph.D.
Valerie Williamson, Ph.D., Professor
Emeriti Faculty
George Bruneing, Ph.D., Professor Emeritus
Edward E. Buhr, Ph.D., Professor Emeritus
Robert N. Campbell, Ph.D., Professor Emeritus
James E. DeVay, Ph.D., Professor Emeritus
John M. Duniway, Ph.D., Professor Emeritus
Raymond G. Grogan, Ph.D., Professor Emeritus
Clarence I. Kado, Ph.D., Professor Emeritus
Sreep John M. Misricich, Ph.D., Lecturer (USDA)
Emeritus
Jerry K. Uyemoto, Ph.D., Lecturer (USDA) Emeritus
Robert K. Webster, Ph.D., Professor Emeritus

Affiliated Faculty
Kendra Baumgartner, Ph.D. (USDA)
Greg Browne, Ph.D. (USDA)
Daniel Kleepefel, Ph.D. (USDA)
Deborah A. Golino, Ph.D., Lecturer and Specialist in Cooperative Extension
W. Douglas Gubler, Ph.D., Lecturer and Specialist in Cooperative Extension

Thems Michailidis, Ph.D., Lecturer and Plant Pathologist
Adlb Rowhani, Ph.D., Lecturer
Krishna Subbarao, Ph.D., Lecturer and Specialist in Cooperative Extension
Myxor Sudareshana, Ph.D. (USDA)
Takao Kasuge, Ph.D., Lecturer (USDA)

Related Major Programs. See the major in Plant Biology, page 117.

Graduate Study. The Department of Plant Pathology offers programs of study and research leading to the Master’s and Ph.D. degrees. Information can be obtained from the graduate advisor. See also the Graduate Bulletin, page 111.

Graduate Advisers. R.M. Davis, G.L. Coaker, R.M. Bostock

Courses in Plant Pathology (PLP)

Lower Division
40. Edible Mushroom Cultivation (2)
Lecture—1 hour; laboratory—3 hours. Prerequisite: Biological Sciences 10 or Microbiology 20 recommended. Principles and practices of growing edible mushrooms, including culture maintenance, basic mushroom substrate preparation, composting, spawn generation techniques, inoculation methods, harvesting, and pest and pest management. —II. (II) Davis

Upper Division
120. Introduction to Plant Pathology (4)
Lecture—2 hours; laboratory—6 hours. Prerequisite: Biological Sciences 1C, Microbiology 102 recommended. The nature, cause, and control of plant diseases. —I. (I) Bostock, Fall, Gilbertson, McRoberts

123. Plant-Virus-Vector Interaction (3)
Lecture—3 hours. Prerequisite: Biological Sciences 2A, Biological Sciences 101; Plant Biology 102, course 120, and Entomology 100 recommended. Analysis of interactions necessary for viruses to infect plants. Interactions among insect vectors and host plants involved in the plant-virus life cycle. Evolutionary aspects of the molecular components in viral infection and modern approaches to the interdiction of viral movement. Course requires Entomology 123 and Plant Biology 102. Offered in alternate years. GE credit: SE, SL, WE. —II. (II) Lucas, Gilbertson, Ullman

130. Fungal Biotechnology and Biochemistry (3)
Lecture—3 hours. Prerequisite: Plant Biology 119, Biological Sciences 103. How fundamental physiological and biochemical activities of fungi impact the destructive and beneficial roles of these organisms in nature. Utilization of manipulation of fungi for biotechnological and industrial applications. —II. (II) Gilchrist, Stergiopoulous

135. Field Identification of Mushrooms (1)
Field work; three-day mandatory field trip. Prerequisite: Introductory course in botany. —II. (II) Davis

140. Agricultural Biotechnology and Public Policy (4)
Lecture—3 hours; discussion—1 hour. Prerequisite: high school level biology, including genetics; Biological Sciences 10 recommended. Examination of the development and deployment of agricultural biotechnologies, particularly transgenic crops, microorganisms and animals, with consideration of conventional agriculture, public perceptions of technologies, food safety, environmental impact, public policies and regulations. GE credit: ScEng. Wrt | SL. —III. (III) Cook, Newell-McGloughlin

148. Introductory Mycology (4)
Lecture—2 hours; laboratory—6 hours. Prerequisite: Biological Sciences 1A, 1B, 1C, Systematics, ecology, evolution, and morphology of fungi. Importance of fungi to humans. (Same course as Plant Biology 148.) GE credit: MacDonald, Rizzo

150. Fungal Ecology (4)
Lecture—3 hours. Prerequisite: Biological Sciences 1C or equivalent. The ecological roles of fungi as saprobes, mutualists and parasites in native and managed ecosystems. Physiological and reproductive strategies and adaptations to diverse habitats. —II. (II) Gordon

185. Advanced Mushroom Taxonomy (2)
Lecture/discussion—3 hours; fieldwork—1 hour. Prerequisite: course 135 or 148, and Biological Sciences 101 or equivalent. Microscopic and molecular methods used in the identification of mushroom species; molecular characterization including PCR-amplification of ribosomal nuclear DNA, digestion of the product with restriction enzymes, and DNA sequencing, a one-day field trip is required. Offered in alternate years. —I. Davis

189D. Global Disease Biology Research Discussion (1)
Discussion—1 hour. Prerequisite: junior standing, courses 90, 187, Science and Society 23; course 189B required concurrently. Restricted to Global Disease Biology majors only. Course helps prevent or solve problems students are researching. Independent advising and assistance on research proposal. (P/NP grading only)—I, II, III. (I, II, III)

192. Internship (1-12)
Internship—3-36 hours. Prerequisite: course 120 and consent of instructor. Experience off and on campus, supervised by a member of the faculty. (P/NP grading only.)

199. Directed Group Study (1-5)
(P/NP grading only)

199. Special Study for Advanced Undergraduate (1-5)
(P/NP grading only)

Graduate
201A. Impacts, Mechanisms and Control of Plant Disease (4)
Lecture—3 hours; discussion—1 hour. Prerequisite: course 120, graduate student status in the Plant Pathology Graduate Program, or consent of instructor. A case-studies approach to study of plant diseases caused by bacteria, fungi, oomycetes, and viruses, including impacts, etiology, pathogen taxonomy and epidemiology, biochemical and genetic aspects of pathogen-host interactions, virulence and resistance, and approaches to disease control. —II. (II) Gordon

201B. Impacts, Mechanisms and Control of Plant Disease (4)
Lecture—2 hours; discussion—1 hour. Prerequisite: course 120, course 201A, and graduate student status in the Plant Pathology Graduate Program, or consent of instructor. A case-studies approach to analysis of plant diseases, including emerging dis-

Plant Pathology 475
Plant Physiology


290C. Advanced Research Conference (1) Seminar—1 hour. Prerequisite: course 120 or consent of instructor. Presentation, evaluation, and critical discussions of research activities in the area of advanced study, primarily designed for graduate students. (S/U grading only.)—I, II, III, (I, II, III)

291. Seminar in Molecular Plant Pathology (1) Seminar—1 hour. Prerequisite: course 120 or consent of instructor. Review and evaluation of current literature and research in biochemistry and molecular biology of plant microbe interactions. May be repeated for credit. (S/U grading only.)—I, II, III, (I, II, III)

Bostock, Cooker, Cook, Gilchrist, VanAllen

295. Seminar in Mycology (1) Seminar—1 hour. Review and evaluation of current literature and research in mycology. May be repeated for credit. (S/U grading only.)—I, II, III, (I, II, III)

Rizzo

298. Special Group Study (1-5) (S/U grading only)

Plant Biology (A Graduate Group), on page 471; and Plant Biology (A Graduate Group), on page 473.

Plant Sciences

College of Agricultural and Environmental Sciences

Chris van Kessel, Ph.D., Chairperson of the Department

Department Office, 1210 Plant and Environmental Sciences 3307-752-1703; http://www.plantsciences.ucdavis.edu/

Faculty

Kassim Al-Khatib, Ph.D., Professor
Diane M. Beckles, Ph.D., Associate Professor
Alan B. Bennett, Ph.D., Distinguished Professor
Alison M. Berry, Ph.D., Professor
Arnold J. Bloom, Ph.D., Professor
Eduardo Blumwald, Ph.D., Professor
Kent J. Bradford, Ph.D., Distinguished Professor
Patrick H. Brown, Ph.D., Professor
Mary Cademason, Ph.D., Associate Professor
Abhayaa M. Dandekar, Ph.D., Professor
Theodore M. DeJong, Ph.D., Distinguished Professor
Georgi Drakakaki, Ph.D., Assistant Professor
Jorge Dubcovsky, Ph.D., Professor
Jan Dvorak, Ph.D., Distinguished Professor
Valerie Eviner, Ph.D., Associate Professor
Albert J. Fischer, Ph.D., Professor
Paul L. Gepts, Ph.D., Professor
Matthew Gilbert, Ph.D., Assistant Professor
Thomas M. Gradziel, Ph.D., Professor
Kentaro Inoue, Ph.D., Professor
Marie A. Jasieniuk, Ph.D., Associate Professor
Thomas M. Gradziel, Ph.D., Professor
J. Heinrich Lieth, Ph.D., Professor
Richard W. Michelmore, Ph.D., Professor
Douglas V. Shank, Ph.D., Professor
Venkatasesu Sundararesan, Ph.D., Professor
Kenneth A. Shackel, Ph.D., Professor
Larry R. Teuber, Ph.D., Professor
Li Tian, Ph.D., Assistant Professor
Chris van Kessel, Ph.D., Professor
Astrid Volder, Ph.D., Assistant Professor
John I. Yoder, Ph.D., Professor
Truman P. Young, Ph.D., Professor
Florence Zakhovar, Ph.D., Associate Professor
Maciej Zwieniecki, Ph.D., Associate Professor

Emeriti Faculty

Steffen Abel, Ph.D., Professor Emeritus
Huseyn Ajwa, Ph.D., Specialist in Cooperative Extension, Emeritus
David E. Bayer, Ph.D., Professor Emeritus
Michael G. Barbou, Ph.D., Professor Emeritus
Academic Senate Distinguished Teaching Award Frederick A. Bliss, Ph.D., Professor Emeritus
R. William Breidenbach, Ph.D., Lecturer Emeritus
Ivan W. Buddenhagen, Ph.D., Professor Emeritus
David W. Burger, Ph.D., Professor Emeritus
Thomas G. Byrne, M.S., Specialist in the AES, Emeritus
William J. Clawson, M.S., Specialist in Cooperative Extension, Emeritus
Montague W. Denman, Ph.D., Professor Emeritus
Don J. Durzan, Ph.D., Professor Emeritus
Clyde E. Elmore, Ph.D., Specialist in Cooperative Extension, Emeritus
Theodore C. Foin, Jr., Ph.D., Professor Emeritus
Shu Geng, Ph.D., Professor Emeritus
William H. Griggs, Ph.D., Professor Emeritus
James A. Harding, Ph.D., Professor Emeritus
Charles E. Hess, Ph.D., Professor Emeritus
Ray C. Huffaker, Ph.D., Professor Emeritus
Subodh K. Jain, Ph.D., Professor Emeritus
R. Scott Johnson, Ph.D., Specialist in Cooperative Extension, Emeritus
Milton B. Jones, Ph.D., Lecturer Emeritus
W. Thomas Janini, Ph.D., Lecturer Emeritus
William C. Liebhardt, Ph.D., Specialist in Cooperative Extension, Emeritus
George C. Martin, Ph.D., Professor Emeritus
Warren C. Mieke, M.S., Specialist in Cooperative Extension, Emeritus
Donald J. Nevin, Ph.D., Professor Emeritus
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Jack L. Pope, Ph.D., Professor Emeritus
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Vito S. Polito, Ph.D., Professor Emeritus
Calvin O. Quaife, Ph.D., Professor Emeritus
Carlos F. Rejmanek, Ph.D., Professor Emeritus
Charles A. Raguse, Ph.D., Professor Emeritus
David E. Ramos, Ph.D., Professor Emeritus
William Rains, Ph.D., Professor Emeritus
Lawrence Rappaport, Ph.D., Professor Emeritus
Michael S. Reid, Ph.D., Professor Emeritus
Kevin J. Riese, Ph.D., Professor Emeritus
Roger J. Romani, Ph.D., Professor Emeritus
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Kay Ryugo, Ph.D., Professor Emeritus
Charles W. Schaller, Ph.D., Professor Emeritus
Herman Timm, Ph.D., Specialist, Emeritus
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Raymond C. Varela, Ph.D., Professor Emeritus
Ronald E. Voss, Ph.D., Specialist in Cooperative Extension, Emeritus
Barbara D. Webster, Ph.D., Professor Emeritus
Steven A. Weinburgh, Ph.D., Professor Emeritus
Lin L. Wu, Ph.D., Professor Emeritus
Masatoshi Yamazaki, Ph.D., Professor Emeritus

Plant Sciences

See Plant Biology, on page 471; and Plant Biology (A Graduate Group), on page 473.

Affiliated Faculty

Marita Cantwell, Ph.D., Lecturer and Specialist in Cooperative Extension
Roger T. Chetelat, Ph.D., Lecturer and Agronomist
Carlos H. Criacho, Ph.D., Lecturer and Specialist in Cooperative Extension
Joseph M. DiTomaso, Ph.D., Lecturer and Specialist in Cooperative Extension
Richard V. Evans, Ph.D., Lecturer and Specialist in Cooperative Extension
Steven A. Fennimore, Ph.D., Lecturer and Specialist in Cooperative Extension
Lousie Ferguson, Ph.D., Lecturer and Specialist in Cooperative Extension
Bradley Hanson, Ph.D., Associate Specialist in Cooperative Extension
Timothy K. Hartz, Ph.D., Lecturer, Agronomist and Specialist in Cooperative Extension
James E. Hill, Ph.D., Lecturer and Specialist in Cooperative Extension
Robert D. Huethamer, Ph.D., Lecturer and Specialist in Cooperative Extension
Stephen R. Kalka, Ph.D., Lecturer and Specialist in Cooperative Extension
Bruce Lampinen, Ph.D., Lecturer and Specialist in Cooperative Extension
Kirk Larson, Ph.D., Pomologist and Specialist in Cooperative Extension
Muhammad Marrash, Ph.D., Continuing Lecturer
Elizabeth J. Mitcham, Ph.D., Lecturer, Pomologist and Specialist in Cooperative Extension
Jeffrey F. Mitchell, Ph.D., Lecturer, Horticulturist and Specialist in Cooperative Extension
Lorele R. Oki, Ph.D., Lecturer and Associate Specialist in Cooperative Extension (Plant Sciences, Human Ecology)
Dae E. Park, Ph.D., Lecturer, Horticulturist and Specialist in Cooperative Extension
Daniel H. Putnam, Ph.D., Lecturer, Agronomist and Specialist in Cooperative Extension
Johan W. Sex, Ph.D., Adjunct Professor
Trevor V. Sisulow, Ph.D., Lecturer, Postharvest Horticulturist and Specialist in Cooperative Extension

Major Programs. See Biotechnology, on page 476; Three-dimensional Sciences, on page 319; Environmental Horticulture and Urban Forestry, on page 297, and Plant Sciences, on page 476.

Related Courses. See the Biotechnology, Environmental Horticulture, Horticulture and Agronomy, and Plant Biology course listings.

Graduate Study. For related graduate study, see the M.S. degree program in International Agricultural Development, and the M.S. and Ph.D. degree programs in the graduate groups of Horticulture and Agronomy, Plant Biology, Ecology, Genetics, Geogrophy, and Soils and Biogeochemistry. See also Graduate Studies, on page 111.

The Major Program

The Plant Sciences major is designed for students who are interested in a scientific understanding of how plants grow and develop in managed agricultural ecosystems and how plant products are utilized for food, fiber and environmental enhancement.

Advances in science and technology have provided new insights and options for using plants to address the issues associated with providing renewable food, fiber and energy resources for a growing global population while minimizing adverse impacts on the natural environment. Graduates in Plant Sciences are able to apply their skills and knowledge to a diverse range of agricultural and environmental goals or pursue advanced degrees in plant sciences.

The Program. The curriculum provides depth in the biological and physical sciences and a solid understanding of how plants obtain and utilize resources from their environment to sustain their growth and development. The influences of genetics, management systems and environmental inputs on crop development and productivity are emphasized along with the postharvest preservation and marketing of plant products. Students will develop an area...