Plant Physiology

290. Seminar (1) Seminar—1 hour. Review and evaluation of current research in plant pathology. (S/U grading only.—I, II, III, [I, II, III].)

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 research primarily designed for graduate students. (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.) Rizzo

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

299. Research (1-12)

Plant Sciences

See Plant Biology, 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 530-752-1703; 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
Edwaroo Blumwald, Ph.D., Professor
Kent J. Bradford, Ph.D., Distinguished Professor
Patrick H. Brown, Ph.D., Professor
Mary Cadenasso, Ph.D., Associate Professor
Abhaya M. Dandekar, Ph.D., Professor
Theodore M. Delang, Ph.D., Distinguished Professor
Georgios Drakakis, Ph.D., Assistant Professor
Jorge Dubcovsky, Ph.D., Professor
Jan Dvorak, Ph.D., Distinguished Professor
Valerie Evner, Ph.D., Associate Professor
Alfred J. Fischer, Ph.D., Professor
Paul L. Gepts, Ph.D., Professor
Matthew Gilbert, Ph.D., Assistant Professor
Thomas M. Gradalz, Ph.D., Professor
Kentaro Inoue, Ph.D., Professor
Marie A. Jasienski, Ph.D., Associate Professor
Judy Jensenfeld, Ph.D., Professor
Daniel J. Kliebenstein, Ph.D., Professor
John M. Labavitch, Ph.D., Professor
Emilio A. Laca, Ph.D., Professor
Andrew M. Latimer, Associate Professor
J. Heinrich Leith, Ph.D., Professor
Richard W. Michelmore, Ph.D., Professor
David B. Neele, Ph.D., Professor
Daniel Potter, Ph.D., Professor
Kevin J. Rice, Ph.D., Professor
Jeffrey S. Ross-Ibarra, Ph.D., Associate Professor
Dina S. Clair, Ph.D., Professor

Mikal E. Salweite, Ph.D., Professor
Kenneth A. Shackel, Ph.D., Professor
Douglas V. Sharrock, Ph.D., Professor
Venkatesan Sundaresan, Ph.D., Professor (Plant Biology)
Kenneth W. Tate, Ph.D., Professor
Larry R. Teuber, Ph.D., Professor
Li Tian, Ph.D., Assistant Professor
Christian van Kessel, Ph.D., Professor
Astrid Voldr, Ph.D., Assistant Professor
John I. Yoder, Ph.D., Professor
Truman P. Young, Ph.D., Professor
Florence Zhao, Ph.D., Associate Professor
Maciej Zwieciec, Ph.D., Associate Professor

Emeriti Faculty

Stefan Abel, Ph.D., Professor Emeritus
Husein Ajwa, Ph.D., Specialist in Cooperative Extension, Emeritus
David E. Bayer, Ph.D., Professor Emeritus
Michael F. Barbour, Ph.D., Professor Emeritus
Academic Senate Distinguished Teaching Award: Frederick A. Bliss, Ph.D., Professor Emeritus
R. William Breidenbach, Ph.D., 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 L. 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
Milan B. Jones, Ph.D., Emeritus
W. Thomas Lani, Ph.D., Emeritus
William C. Liebhart, Ph.D., Specialist in Cooperative Extension, Emeritus
William M. Longhurst, Ph.D., Emeritus
Robert S. Loomis, Ph.D., Professor Emeritus
James M. Lyons, Ph.D., Professor Emeritus
Vern L. Marble, Ph.D., Specialist in Cooperative Extension, Emeritus
George C. Martin, Ph.D., Professor Emeritus
Warren C. Mickle, M.S., Specialist in Cooperative Extension, Emeritus
Donald J. Nevin, Ph.D., Professor Emeritus
Robert F. Norris, Ph.D., Professor Emeritus
Jack L. O'Neill, Ph.D., Professor Emeritus
Donald A. Phillips, Ph.D., Professor Emeritus
Richard E. Plant, Ph.D., Professor Emeritus
Vito S. Polito, Ph.D., Professor Emeritus
Calvin O. Quasgel, Ph.D., Professor Emeritus
Carlos F. Quiros, Ph.D., Professor Emeritus
Charles A. Raguse, Ph.D., Professor Emeritus
D. William Raines, Ph.D., Professor Emeritus
David E. Ramos, Ph.D., Specialist in Cooperative Extension, Emeritus
Lawrence Rappaport, Ph.D., Professor Emeritus
Michael S. Reid, Ph.D., Professor Emeritus
Kevin J. Risa, Ph.D., Professor Emeritus
Roger J. Romani, Ph.D., Professor Emeritus
Vincent Rubatzky, Ph.D., Specialist in Cooperative Extension, Emeritus
Kai Ryugo, Ph.D., Professor Emeritus
Charles W. Schaller, Ph.D., Professor Emeritus
Herman Timm, Ph.D., Specialist, Emeritus
Robert L. Travis, Ph.D., Professor Emeritus
Raymond C. Valera, Ph.D., Specialist in Cooperative Extension, Emeritus
Ronald E. Voss, Ph.D., Specialist in Cooperative Extension, Emeritus
Barbara D. Webster, Ph.D., Professor Emeritus
Steven A. Weintraub, Ph.D., Professor Emeritus
Lin L. Wu, Ph.D., Professor Emeritus
Masatoshi Yamaguchi, Ph.D., Professor Emeritus

Affiliated Faculty

Marita Cantwell, Ph.D., Lecturer and Specialist in Cooperative Extension
Roger T. Chelatch, Ph.D., Lecturer and Agronomist
Care H. Chrisato, Ph.D., Lecturer and Specialist in Cooperative Extension
Joseph M. DiTomasso, Ph.D., Lecturer and Specialist in Cooperative Extension
Richard D. Evans, Ph.D., Lecturer and Specialist in Cooperative Extension
Steven A. Fenimore, Ph.D., Lecturer and Specialist in Cooperative Extension
Louise 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 H. E. Hill, Ph.D., Lecturer and Specialist in Cooperative Extension
Robert A. Hutmacher, Ph.D., Agronomist and Specialist in Cooperative Extension
Stephen R. Kalfka, 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 Mahmud, Ph.D., Continuing Lecturer
Elizabeth J. Mitan, Ph.D., Lecturer, Pomologist and Specialist in Cooperative Extension
Jeffrey P. Mitchell, Ph.D., Lecturer, Horticulturist and Specialist in Cooperative Extension
Lorenz O. Oki, Ph.D., Lecturer and Associate Specialist in Cooperative Extension (Plant Sciences, Human Ecology)
Don E. Parfitt, Ph.D., Lecturer, Pomologist and Specialist in Cooperative Extension
Daniel H. Putnam, Ph.D., Lecturer, Agronomist and Specialist in Cooperative Extension
Johan W. Six, Ph.D., Adjunct Professor
Trevor V. Sislow, Ph.D., Lecturer, Postharvest Horticulturist and Specialist in Cooperative Extension
Allen Van Deynze, Ph.D., Lecturer and Researcher

Major Programs. See Biotechnology, on page 185; Ecological Management and Restoration, on page 229; 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, Geograpy, 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 sound 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 impacts on crop development and productivity are emphasized along with the postharvest preservation and marketing of plant products. Students will develop an area

Quarter Offered: I = Fall, II = Winter, III = Spring, IV = Summer; 2013-2016 offering in parentheses

Pre-Fall 2011 General Education (GE) | Arts and Humanities: AH; Science: Science and Engineering, SS; Social Sciences: SS; World Cultures: WE; 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; Wrt = Writing Experience

ACGH = American Cultures; DD = Domestic Diversity; OL = Oral Skills; QQ = Quantitative; SL = Scientific; VL = Visual; WC = World Cultures; Wrt = Writing Experience
of specialization with options in Crop Production, Plant Genetics and Breeding, or Postharvest Biology and Technology. An individual option is also available to match specific subject matter or career goal interests in the plant sciences. All students gain practical experience through a combination of practical laboratory courses and internships. Students may also pursue an Honors thesis in their senior year.

Career Alternatives. Graduates from this program are prepared to pursue a wide range of careers, including various technical and management positions in public and private laboratories, or in commercial firms. Graduates may also pursue a career in teaching, or in research and development in plant sciences.

B.S. Major Requirements:

<table>
<thead>
<tr>
<th>UNITS</th>
<th>Course Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>57-64</td>
<td>Preparatory Subject Matter</td>
<td>57-64</td>
</tr>
<tr>
<td>14-15</td>
<td>Biological Sciences 1A, 1B, or 2A, 2B</td>
<td>14-15</td>
</tr>
<tr>
<td>5</td>
<td>Plant Sciences 2</td>
<td>5</td>
</tr>
<tr>
<td>15</td>
<td>Chemistry 2A, 2B, 2C</td>
<td>15</td>
</tr>
<tr>
<td>6.12</td>
<td>Chemistry 8A, 8B or 118A, 118B</td>
<td>6.12</td>
</tr>
<tr>
<td>6-12</td>
<td>Physics 1A, 1B or 7A, 7B, 7C</td>
<td>6-12</td>
</tr>
<tr>
<td>6-8</td>
<td>Mathematics 16A, 16B, or 17A, 17B</td>
<td>6-8</td>
</tr>
<tr>
<td>4</td>
<td>Plant Sciences 120</td>
<td>4</td>
</tr>
<tr>
<td>3</td>
<td>Plant Sciences 21</td>
<td>3</td>
</tr>
<tr>
<td>2.3</td>
<td>Applied Biological Systems Technology 45 or Plant Sciences 49</td>
<td>(recommended) 2.3</td>
</tr>
</tbody>
</table>

Depth Subject Matter

<table>
<thead>
<tr>
<th>UNITS</th>
<th>Course Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>39-43</td>
<td>Plant Sciences 100A, 100B, 100C</td>
<td>39-43</td>
</tr>
<tr>
<td>6</td>
<td>Plant Sciences 100AL, 100BL, 100CL</td>
<td>6</td>
</tr>
<tr>
<td>4</td>
<td>Plant Sciences 152</td>
<td>4</td>
</tr>
<tr>
<td>3-5</td>
<td>Evolution and Ecology 100 or Plant Biology 102 or 108 or 143</td>
<td>3-5</td>
</tr>
<tr>
<td>4</td>
<td>Plant Biology 117 or 147 or Plant Sciences 142 or Environmental Horticulture 160 and 161</td>
<td>4</td>
</tr>
<tr>
<td>3</td>
<td>Two courses chosen from: Plant Pathology 120, Entomology 110, Nematology 100, Plant Sciences 210</td>
<td>3</td>
</tr>
<tr>
<td>3</td>
<td>Plant Sciences 171</td>
<td>3</td>
</tr>
<tr>
<td>3</td>
<td>Internship, Plant Sciences 192</td>
<td>3</td>
</tr>
</tbody>
</table>

Areas of Specialization (choose one)

Crop Production Option

<table>
<thead>
<tr>
<th>UNITS</th>
<th>Course Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>27-33</td>
<td>Complete the two courses in plant management not completed for the depth subject matter: Plant Pathology 120, Entomology 110, Nematology 100, Plant Sciences 176</td>
<td>27-33</td>
</tr>
<tr>
<td>5</td>
<td>Soil Science 100</td>
<td>5</td>
</tr>
<tr>
<td>4</td>
<td>Plant Sciences 171</td>
<td>4</td>
</tr>
<tr>
<td>5</td>
<td>Agricultural and Resource Economics 15 or Economics 1A</td>
<td>5</td>
</tr>
<tr>
<td>4</td>
<td>Select two courses from: Plant Sciences 110A, 110B, 110C, 113, 114, 170A, 170B, Environmental Horticulture 125</td>
<td>4</td>
</tr>
<tr>
<td>4</td>
<td>Restricted Electives</td>
<td>4</td>
</tr>
</tbody>
</table>

Plant Breeding and Genetics Option

<table>
<thead>
<tr>
<th>UNITS</th>
<th>Course Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>27</td>
<td>Biological Sciences 101</td>
<td>27</td>
</tr>
<tr>
<td>3</td>
<td>Botany and Physiology of Cultivated Plants</td>
<td>3</td>
</tr>
<tr>
<td>4</td>
<td>Flora Power—Art and Science of Flowers and Their Uses</td>
<td>4</td>
</tr>
<tr>
<td>5</td>
<td>Power Flower—Art and Science of Flowers and Their Uses</td>
<td>5</td>
</tr>
<tr>
<td>1</td>
<td>Development 170, Agricultural and Resource Economics 100A, 130, 138, Biotechnology 150</td>
<td>1</td>
</tr>
<tr>
<td>26</td>
<td>Postharvest Biology and Technology</td>
<td>26</td>
</tr>
</tbody>
</table>

Courses in Plant Sciences (PLS)

<table>
<thead>
<tr>
<th>UNITS</th>
<th>Course Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Agriculture, Nature and Society</td>
<td>1</td>
</tr>
<tr>
<td>3</td>
<td>Botany and Physiology of Cultivated Plants</td>
<td>3</td>
</tr>
<tr>
<td>4</td>
<td>Power Flower—Art and Science of Flowers and Their Uses</td>
<td>4</td>
</tr>
<tr>
<td>6</td>
<td>Flowers Power—Art and Science of Flowers and Their Uses</td>
<td>6</td>
</tr>
<tr>
<td>8</td>
<td>Fruits and Nuts of California and the World</td>
<td>8</td>
</tr>
<tr>
<td>10</td>
<td>Introduction to Sustainable Agriculture</td>
<td>10</td>
</tr>
<tr>
<td>12</td>
<td>Internship</td>
<td>12</td>
</tr>
<tr>
<td>12</td>
<td>Postharvest Biology and Technology</td>
<td>12</td>
</tr>
<tr>
<td>12</td>
<td>Principles and Practice of Plant Breeding</td>
<td>12</td>
</tr>
<tr>
<td>12</td>
<td>Plant Pathology</td>
<td>12</td>
</tr>
<tr>
<td>12</td>
<td>Plant Physiology</td>
<td>12</td>
</tr>
<tr>
<td>12</td>
<td>Principles and Practice of Plant Breeding</td>
<td>12</td>
</tr>
<tr>
<td>12</td>
<td>Plant Pathology</td>
<td>12</td>
</tr>
<tr>
<td>12</td>
<td>Plant Physiology</td>
<td>12</td>
</tr>
<tr>
<td>12</td>
<td>Principles and Practice of Plant Breeding</td>
<td>12</td>
</tr>
<tr>
<td>12</td>
<td>Plant Pathology</td>
<td>12</td>
</tr>
</tbody>
</table>

11. Introduction to Plant Science (4)

<table>
<thead>
<tr>
<th>Course Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>4</td>
<td>Principles and Practice of Plant Breeding</td>
</tr>
</tbody>
</table>

8. Fruits and Nuts of California and the World (3)

<table>
<thead>
<tr>
<th>Course Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>3</td>
<td>Principles and Practice of Plant Breeding</td>
</tr>
</tbody>
</table>

12. Plants and Society (4)

<table>
<thead>
<tr>
<th>Course Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>4</td>
<td>Principles and Practice of Plant Breeding</td>
</tr>
</tbody>
</table>

15. Introduction to Sustainable Agriculture (4)

<table>
<thead>
<tr>
<th>Course Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>4</td>
<td>Principles and Practice of Plant Breeding</td>
</tr>
</tbody>
</table>

21. Application of Computers in Technology (3)

<table>
<thead>
<tr>
<th>Course Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>3</td>
<td>Principles and Practice of Plant Breeding</td>
</tr>
</tbody>
</table>

49. Organic Crop Production Practices (3)

<table>
<thead>
<tr>
<th>Course Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>3</td>
<td>Principles and Practice of Plant Breeding</td>
</tr>
</tbody>
</table>

98. Directed Group Study (1-5)

<table>
<thead>
<tr>
<th>Course Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>1-5</td>
<td>Principles and Practice of Plant Breeding</td>
</tr>
</tbody>
</table>
102. California Flora (5) Lecture—3 hours; laboratory—8 hours. Prerequisite: course 2, Biological Sciences 1C, 2C, or equivalent. Survey of the flora of California, emphasizing recognition of important vascular plant families and genera and use of taxonomic keys for species identification. Current understanding of relationships among plant families. Invasive species of plant taxonomy and phylogenetic systematics. One Saturday field trip. (Same course as Plant Biology 102.) GE credit: SciEng | SE, VL.—I. (Ill.) Teuber

110A. Principles of Agronomic Crop Production in Temperate and Tropical Systems (3) Lecture—3 hours. Prerequisite: course in general botany or course 2 recommended. Fundamentals of field crop production in temperate and tropical climates. Resource utilization and economic, political and social problems are considered in relation to technical and policy aspects of crop production on agricultural development. Not open for credit to students who have completed Agricultural Management and Rangeland Resources 105. (Former course Agricultural Management and Rangeland Resources 110A.) GE credit: SciEng | SE.—I. (Ill.) Al-Khatib, Flint

110C. Crop Management Systems for Vegetable Production (4) Lecture—2 hours; laboratory—3 hours; discussion—1 hour. Prerequisite: course 2; course 110A recommended. Horticultural principles applied to production and management systems for vegetable crops. Laboratory and discussion will illustrate efficient field management and resource use practices. Not open for credit to students who have completed Agricultural Management and Rangeland Resources 110C. (Former course Agricultural Management and Rangeland Resources 110C.) GE credit: SciEng | SE.—I. (Ill.) Mitchell

110L. Principles of Agronomy Laboratory (1) Laboratory—3 hours. Prerequisite: course 110B may be taken concurrently. Not open for credit to students who have completed Agicultural Management and Rangeland Resources 110L. (Former course Agricultural Management and Rangeland Resources 110L.) GE credit: SciEng | SE.—III. (III.) Brown

112. Forage Crop Ecology (3) Lecture—3 hours. Prerequisite: course 2, Biological Sciences 1C, 2C, or consent of instructor. Forages as a world resource in food production. Ecological principles governing the adaptations, establishment, growth and management of perennial and annual forages, including pastures, rangelands and hay; aspects of forage community structure and plant species, and their adaptation for grazing or forage drying. Not open for credit to students who have completed Agricultural Management and Rangeland Resources 112. (Former course Agricultural Management and Rangeland Resources 112.) Offered in alternate years. GE credit: SciEng | SE.—III. Teuber

113. Biological Applications in Fruit Tree Management (2) Lecture—1 hour; laboratory—3 hours. Prerequisite: course 2, Biological Sciences 1C, 2C or equivalent. Physiology, growth, development and environmental requirements of fruit trees and the cultural practices used to maintain them. Emphasis on the application of biological principles in the culture of commercially important temperate zone fruit tree species. Not open for credit to students that have completed Plant Biology 173. (Former course Plant Biology 173.) GE credit: SciEng | SE

114. Biological Applications in Fruit Production (2) Lecture—1 hour; laboratory—3 hours. Prerequisite: course 2, Biological Sciences 1C or 2C. GE credit: SciEng | SE

120. Applied Statistics in Agricultural Science (4) Lecture—3 hours; discussion/laboratory—3 hours. Prerequisite: upper division standing. Application of statistical methods to design and analysis of research for plant, animal, behavioral, nutritional, and consumer sciences. Basic concepts and statistical methods are presented in lectures, laboratories emphasize data processing techniques, problem solving, and interpretation in specialized fields. Not open for credit to students who have completed Agricultural Management and Rangeland Resources 120. (Former course Agricultural Management and Rangeland Resources 120.) GE credit: SciEng | QL.—I. (II.) Loca, Medrano, Teuber

130. Rangelands: Ecology, Conservation and Restoration (3) Lecture—3 hours. Prerequisite: Biological Sciences 1C or introductory ecology course recommended. Emphasis on ecosystem processes and their role in the restoration of disturbed or degraded ecosystems. Introduction to the ecological principles and processes important for an understanding of the dynamics of range ecosystems. GE credit: SciEng | SE, VL.—I. (I.) Tate

131. Identification and Ecology of Grasses (2) Lecture—7.5 hours; laboratory—20 hours; discussion—5 hours. Prerequisite: Biological Sciences 1C or course 2; Plant Biology 102 and junior standing recommended. Taxonomy, identification and ecology of western grasses. Development of skills in using plant identification keys. Ecology and evolution of grasses in grazing ecosystems. Given the week following spring quarter. GE credit: SciEng | SE, VL

135. Ecology and Community Structure of Grassland and Savannah Herbivores (3) Lecture—3 hours. Prerequisite: Biological Sciences 1A or 1B and course 2, or Biological Sciences 1C; general ecology course recommended. Not open for credit to students that have completed Plant Biology and Rangeland Resources 135. (Former course Agricultural Management and Rangeland Resources 135.) Offered in alternate years. GE credit: SciEng | SE, VL

140. Culinary and Medicinal Herbs (3) Lecture/discussion—3 hours. Prerequisite: Plant Sciences 2, Biological Sciences 1C, or Botanical Sciences 2C. Growth, identification, cultivation and use of common culinary and medicinal herbs; herbal plant families, effects of climate on crop species, herbal medicine, ecology and geography of herbs; herbs garden design; secondary chemistry of active compounds. (Same course as Environmental...
150. Sustainability and Agroecosystem Management (4)
Lecture—2 hours; laboratory—2 hours. Prerequisite: Soil Science 101, Chemistry 2A, and course 2, Biological Sciences 1C or 2C. Interdisciplinary analysis of agricultural production and food systems with primary emphasis on biophysical processes. Consideration of principles of temperate and tropical agroecosystems in relation to resource availability, ecological sustainability, and socio-economic viability. Comparative ecological analyses of agroecosystems. Students who have completed Agricultural Management and Rangeland Resources 150. (Former course Agricultural Management and Rangeland Resources 150.) GE credit: SciEng | OL, SE, SL.—(III.) Cadenasso.

152. Plant Genetics (4)
Lecture—3 hours; discussion/laboratory—1 hour. Prerequisite: Biological Sciences 1A or 2A or consent of instructor. Basic principles of transmission genetics, classical quantitative genetics, and molecular genetics. Practical aspects of genetic crosses and analysis of segregating populations. Not open to students who have completed Plant Biology 152. (Former course Plant Biology 152.) GE credit: SciEng | SE.—I. (I.) Beckles

153. Plant, Cell, Tissue and Organ Culture (4)
Lecture—2 hours; discussion—1 hour; laboratory—3 hours. Prerequisite: course 2 or Biological Sciences 1C or 2C. Basic and applied aspects of plant tissue culture including media preparation, micropropagation, organogenesis, and biotechnology; the culture of plants, protoplasmic culture and transformation. Not open for credit to students who have completed Plant Biology 153. (Former course Plant Biology 153.) GE credit: SciEng | SE.—I. (I.) Dahlen, Matzer, Zwieniecki.

157. Physiology of Environmental Stresses in Plants (4)
Lecture—2 hours; discussion—2 hours. Prerequisite: course 100C or Plant Biology 111 or 112 or Environmental Horticulture 102 and Viticulture and Enology 117. An introductory exploration of major environmental stresses and the mechanisms plants employ to avoid or tolerate these stresses. GE credit: SciEng | SE.—II. (II.) St Clair

158. Mineral Nutrition of Plants (4)
Lecture—3 hours; laboratory—3 hours. Prerequisite: course 100A or Plant Biology 111 or Environmental Horticulture 110. Evolution and scope of plant nutrition; essential elements; mechanisms of absorption and membrane transporters; translocation and allocation processes; mineral metabolism and toxicities; genetic variation in plant nutrition; applications to management and understanding ecological effects of nutrient availability or deficiency. Not open for credit to students who have completed Plant Biology 158. (Former course Plant Biology 158.) GE credit: SciEng | SE.—III. Brown

160. Agroforestry: Global and Local Perspectives (3)
Lecture—3 hours. Prerequisite: Plant Sciences 2 or Biological Sciences 1C or 2C, Plant Sciences 142 or 150 or Biological Sciences 28 or a general ecology course. Traditional and evolving uses of trees in agricultural ecosystems; their multiple roles in environmental stewardship; production of food, fuel, and fiber; and socioeconomic barriers to the adoption and implementation of agroforestry practices. Not open for credit to students who have previously taken Agricultural Management and Rangeland Resources 160. (Former course Agricultural Management and Rangeland Resources 160.) GE credit: SciEng | SE.—I. (I.) Schuster, T. Takhar.
173. Molecular and Cellular Aspects of Postharvest Biology (3)
Lecture/discussion—4 hours. Prerequisite: course 2, Biological Sciences 1C or 2C or equivalent. Basic concepts and current knowledge of issues relevant to postharvest biology. Mechanisms of fruit ripening, senescence and cell death. Metabolism and functions of phytohormones, carbohydrates, lipids, pigments, flavor compounds, and phytonutrients at molecular and cellular levels. GE credit: SciEng | SE.—I, II, III, V | Zakharyov

174. Microbiology and Safety of Fresh Fruits and Vegetables (3)
Lecture—3 hours. Prerequisite: course 2 or Biological Sciences 1C or 2C or equivalent. Overview of microbiological organisms on fresh produce, pre- and postharvest factors influencing risk of microbial contamination, attachment of microorganisms to produce, postharvest contamination and detection, transportation and storage, and methods of detection. Mock outbreak trial and presentation of science-based forensic discovery. GE credit: SciEng | SE.—I, II, III | V | Zakharyov

176. Introduction to Weed Science (4)
Lecture—2 hours; laboratory/discussion—4 hours. Prerequisite: course 2 or Biological Sciences 1C or 2C. Weed biology, methodology, weed management, biological control, herbicides and herbicide resistance. Weed control in managed and natural ecosystems. Basal, selective, and residual herbicides. GE credit: SciEng | SE.—I, II, III, IV | V | Anderson

178. Biological and Molecular Aspects of Plants (3)
Lecture—3 hours. Prerequisite: course 2, Biological Sciences 1C or 2C, course 100B or 118B; course 100C, Plant Biology 111, Environmental Horticulture 102, or Hydrologic Science 122 recommended. Brief survey of common and invasive Fresh water plants and macroalgae, their reproductive modes, physiology, growth (photosynthesis, nutrient utilization), development (meromorph interactions), ecology, modes and impacts of invasion, and management. Two Saturday field trips required. Offered in alternate years. Not open for credit to students who have completed course 2 Plant Biology 176. (Former course Plant Biology 178.) GE credit: SciEng, Writ | OL, SE.—II, III | V | Anderson, Mitcham, Zakharov

187. Undergraduate Research Proposal (3)

189L. Laboratory Research in Plant Sciences (2-5)
Laboratory—3-12 hours; discussion—1 hour. Prerequisite: course 188 and consent of instructor. Formulating experimental approaches to current questions in Plant Sciences; preparation of proposed experiments. May be repeated up to 12 units for credit. [P/NP grading only.]—I, III, IV | V | Kliebenstein

190. Seminar on Alternatives in Agriculture (2)
Seminar—2 hours. Prerequisite: upper division standing. Seminar on topics related to alternative theories, practices and systems of agriculture and the relationship of agriculture to the environment and society. Scientific, technological, social, political and economic perspectives. May be repeated for credit. [Former course Agricultural Management and Rangeland Resources 190.] (P/NP grading only.) GE credit: SciEng | SE.—II, III | V | Van Horn

190C. Research Group Conference (1)
Discussion—1 hour. Prerequisite: advanced standing, consent of instructor. Weekly conference on research progress and methods and techniques in the plant sciences. May be repeated for credit. [P/NP grading only.]—I, II, III, IV | V | Laca

192. Internship (1-12)
Internship—3-36 hours; seminar—1 hour. Prerequisite: completion of 84 units and consent of instructor. Work experience on or off campus in subject areas pertaining to plant and environmental sciences. Internship supervised by a faculty member. [P/NP grading only.]—I, II, III, IV | V, II, III, IV | V | Laca

194H. Senior Honors Thesis (2-6)
Independent study. Prerequisite: senior standing; overall GPA of 3.500 or higher and consent of master adviser. Two or three successive quarters of guided research on a subject of special interest to the student. [P/NP grading only; deferred grading only, pending completion of thesis.] GE credit: SE.—II, III, IV | V | Laca

196. Postharvest Technology of Horticultural Crops (3)
Lecture/discussion—45 hours; fieldwork—45 hours. Prerequisite: upper division or graduate student standing. Intensive study of postharvest considerations and current challenges in postharvest handling for fruits, nuts, vegetables, and ornamentals in California. Scheduled first two weeks immediately following last day of spring quarter. Not open for credit to students who have completed Plant Biology 196. (Former course Plant Biology 196.) [P/NP grading only.] GE credit: SE.—I, II, III, IV | V | Mitcham, Kliebenstein

197T. Tutoring in Plant Sciences (1-5)
Tutoring—1-5 hours. Prerequisite: upper division standing, completion of, or the equivalent, consent of instructor. Leading small voluntary discussion or lab groups affiliated with one of the department’s regular courses. May be repeated for up to eight units of credit. [P/NP grading only.]

199. Special Study for Advanced Undergraduates (1-5)
Prerequisite: consent of instructor. (P/NP grading only.)—I, II, III, IV | V, II, III, IV | V | Laca

200. Undergraduate Research Proposal (3)
Lecture/discussion—3 hours. Prerequisite: course 120 or equivalent. Introduction to the research process and statistical methods to plan, conduct and interpret experiments. Not open for credit to students who have completed Agronomy 205. (Former course Agronomy 205.)—II | V | Dubcovsky

206. Applied Multivariate Modeling in Agronomic and Environmental Sciences (4)
Lecture—3 hours; discussion—1 hour. Prerequisite: one of course 120, Statistics 106, 108, course 205 or equivalent. Multivariate linear and nonlinear models. Model selection and parameter estimation. Analysis of manipulative and observational agronomic experiments. Discriminant, principal component, and path analyses. Logistic and biased regression. Bootstrapping. Exercises based on actual research by UCD students. Not open for credit to students who have completed Agronomy 206. (Former course Agronomy 206.)—I | V | Laca

211. Principles and Practices of HPLC (2)
Lecture—1 hour; laboratory—3 hours. Prerequisite: undergraduate physics and chemistry; Biological Sciences 102, 103 recommended. Principles and theory of HPLC involving various modes of separation and detection. Optimization of separation using isocratic and gradient elution. Development practical knowledge about the use, maintenance and troubleshooting of HPLC equipment, including HPLC columns. Development of new HPLC methods. Not open for credit to students who have completed Agronomy 211. (Former course Agronomy 211.)

212. Postharvest Biology and Biotechnology of Fruits and Nuts (3)
Lecture—3 hours. Prerequisite: course 172. Review of postharvest biology of fruits and nuts and biotech- nological approaches to address postharvest chal- lenges. Morphology, biology and postharvest handling of fruits and nuts are presented along with current research, including biotechnology, and dis- cussion of current research needs and approaches. Offered in alternate years. Not open for credit to students who have completed Pomology 212. (III.) Crisosto, Mitcham, Zakharov

213. Postharvest Physiology of Vegetables (3)
Lecture—2 hours; discussion—1 hour. Prerequisite: courses 172 or course 100B or Plant Biology 112. Comparative physiology of harvestable vegetables; emphasis on maturation, senescence, compositional changes, physiological disorders and effects of envi- ronmental factors. Concepts and research proce- dures. Not open for credit to students who have completed Vegetable Crops 212. (Former course Vegetable Crops 212.) Offered in alternate years. (III.) Salvesen

220. Genomics and Biotechnology of Plant Improvement (3)
Lecture—3 hours. Prerequisite: Biological Sciences 101 or the equivalent. Integration of modern bio- technology and classical plant breeding including the impact of structural, comparative and functional genomics on gene discovery, characterization and exploitation. Also covers molecular markers, plant transformation, hybrid production, disease resist- ance, and novel output traits. Not open for credit to students who have completed Vegetable Crops 220. (Former course Vegetable Crops 220.) (Same course as Genetics 220.—I, III | Nevins

221. Genomics and Breeding of Vegetable Crops (3)
Lecture—3 hours. Prerequisite: Biological Sciences 101 or equivalent. Preview of genome structure, mapping, gene tagging and development of other genetic resources applied to improvement of major vegetables. For graduate students contemplating a career in modern vegetable breeding and biotech- nology. Not open for credit to students who have completed Vegetable Crops 221. (Former course Vegetable Crops 221.)

222. Advanced Plant Breeding (4)
Lecture—3 hours; laboratory—3 hours. Prerequisite: courses 154 and 205; Genetics 201 or Animal Genetics 107 recommended. Philosophy, methods, and problems in developing improved plant species. Topics include: inbreeding, heterosis, progeny testing, breeding methodology, index selection, germplasm conservation, and breeding for stress resistance. Laboratories include tours of breeding facilities and calculation and interpretation of quanti- tative data. Offered in alternate years.—III | Feuber

290. Seminar (1-2)
Seminar—1-2 hours. Topics of current interest related to plant sciences. [S/U grading only.]—I, II, III, IV | V, II, III, IV | V | Feuber

290C. Research Conference (1)
Discussion—1 hour. Prerequisite: consent of instructor. [S/U grading only.]—I, II, III, IV | V | Feuber

297T. Tutoring in Plant Science (1-5)
Tutoring—1-5 hours. Prerequisite: graduate standing, consent of instructor; completion of course to be tutored or the equivalent. Designed for graduate stu- dents who desire teaching experience but are not teaching assistants. May be repeated for credit for a total of five units. Same course may not be tutored more than once. [S/U grading only.]

298. Group Study (1-5)
Group Study (1-5)
299. Research (1-12)
Prerequisite: consent of instructor. [S/U grading only.]—I, II, III, IV | V, II, III, IV | V | Feuber
Professional

396. Teaching Assistant Training Practicum
(1-4)
Prerequisite: consent of instructor; graduate standing. [S/U grading only]—I, II, III, IV, (I, II, III, IV)

Plastic Surgery

See Medicine, School of, on page 396.

Political Science

(Imege of Letters and Science)
John T. Scott, Ph.D., Interim Chairperson of the Department
Department Office, 469 Kerr Hall
530-752-0966
Undergraduate Student Matters, 468 Kerr Hall
530-752-6241
Graduate Student Matters, 472 Kerr Hall
530-752-0969
http://ps.ucdavis.edu

Graduate Program Coordinator office.
Graduate Study.

Fields of concentration


Comparative Politics (courses with Political Science 2 as a prerequisite): Political Science 126, 140A-140C, 142A-142B, 143A-143B, 144A-144B, 146A-146B, 147A-147D, 148A-148C.

International Relations (courses with Political Science 3 as a prerequisite): Political Science 120-124, 126, 129, 130-132, 134-137, 139, 190, 196C, International Relations 131.

Political Theory (courses with Political Science 4 as a prerequisite): Political Science 110, 112-117, 118A-118C, 119, 187, 196D.

Total Units for the Major: 72-73

Political Science—Public Service

A.B. Major Requirements:

Preparatory Subject Matter: 20

Political Science 1

Two courses from: Political Science 2, 3, 4, 5 or 7

Statistics 13 [or equivalent] 4

Political Science 51 (required course) 4

Recommended: Economics 1A-1B

Depth Subject Matter: 44-46

Core program: 12


Field (2) Policy Interpretation (public/pre-law): Political Science 119, 150, 151, 152, 153, 155

Field (3) State & Local Policy: Political Science 100, 102, 104; Environmental Science and Policy 173; Sociology 143A

Field (4) Foreign Policy: Political Science 122, 130, 131, 132, 134, 139

Field (5) Environmental Policy: Political Science 107; Environmental Science and Policy 160, 161, 162, 166, 168A, 168B, 169, 171, 173, 179

Field (6) Economic Policy: Economics 100, 130, 131, 151A, 151B

Field (7) Social Policy: Sociology 104, 124, 141, 150, 151, 154, 155, 175, 181

Field (8) Policy Analysis Tools: Economics 102, 140; Political Science 114

Total Units for the Major: 64-66

Major Advisers. Consult Department office.

Minor Program Requirements: Students electing a minor in Political Science may choose one of two plans.

UNITS

Political Science: 24

Six upper division courses: Three courses in one of the fields of concentration and three courses outside of that field.

Public Affairs Internship Program. This program is open to upper division students in any major who want to obtain an internship in the area of government and public service. Information and applications are available from the Political Science Department in 1273 Social Sciences and Humanities Building.

Graduate Study. The Department of Political Science offers a program of graduate study and research leading to a Ph.D. degree or an M.A./J.D. joint degree. The M.A./J.D. joint degree is offered only in conjunction with UC Davis School of Law. Information concerning admission to these programs and requirements for completion are available in the Graduate Program Coordinator office.

Graduate Adviser. Consult Graduate Program Coordinator office.

American History and Institutions. This University requirement may be satisfied by passing any one of the following Political Science courses: 1, 5, 100, 102, 104, 105, 106, 108, 109, 113, 130, 131, 160, 163; see also under University requirements.

Courses in Political Science (POL) Lower Division

1. American National Government (4)

Lecture—3 hours; discussion—1 hour. Survey of American national government, including the constitutional system, political culture, parties, elections, the presidency, Congress, and the courts. GE credit: SocSci, Wrt | ACGH, SS, WE.